MiCOM P220/P225

Motor Protection Relays

P220 Version V10B

P225 Version V10B

Technical Data Sheet

P22x/EN TDS/B44

This Document Should be Read Alongside the Technical Manual

MiCOM P220 and P225

MOTOR PROTECTION RELAY
MOTOR AND OVERCURRENT PROTECTION RELAY

The MiCOM P22x protection relay range is designed for motor protection applications. A complete set of protection functions is performed on the measurement of current, voltage* and temperature. In addition to these basic functions, the relay carries out a large number of other functions that enable it to protect and run the motor more effectively.

The reliability of the system is further enhanced via checks on bus voltage prior to start-up* during reacceleration, supervision of trip-circuit wiring continuity and protection against circuit-breaker failure.

The MiCOM P22x protection relay range is particularly adapted to Oil refinery, chemical plant, metallurgy, glass and cement manufacturing, paper mills, electrical and mechanical engineering, food production, mining etc. It is also suitable for water treatment and in pumping stations as well as in steam power plants.

On top of that high inertia loads and anti-backspin protection ensures that the rotor stops before the motor can be re-started.

For motors whose current supply contains a considerable degree of distortion, the relay provides a true RMS base thermal image allowing efficient protection against overload phenomena due to the presence of harmonic components.

The addition of power measurement* and energy metering*, and the presence of analogue outputs (current loop) make the MiCOM P22x protection relay range a highly competitive and effective equipment in terms of protection.

** on some models only*

Customer Benefits

- Provide comprehensive protection functions for a wide range of applications.
- Optimize the installation cost.
- Improve monitoring conditions.
- Reduce the need of documents and trainings.
- Save time on day-to-day use.

APPLICATION

The MiCOM P22x protection relay range performs and offers numerous functions in a compact design:

- > Protection
- > Monitoring
- > Diagnosis
- > Fault analysis tools
- > Aid to maintenance

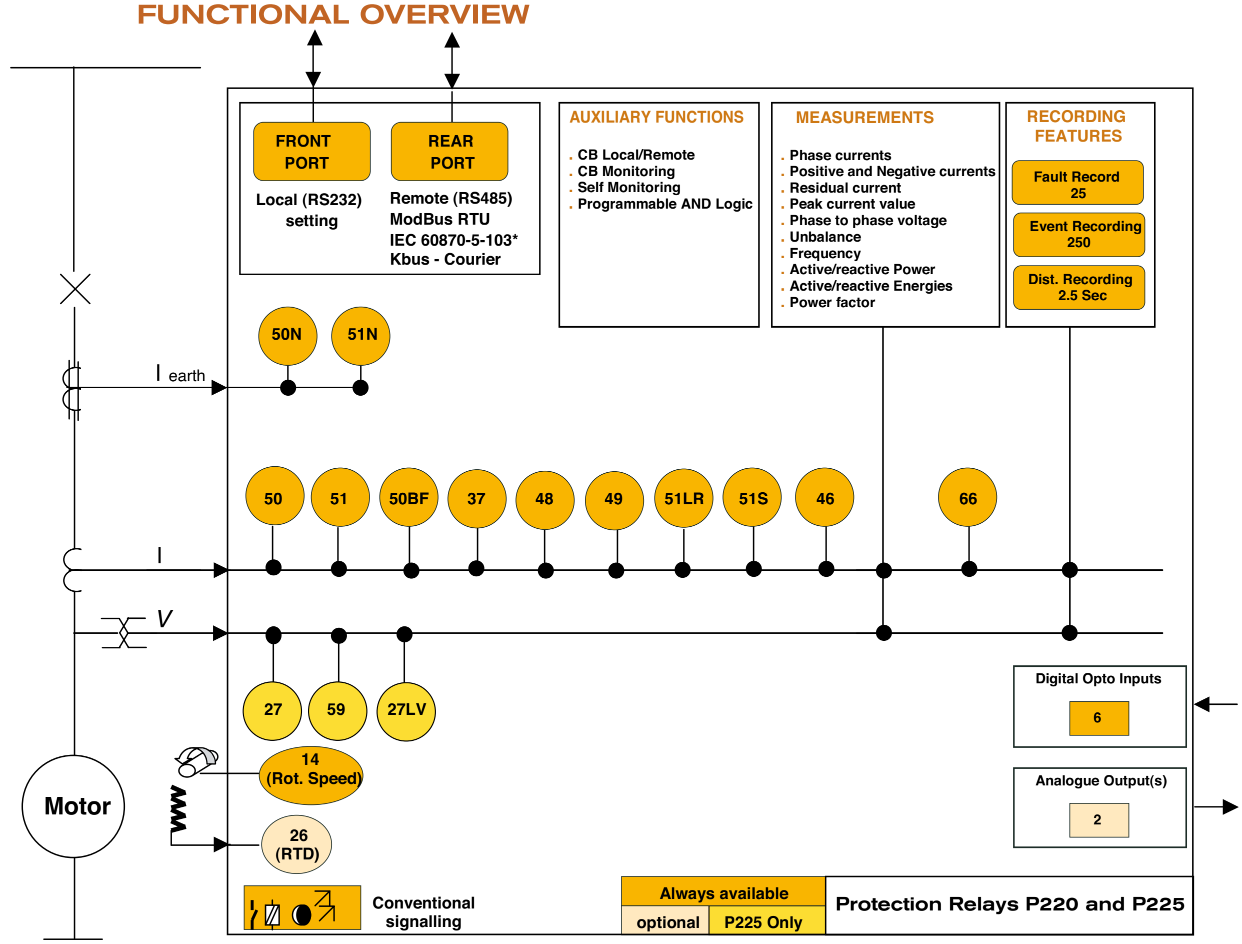
Compact and «Plug and play» made, the P22x protection relay range supply essential functions for industry applications, where the following requirements must be achieved:

- > Small and medium motors
- > High inertia
- > Compact case model
- > Easy to use
- > Universal auxiliary supply
- > Low cost

MAIN FUNCTIONS

Protection functions are autonomous and can be individually configured or disabled to suit a particular application.

FUNCTIONAL OVERVIEW



PROTECTION FUNCTIONS

ANSI	Features	P220	P225
50/51	Three-Phase Overcurrent	•	•
50N/51N	Earth fault	•	•
50BF	Break Failure	•	•
66	Number of starts limitation	•	•
37	Loss of load/Underpower	•	•
46	Negative Sequence Overcurrent	•	•
49	Thermal Overload	•	•
27/27LV/59	Undervoltage/Overvoltage		•
86	Latching of output relay	•	•
48/51LR	Start/Stalled protection/Motor Re-acceleration	•	•
	Undervoltage Auto-Restart / Load restoration sequence		•
51S	Locked rotor during start-up	•	•
14	Speed switch input	•	•
26	Optional RTD/Thermistor inputs	6/2	10/3

CONTROL AND MONITORING

Features	P220	P225
Emergency Restart	•	•
Programmade Scheme Logic (4 basic equations)	•	•
CB Control & Monitoring	•	•
Trip Circuit Supervision	•	•
Setting Groups	2	2

MEASUREMENT & RECORDS

Features	P220	P225
Measurements	•	•
Power and Energy Measurements		•
Hours Run	•	•
CB Operations	•	•
Disturbance Records up to number x 2.5 sec (backed-up)	5	5
Fault Records (backed-up)	25	25
Event Logging (backed-up)	250	250

COMMUNICATION

Features	P220	P225
Front port (RS232)	•	•
Rear port (RS485) (*option)	•	•

REAR PORT PROTOCOL

Features	P220	P225
Modbus RTU	•	•
IEC 60870-5-103	•	•
Kbus-Courier	•	•

HARDWARE

Features	P220	P225
Logic inputs (*option)	6	6
Outputs relays	6	6
1/5 dual rated AC Current inputs(*settable)	4	4
57….130 or 220…480 V AC Voltage inputs (optional)		1

PROTECTION FUNCTIONS

> Three-Phase Overcurrent (50/51)

Three independent stages are available in P220/P225 for phase fault protection. For the first and second stage the user may independently select definite time delay (DTOC) or inverse time delay (IDMT) with different type of curves (IEC, IEEE/ANSI, RI). The third stage is definite time only. Each stage and related time delay can be programmed to provide maximum selectivity. The IDMT stages have reset definite or IDMT timer to reduce clearance times when intermittent faults occur.

> Earth fault (50N/51N)

Two elements are available. Each threshold has instantaneous and delayed signal at its disposal. The adjustment range for earth current threshold varies from 0.002 to 1 Ien, allowing maximum sensitivity for earth fault detection. The relay's earth current input can be wired to a core balanced CT or to the summation of the three-phase CTs.

> CB failure (50BF)

The CB failure on fault will be detected very quickly by the P220/P225 relays, which will then either send a new local tripping signal or act directly on the immediately upstream CB.

By speeding up the time taken to clear the fault in the case of CB failure, the P220/P225 relays help maintain the stability of the network and the reliability of the protection system.

> Limitation of the number of starts, time between starts (66)

The number of motor start-ups can be limited. The P22x relay can discriminate between a warm and a cold motor, making it possible to optimise the number of start-ups allocated to a particular motor over a given period of time. Setting a minimum delay between two start-ups avoids exposing the motor and its start-up system to over-large resultant stresses.

> Loss of load (37)

Loss of load, caused by shaft rupture or the unpriming of a pump, is detected by a timed minimum phase under current threshold.
This function can be deactivated during the start-up phase so that the motor can gradually increase its load.

> Unbalance, loss of phase and single phasing (46)

Two overcurrent elements based on the negative sequence component of current are available. One is associated with an IDMT characteristic, while the other has a definite time characteristic. The two elements make it possible to differentiate between a short or low amplitude unbalance and a more marked phenomenon such as loss of phase or single phasing.

> Thermal overload (49) - True RMS base

The thermal image of the MiCOM P22x relay allows for simultaneous protection of the rotor and stator windings of the motor, whatever the operating conditions of the machine, under and overload operating conditions, during start-up, with rotor locked or with the motor off.

Classic I^2t thermal images afford protection to stator windings but do not take account of overheating in the rotor during a current unbalance. Similarly, the presence of harmonic current components causes additional overheating of the stator windings. In order to take this overheating properly into account, the P22x relay separates the negative sequence current and reconstitutes it with the true RMS value of the stator currents absorbed by the motor. The result is better protection against overloads and hence a marked decrease in the risk of motor damage.
An alarm threshold, tripping threshold and thermal threshold, beyond which the motor cannot be re-started, are available.

As an option, RTDs can be connected to the MiCOM P220/P225 relays to monitor the motor's temperature. For each of the RTD channels, two temperature thresholds with individual time-delay settings are available. It is therefore possible to monitor stator windings separately, as well as the spin bearings of the motor and the load involved. If the motor is equipped with thermistors, the P220/P225 relays monitor temperature via its two/three thermistor inputs.

Rapide and selective clearance of motor faults

> Undervoltage (27) / Overvoltage (59) / Re-acceleration authorisation (27 LV)) / Auto Restart

If supply voltage drops or the supply is lost completely, a phase-to-phase under voltage threshold causes the motor to stop. This function on P225 relays can be selectively put into or out of operation during the motor start-up phase. An over-voltage threshold (P225 only) protects against over-voltage and also give warning of ageing insulators.

The relays can detect voltage sag via the voltage input (P225 only) or by using an external U/V device and a logical input of the relay (P220/P225). Depending on the duration of the voltage sag, the P220/P225 relays can authorise a re-acceleration of the motor when voltage is restored or, on the other hand, stop the motor to allow the motors most critical to the process to re-accelerate.
P225 relay can also auto re-start the motor if the voltage is restored within a set time after it has been stopped due to voltage sag condition or a sequential re-start to be programmed to allow load restoration in a controlled manner.

> Latching of output relays (86)

The trip order can be maintained to avoid the risk of re-starting on an electrical, mechanical or thermal fault.

> Excessive start time (48) / Locked rotor while running or at start-up (51LR)

Whether the motor is unloaded or coupled to a heavy load, this function monitors the duration of the motor start-up phase.

The choice of the motor's start-up detection criteria makes it possible to use this function, whatever the motor's start-up mode: eg, direct-on-line, star-delta, auto-transformer, resistor insertion, etc.
During normal motor operation, an overcurrent threshold detects rotor stalling.

> Locked rotor while running or at start-up (51S)

During motor start-up, a locked rotor is detected with the help of a speed switch input on P220/P225 relays.

> Anti-backspin

If a motor with a high inertia load, for example a fan, is stopped, the shaft continues to rotate for some time before the rotor stops completely. If the motor is switched back on while the rotor is still turning, a condition akin to a false coupling may occur, causing mechanical damage such as broken fan blades. The risk of such problems can be eliminated by setting a minimum time-lapse between stopping the motor and re-starting it.

> Presence of bus voltage prior to start-up

Prior to starting the motor, the P225 relay check that voltage levels are sufficiently high before authorising the start-up sequence.

> Emergency start-up

When required by safety conditions or by the process, a logical input of the P22x relay can be used to allow motor start-up. All start-up restrictions will then be inhibited and the thermal image function will be disabled.

Wide range of features to provide complete protection for all types of application

CONTROL FUNCTIONS

> Independent protection setting groups

By virtue of its two setting groups, the MiCOM P22x relay allows for the protection of dual-speed motors as well as motors operating under environmental or operational conditions, which are not constant over time. A change of setting group can be useful following a change in source impedance. The result is improved selectivity.

> Programmable scheme logic (4 basic equations)

MiCOM P22x can achieve up to 4 AND logical gates linked to time delays, by combining internal and external information with the protection relay. The user can also create OR gates by individually programming each output relay. The logical gates help make economies on external relaying and make the relay interactive with the process.

> Trip circuit supervision

Supervision of wiring continuity in the trip circuit makes the system more reliable. The relay can detect a break in the circuit, whether the CB is on or off.

> CB monitoring

Preventive CB maintenance is provided by monitoring summated contact breaking duty, the number of switching operations and the opening time. If a pre-set threshold is exceeded, the P220/P225 relay will generate an alarm signal.

> External trips

The P22x relay accepts external binary signals, which can be used to give a trip or alarm signal, or which may simply be treated as binary information to be passed on through the relay to a remote control system.

> Shape of start-up current and voltage

The MiCOM P22x relay records the envelope of both start-up current and voltage signals with a resolution of one sample for every 5 periods. This recording can be uploaded to a PC via the communication network or via the RS232 port on the front plate.

It is very helpful to be able to visualise these curves during commissioning and this function of the MiCOM P22x avoids the need for a plotter.

> Analogue outputs

Two optional analogue outputs are available (P220/P225). Some information and measurements such as power (P225), energy (P225) and temperature values, etc., can be fed through a current loop to a PLC.

> Trip cause statistics

The MiCOM P22x relay provides the user with trip statistics for every protection function. The user can thus keep track of the number of trips, which have taken place as well as their origin.

MEASUREMENTS AND RECORDING FACILITIES

> Measurements

The MiCOM P22x relay constantly measures a large amount of electrical data, such as:

- Phase current magnitude in true RMS value: IA, IB, IC
- Neutral current magnitude in true RMS value: IN
- Positive sequence current I1
- Negative sequence current I2
- Zero sequence current Io
- Unbalance ratio I1/I2
- Frequency
- Peak current value
- Phase-to-phase voltage in true RMS value*
- Active and reactive power W and VAR*
- Active and reactive energies Wh and VARh*
- Power factor*

To provide the user with more accurate information on the motor's status and availability, the P22x relay keeps track of:

- Thermal status of the motor
- Load value as a % of full load current
- Time to thermal trip
- Temperature of each RTD*
- Hottest RTD*
- Authorised start number
- Time before another start-up authorisation
- Last start current magnitude
- Last start time value
- Number of starts and emergency starts
- Total motor running hours

> Event records

The last 250 status changes are recorded in a non-volatile memory. This covers all status changes to logic inputs and outputs, modifications to one or more parameters, alarm signals or the operation of one of the output contacts. Events are logged every 1 ms.

> Fault records

The P22x relay records the last 25 faults. The information provided in the fault record includes:

- Fault number
- Date and time
- Active setting group
- Faulty phase or phases
- Function that gave the trip
- Magnitude of the value that gave rise to the trip command
- Values of the phases and earth currents and voltage*.

> Disturbance records

5 disturbance records, of 2.5 seconds each, can be stored,. Disturbance record can be uploaded via the communication network (RS485) or locally (RS232).

** available on some models.*

USER INTERFACE

> Front plate and menus

All the relay's parameters, ie., protection functions, logic controls, communication, LEDs, inputs and outputs, can be programmed and modified by push-buttons located on the front panel.

An alphanumeric, highlighted, 32-character LCD screen displays all the relay's data (settings, measurements, etc.).

The menus are designed so that the user can move around them easily, without confusion. The user will soon be at ease with the Human-Machine Interface.

> Dedicated and programmable LEDs

4 LEDs show the relay's status (Trip, Alarm, Equipment fault and Healthy). MiCOM P22x relay offers free programming of 4 LEDs. Each LED can be assigned to one or more functions or logic states and then limit the need for external signal lights. Each LED can also be assigned to to any one of the 6 logical inputs as well as the internal Auto Re-start signal.

> Local and remote communication

The MiCOM P220/P225 relays are equipped with a RS485 port on its rear plate, which enables them to communicate via MODBUS™, Courier* or IEC 60870-5-103. It is thus possible to transmit adjustment values, measurement data, alarm signals and all other recordings to the Substation Control System or to a SCADA. Communication parameters can be adjusted by the operator via the user interface. Communication failure does not affect MiCOM relays' protective functions.

** available on some models*

Designed to secure industrial processes

1. PROTECTION FUNCTIONS

1.1 Thermal replica

Thermal current threshold Iθ>	0,2 to 1,5 In by steps of 0,01 In
Overload time-constant T_{e1}	1 to 180 min by steps of 1min
Start-up time-constant T_{e2}	1 to 360 min by steps of 1min
Cooling time-constant T_r	1 to 999 min by steps of 1min
Negative sequence current recognition factor K_e	0 to 10 by steps of 1
Trip thermal threshold	Set to 100%
Thermal alarm threshold	20 to 100% by steps of 1%
Thermal trip & alarm thresholds hysteresis	97%
Start-up inhibition	20 to 100% by steps of 1%

1.2 Short-circuit protection

Current threshold I>	0.1 to 25 In by steps of 0.05 In
Time delay tI>	0 to 150 s by steps of 0,01 s or IDMT
Current threshold I>>	0.5 to 40 In by steps of 0,05 In
Time delay tI>>	0 to 150 s by steps of 0,01 s or IDMT
Current Time delay tI>>>	0 to 150s by steps of 0,01 s
threshold I>>>	0.5 to 40 In by steps of 0.05 In
Operating time	< 40 ms
Drop-off time	< 30 ms
Hysteresis	95 %

1.3 Too long start-up protection

Start-up detection criteria	(closing 52) or (closing 52 + current threshold) optional
Current threshold I_{UTIL}	0.5 to 5 In by steps of 0.01 In
Time-delay tI_{start}	1 to 200 s by steps of 1 s

1.4 Locked rotor protection

Current threshold I_{stall}	0.5 to 5 In by steps of 0.01 In
Hysteresis	95%
Time-delay tI_{stall}	0,1 to 60 s by steps of 0,1 s
Locked rotor at start-up detection	Yes/No

1.5 Unbalance protection

Negative sequence current threshold I2>	0,04 to 0,8 In by steps of 0,01 In
Time-delay tI2>	0 to 200 s by steps of 0,01 s
Negative sequence current threshold I2>>	0,04 to 0,8 In by steps of 0,01 In
IDMT time-delay	$t = TMS \times 1,2/(I_2/In)$
Time Multiplier setting TMS I2>>	0,2 to 2 by steps of 0,001

Hysteresis	95%

1.6 Earth fault protection

Current threshold Io>, Io>>	0,002 to 1 Ion by steps of 0,001 Ion
Time-delays tIo>, tIo>>	0 to 100 s by steps of 0,01 s
Operating time	< 40 ms
Drop-off time	< 30 ms
Hysteresis	95%

1.7 Under current protection

Current threshold I<	0,1 to 1 In by steps of 0,01 In
Time-delay tI<	0,2 to 100 s by steps of 0,1 s
Inhibition time at start-up T_{inhib}	0,05 to 300 s by steps of 0,1 s
Hysteresis	105%

1.8 Undervoltage protection (P225 only)

Voltage threshold V<	Range A Range B	5 to 130 V by steps of 0,1 V 20 to 480 V by steps of 0,5 V
Time-delay tV<		0 to 600 s by steps of 0,01 s
V< inhibition during start-up		Yes/No
Hysteresis		105 %

1.9 Overvoltage protection (P225 only)

Voltage threshold V>	Range A Range B	5 to 260 V by steps of 0,1 V 20 to 960 V by steps of 0,5 V
Time-delay tV>		0 to 600 s by steps of 0,01 s
Hysteresis		95 %

2. AUTOMATION FUNCTIONS

2.1 Limitation of the number of start-ups

Reference period $T_{reference}$	10 to 120 min by steps of 5 min
Number of cold starts	1 to 5 by steps of 1
Number of hot starts	0 to 5 by steps of 1
Restart inhibition time $T_{forbiden}$	1 to 120 min by steps of 1 min

2.2 Time between 2 start-ups

Inhibition time $T_{betw\ 2\ start}$	1 to 120 min by steps of 1 min

2.3 Anti-backspin protection

Restart prevention time tABS	1 to 7200 s by steps of 1 s

2.4 Re-acceleration authorisation (P225 only)

Voltage dip detection	Range A Range B	37 to 98 V by steps of 0.2 V 143 to 360 V by steps of 0.2 V
Voltage restoration detection	Range A Range B	45 to 117 V by steps of 0.2 V 176 to 32 V by steps of 0.2 V
Voltage collapse duration T_{reacc}		0.1 to 5 s by steps of 0,01 s
Auto Re-Start delay $t_{reacc\ long}$		OFF to 60 s by steps of 1 s
Auto Re-Start restoration delay $t_{reacc\ shed}$		OFF to 99 min by steps of 1 min

2.5 Presence of bus voltage prior to start-up (P225 only)

Voltage threshold	Range A Range B	5 to 130 V by steps of 0,1 V 20 to 480 V by steps of 0,5 V
Hysteresis		105 %

2.6 CB failure

Current threshold I< BF	10 to 100% In by steps of 10% In
Time-delay tBF	0,03 to 10 s by steps of 0,01 s

2.7 Trip circuit supervision

Time-delay tSUP	0,1 to 10 s by steps of 0,01 s

2.8 Auxiliary timers

Logic inputs with alarm message on occurrence	2 external signals, EXT1 and EXT2
Logic inputs without alarm message on occurrence	2 external signals, EXT3 and EXT4
Timers tEXT1, tEXT2, tEXT3 and tEXT4	0 to 200 s by steps of 0,01s

2.9 AND logical gates

4 «AND» gates	
Pick-up time delays	0 to 3600 s by steps of 0,1 s
Reset time delays	0 to 3600 s by steps of 0,1 s

2.10 Latching of output relays

Trip relay (RL1)	Configurable for each trip order
Auxiliary relays (RL2, RL3, RL4 and RL5)	Configurable for each auxiliary relay

2.11 CB control and monitoring

Close command hold	0,2 to 5 s by steps of 0,05 s
Open command hold	0,2 to 5 s by steps of 0,05 s
Number of operations alarm	0 to 50 000 operations by steps of 1
Summated contact breaking duty	10^6 to 4 000.10^6 by steps of 10^6
Adjustment of the exponent «n»	1 or 2
Opening time alarm	0,05 to 1 s by steps of 0,05 s

3. OPTIONAL FUNCTIONS

3.1 Optional 2 analogue outputs

Rating	0-20 mA, 4-20 mA
Insulation	2 kV
Maximum load with active source mode	500 Ω for ratings 0-20 mA, 4-20 mA
Maximum voltage with passive source mode	24 Volt
Accuracy	± 1% at full scale

3.2 Optional 6 or 10 RTD inputs

RTD type	Pt100, Ni100, Ni120, Cu10
Connection type	3 wires + 1 shielding
Maximum load	25 Ω (Pt100, Ni100, Ni120) 2,5 Ω (Cu10)
Insulation	2 kV, active source mode
Thresholds	0 to 200 °C by steps of 1 °C
Time delays	0 to 100 s by steps of 0,1 s
Thermal image influence	Yes/No

3.3 Optional 2 or 3 thermistor inputs

Thermistor type	PTC or NTC
Maximum load	100 Ω
Thresholds	100 to 30 000 Ω by step of 100 Ω
Time-delays	Set to 2 seconds

4. RECORDING FUNCTIONS

4.1 Event recorder

Capacity	250 events
Time-tag	to 1 millisecond
Triggers	Any protection alarm & threshold Any logic input change of state Self test events Any setting change

4.2 Fault recorder

Capacity	25 records
Time-tag	to 1 millisecond
Triggers	Any trip order (RL1 operation)
Data	Fault number Fault date & hour Active setting group Faulty phase(s) Fault type, protection threshold Fault current/voltage magnitude Phases and earth current magnitudes Line to line voltage magnitude

4.3 Oscillography

Capacity	5 records
Duration of each record	2,5 s
Sampling rate	32 samples per frequency cycle
Pre-time setting	0,1 to 2,5 s by steps of 0,1 s
Post-time setting	0,1 to 2,5 s by steps of 0,1 s
Triggers	Any protection threshold overreach or any trip order (RL1 relay operation) logic input Remote command
Data	4 analogue current channels (3ϕ + N) 1 analogue voltage channel Logic input and output states Frequency value

4.4 Start-up current and voltage envelope record

Capacity		1 record
Maximum duration		200 s
Sampling rate		1 sample each 5 frequency cycles
Data	Current	True RMS value, maximum value of one of the 3 phase currents
	Voltage (P225 only)	True RMS value

5. COMMUNICATION

5.1 MODBUS™ communication

Mode	RTU (standard)
Transmission mode	Synchronous
Interface	RS 485, 2 wires + shielding
Data rate	300 to 38 400 bauds (programmable)
Relay address	1 to 255
Parity	Settable
Date format	IEC format or Private format
Connection	Multi-point (32 connections)
Cable	Half-duplex (screened twisted wire pair)
Maximum cable length	1000 meters
Connector	Connector screws or snap-on
Insulation	2 kV RMS

5.2 K-bus/Courier communication

Transmission mode	Synchronous
Interface	K-bus/RS485, 2 wires + shielding
Data rate	64000 bauds
Relay address	1 to 254
Connection	Multi-point (32 connections)
Cable	Half-duplex (screened twisted wire pair)
Maximum cable length	1000 meters
Connector	Connector screws or snap-on
Insulation	2 kV RMS

5.3 IEC 60870-5-103 communication

Transmission mode	Synchronous
Interface	RS 485, 2 wires + shielding
Data rate	9600 to 19200 bauds (programmable)
Relay address	1 to 254
Parity	Even
Connection	Multi-point (32 connections)
Cable	Half-duplex (screened twisted wire pair)
Maximum cable length	1000 meters
Connector	Connector screws or snap-on
Insulation	2 kV RMS

5.4 Front communication

Interface	RS232
Protocol	MODBUS™ RTU
Data rate	19200 bauds
Parity	Without
Stop bit	1
Data bits	8
Connector	Sub-D 9 pin female connector
Cable type	Screened twisted wire cable, no-crossed

6. INPUTS AND OUTPUTS

6.1 Analogue current inputs

Phase currents In		1 and 5 Ampere
Earth current Ion		1 and 5 Ampere
Frequency	Range Nominal	45 to 65 Hz 50/60 Hz
Burdens	Phase current inputs	< 0.3 VA @ In (5A) < 0,025 VA @ In (1A)
	Earth current input	< 0.01 VA @ 0.1Ion (5A) < 0,004 VA @ 0,1 Ion (1A)
Thermal withstand of both phase and earth current inputs		100 In - 1 s 40 In - 2 s 4 In - continuous

6.2 Analogue voltage input (P225 only)

Phase A - Phase C voltage input : Vn		57-130 Volt (range A) 220-480 Volt (range B)
Frequency	Range Nominal	45 to 65 Hz 50/60 Hz
Burden		< 0,1 VA @ Vn
Thermal withstand	Range A	260 V - continuous 300 V - 10 s
	Range B	960 V - continuous 1300 V - 10 s

6.3 Logic inputs

Type	Independent optical isolated
Number	6 (5 programmable, 1 fixed)
Burden	< 10 mA for each input
Recognition time	< 5 ms

6.4 Supply rating

Ordering Code	Relay Auxiliary Power Supply		Logic Inputs				
	Nominal Voltage Range Vx	Operating Voltage Range	Nominal Voltage Range	Minimal Polarisation Voltage	Maximum Polarisation Current	Holding Current After 2 ms	Maximum Continuous Withstand
H	48 - 250 Vdc 48 - 240 Vac	38.4 - 300 Vdc 38.4 - 264 Vac	105-145 Vdc	105 Vdc	3.0 mA @ 129 Vdc		145 Vdc
V	48 - 250 Vdc 48 - 240 Vac	38.4 - 300 Vdc 38.4 - 264 Vac	110 Vdc	77 Vdc	7.3 mA @ 110 Vdc		132 Vdc
W	48 - 250 Vdc 48 - 240 Vac	38.4 - 300 Vdc 38.4 - 264 Vac	220 Vdc	154 Vdc	3.4 mA @ 220 Vdc		262 Vdc
Z	24 - 250 Vdc 24 - 240 Vac	19,2 - 300 Vdc 19.2 - 264 Vac	24 - 250 Vdc 24 - 240 Vac	19,2 Vdc 19,2 Vac	35 mA	2.3 mA	300 Vdc 264 Vac

6.5 Output relay

Contact rating	
Contact relay	Dry contact Ag Ni
Make current	Max. 30A and carrry for 3s
Carry capacity	5A continuous
Rated Voltage	250Vac
Breaking characteristic	
Breaking capacity AC	1500 VA resistive 1500 VA inductive (P.F. = 0.5) 220 Vac, 5A (cos φ = 0.6)
Breaking capacity DC	135 Vdc, 0.3A (L/R = 30 ms) 250 Vdc, 50W resistive or 25W inductive (L/R = 40ms)
Operation time	<7ms
Durability	
Loaded contact	10000 operation minimum
Unloaded contact	100000 operation minimum

7. ACCURACY

Protection thresholds		± 2 %
Time delays		± 2 % with a minimum of 40ms
Measurements	Current	Typical ± 0,2 % @ In
	Voltage	Typical ± 0,2 % @ Vn
	Power	Typical ± 1 % @ Pn
	Temperature	± 2 °C
Pass band for measurements of true RMS values		500Hz

8. CT & VT DATA

Phase CTs primary		1 to 3000 by steps of 1
Earth CT primary		1 to 3000 by steps of 1
Phase CTs secondary		1 or 5
Earth CT secondary		1 or 5
Recommended phase CTs		5P10 - 5VA (typical)
Recommended earth CT		Residual connection or core balanced CT (preferred in isolated neutral systems)
VT primary (P225 only)		1 to 20 000 V by steps of 1 V
VT secondary (P225 only)	Range A	57 to 130 V by steps of 0,1 V
	Range B	220 to 480 V by steps of 1 V

9. INSULATION WITHSTAND

Dielectric withstand	IEC 60255-5: 2000	2 kVrms 1 minute to earth and between independent circuits
	IEEE C39.90: 1989	1.5kV rms AC for 1 minute, (reaffirmed 1994) across normally open contacts
Impulse voltage	IEC 60255-5: 2000	5 kVp Between all terminals & all terminals and case earth
Insulation resistance	IEC 60255-5: 2000	> 1000 MΩ at 500 Vdc

10. ELECTRICAL ENVIRONMENT

High Frequency Disturbance	IEC 60255-22-1:1998	2.5 kV common mode, class 3 1 kV differential mode, class 3
Fast Transient	IEC 60255-22-4:2002	Class A 2 kV 5kHz terminal block comms. 4 kV 2.5kHz all circuits excluding comms.
	EN 61000-4-4:1995 Level 4	2 kV 5kHz all circuits excluding power supply 4 kV 5kHz power supply
Electrostatic Discharge	EN 61000-4-2:1995 & IEC60255-22-2:1996	8 kV contact discharge, class 4 15kV air discharge, class 4
Surge Immunity	EN 61000-4-5:1995 & IEC 60255-22-5:2002	4kV common mode, level 4 2kV differential mode, level 4
Conducted Emissions	EN55022:1998 & IEC 60255-25:2000	0.15 - 0.5MHz, 79dBμV (quasi peak) 66 dBμV (average) 0.5 - 30MHz, 73dBμV (quasi peak) 60 dBμV (average)
Radiated Emissions	EN55022:1998 & IEC 60255-25:2000	30 - 230MHz, 40dBμV/m at 10m measurement distance 230 - 1GHz, 47dBμV/m at 10m measurement distance
Conducted Immunity	EN 61000-4-6:1996 & IEC 60255-22-6:2001	Level 3, 10V rms @ 1kHz 80% am, 150kHz to 80MHz
Radiated Immunity	EN 61000-4-3:2002 & IEC 60255-22-3:2000	Level 3, 10V/m 80MHz to 1GHz @ 1kHz 80% am
Radiated Immunity from Digital Telephones	EN 61000-4-3:2002	Level 4, 30V/m 800MHz to 960MHz and 1.4GHz to 2GHz @ 1kHz 80% am
	ANSI/ IEEE C37.90.2:2004	35V/m 80MHz to 1GHz @ 1kHz 80% am 35V/m 80MHz to 1GHz @ 100% pulse modulated front face only
Magnetic Field Immunity	EN 61000-4-8:1994	Level 5, 100A/m applied continuously, 1000A/m for 3s
	EN 61000-4-9:1993	Level 5, 1000A/m
	EN 61000-4-10:1993	Level 5, 100A/m at 100kHz and 1MHz
ANSI Surge Withstand Capability	IEEE/ ANSI C37.90.1:2002	4kV fast transient and 2.5kV damped oscillatory applied common and transverse mode

11. ENVIRONMENT

Temperature	IEC 60255-6: 1988 IEC 60068-2: 2007	Standard Storage -25°C to +70°C Operation -25°C to + 55°C Extended Storage -25°C to +85°C Operation -40°C to + 85°C Note: Operation at -40°C and +85°C only up to 96 hours. Storage at +85°C only up to 96 hours.
Humidity	IEC 60068-2-78: 2001	56 days at 93% RH and 40 °C
Enclosure Protection	IEC 60-529: 2001	IP 52 Protection (front panel) against dust and dripping water IP 50 Protection for the rear and sides of the case against dust IP 10 Product safety protection for the rear due to live connections on the terminal block
Sinusoidal Vibrations	IEC 60255-21-1:1998	Response and endurance, class 2
Shocks	IEC 60255-21-2:1998	Response and withstand, class 1 & 2
Bump	IEC 60255-21-2:1998	Response and withstand, class 1
Seismic	IEC 60255-21-3:1998	Class 2
Creepage Distances and Clearances	IEC 60255-27: 2005	Pollution degree 2, Overvoltage category III, Impulse test voltage 5 kV
Corrosive Environments	Per IEC 60068-2-60: 1995, Part 2, Test Ke, Method (class) 3	Industrial corrosive environment/poor environmental control, mixed gas flow test 21 days at 75% relative humidity and +30°C Exposure to elevated concentrations of H_2S, NO_2, Cl_2 and SO_2.

12. EU DIRECTIVE

12.1 EMC compliance

CE 89/336/EEC
93/31/EEC

Compliance with European Commission EMC Directive.

Generic standards were used to establish conformity:

EN50081-2: 1994

EN60952-2: 1995

12.2 Product safety

CE 2006/95/EC
(replacing 73/23/EEC from 01/2007)

Compliance with European Commission Low Voltage Directive. Compliance is demonstrated by reference to generic safety standards:

- EN61010-1: 1993/A2: 1995
- EN60950: 1992/A11: 1997

13. IDMT CHARACTERISTIC CURVES

13.1 General

Although the curves tend towards infinite when the current approaches Is (general threshold), the minimum guaranteed value of the operating current for all the curves with the inverse time characteristic is 1.1Is (with a tolerance of ± 0.05Is).

13.1.1 Inverse time curves:

The first and second stage thresholds for phase overcurrent can be selected with an inverse definite minimum time (IDMT) characteristic. The time delay is calculated with a mathematical formula.

In all, there are eleven IDMT characteristics available.

The mathematical formula applicable to the first ten curves is:

$$t = T \times \left(\frac{K}{\left(I / I_S \right)^{\alpha} - 1} + L \right)$$

Where:

t Operation time

K Factor (see table)

I Value of measured current

Is Value of the programmed threshold (pick-up value)

α Factor (see table)

L ANSI/IEEE constant (zero for IEC and RECT curves)

T Time multiplier setting from 0.025 to 1.5

Type of Curve	Standard	K Factor	α Factor	L Factor
Short time inverse	AREVA	0.05	0.04	0
Standard inverse	IEC	0.14	0.02	0
Very inverse	IEC	13.5	1	0
Extremely inverse	IEC	80	2	0
Long time inverse	AREVA	120	1	0
Short time inverse	C02	0.02394	0.02	0.01694
Moderately Inverse	ANSI/IEEE	0.0515	0.02	0.114
Long time inverse	C08	5.95	2	0.18
Very inverse	ANSI/IEEE	19.61	2	0.491
Extremely inverse	ANSI/IEEE	28.2	2	0.1217
Rectifier protection	Rect	45900	5.6	0

The RI curve has the following definition:

$$t = K \cdot \frac{1}{0.339 - \frac{0.236}{\left(I / Is \right)}}$$

K setting is from 0.10 to 10 in steps of 0.05. The equation is valid for 1.1 ≤ I/Is ≤ 20.

13.1.2 Reset timer

The first and second stage thresholds for phase overcurrent protection is provided with a timer hold facility "t Reset".

It may be set to a definite time value or to an inverse definite minimum time characteristic (IEEE/ANSI curves only). This may be useful in certain applications, for example when grading with upstream electromechanical overcurrent relays that have inherent reset time delays.

A possible situation where the reset timer may be used is to reduce fault clearance times where intermittent faults occur.

An example may occur in a cable with plastic insulation. In this application it is possible that the fault energy melts the cable insulation, which then reseals after clearance, thereby eliminating the cause for the fault. This process repeats itself to give a succession of fault current pulses, each of increasing duration with reducing intervals between the pulses, until the fault becomes permanent.

When the reset time of the overcurrent relay is set to minimum the P22x relay will be repeatedly reset and will not be able to trip until the fault becomes permanent. By using the reset timer hold function the relay will integrate the fault current pulses, thereby reducing fault clearance time.

The mathematical formula applicable to the five curves is:

$$t = T \times \left(\frac{K}{1 - \left(I \, / I_S \right)^{\alpha}} \right)$$

Where:

t Reset time

K Factor (see table)

I Value of the measured current

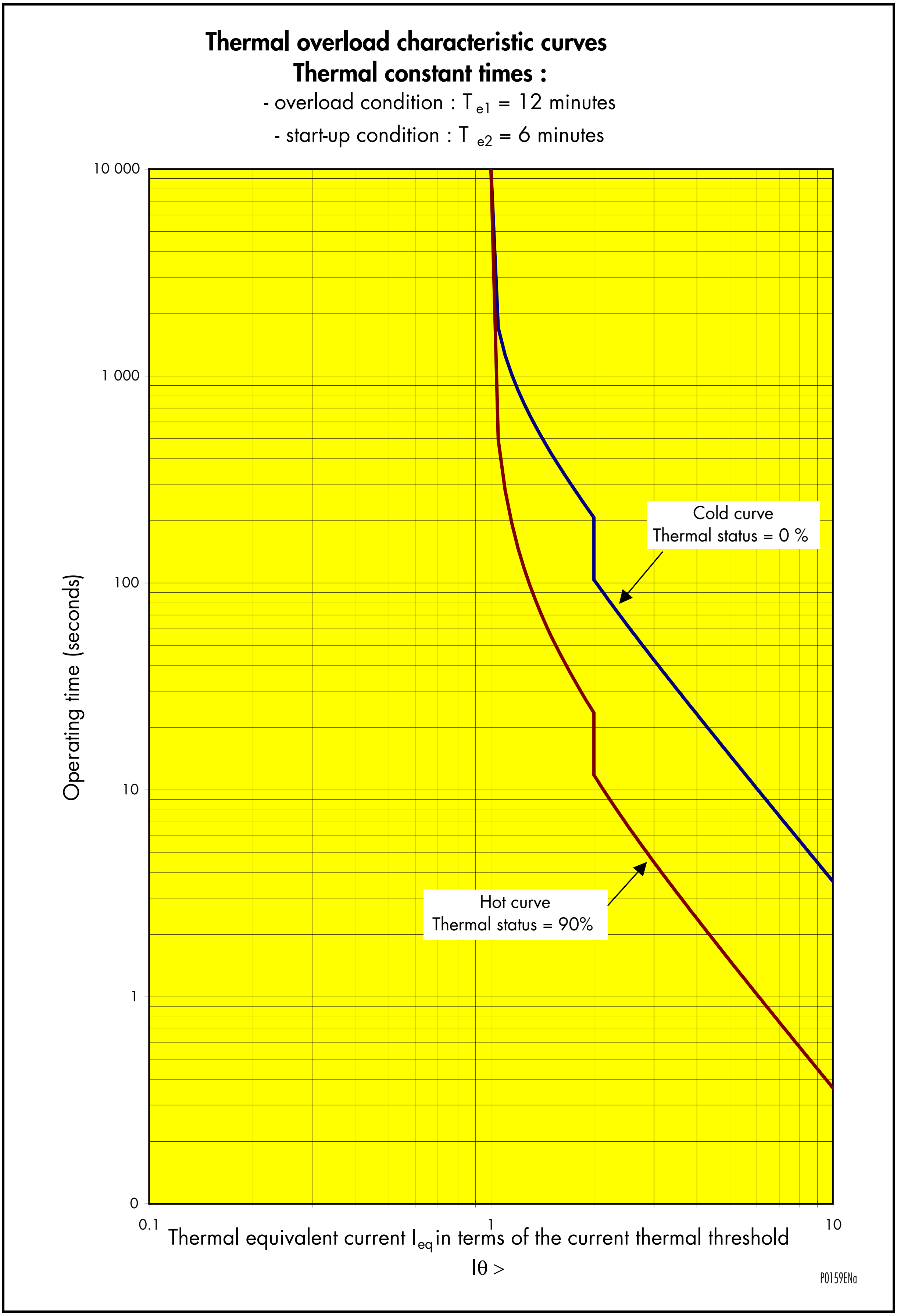
Is Value of the programmed threshold (pick-up value)

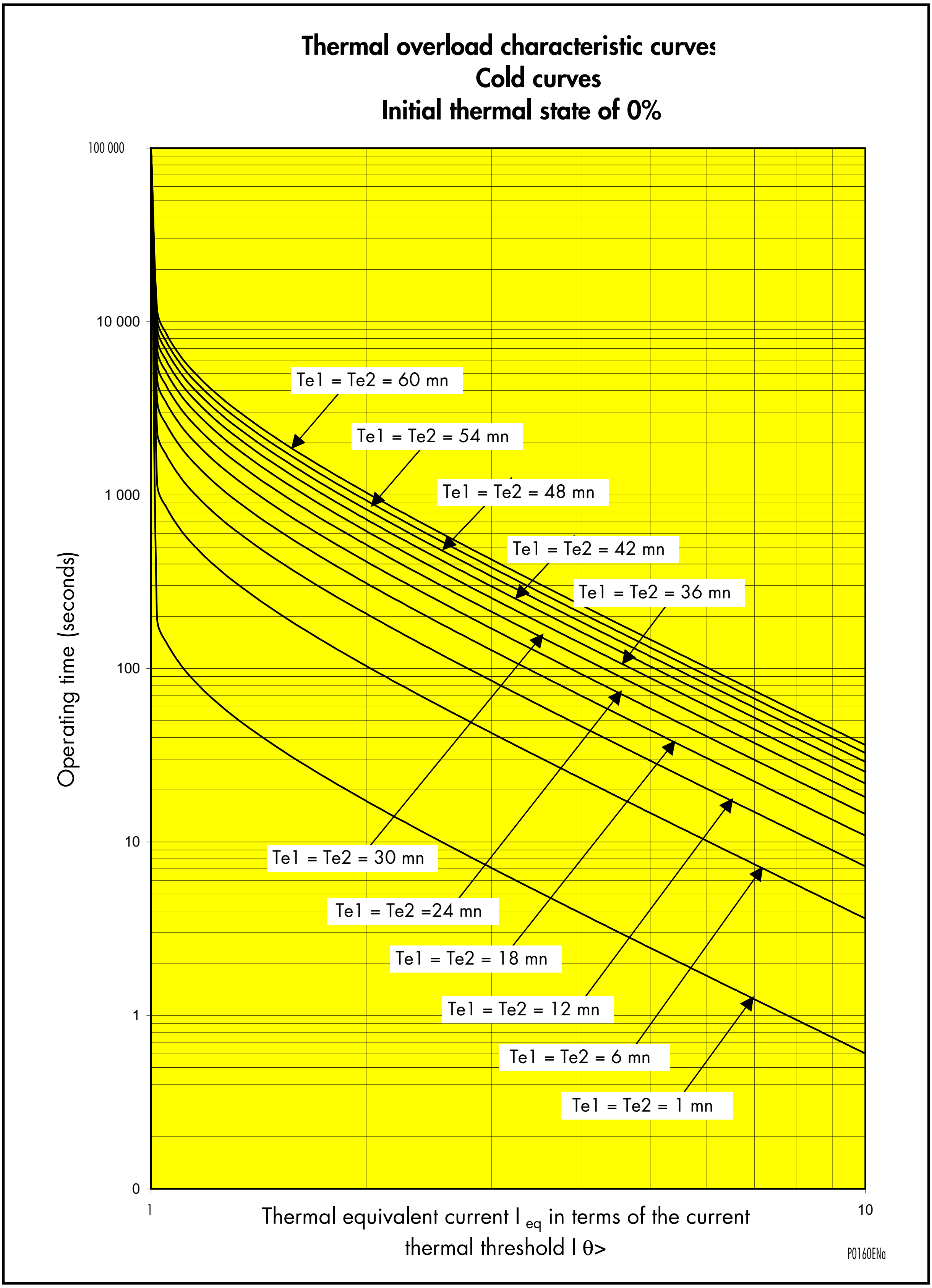
α Factor (see table)

T Reset time multiplier (RTMS) setting between 0.025 and 1.5.

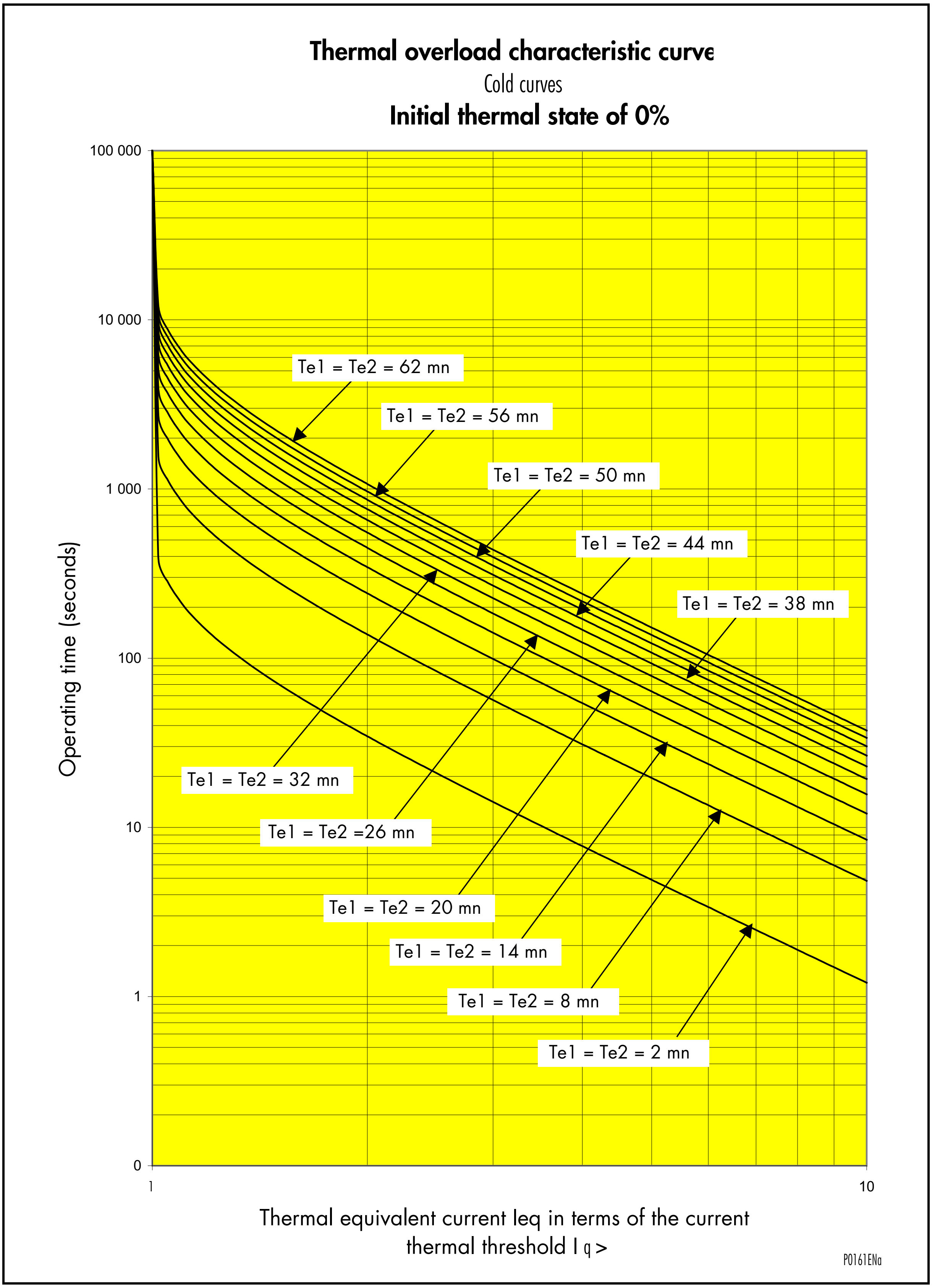
Type of Curve	**Standard**	**K Factor**	**α Factor**
Short time inverse	C02	2.261	2
Moderately inverse	ANSI/IEEE	4.850	2
Long time inverse	C08	5.950	2
Very inverse	ANSI/IEEE	21.600	2
Extremely Inverse	ANSI/IEEE	29.100	2

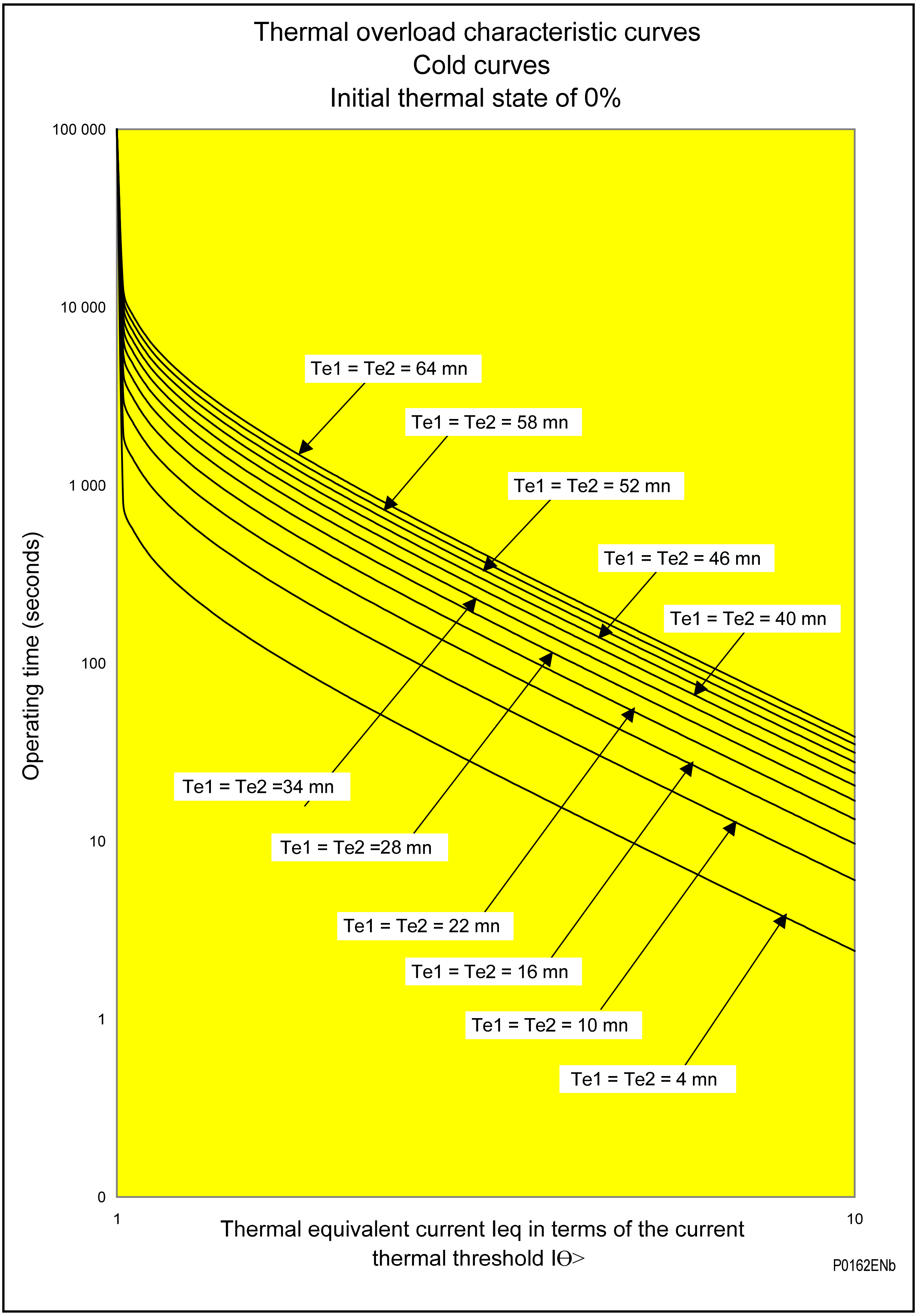
14. THERMAL OVERLOAD CHARACTERISTIC CURVES

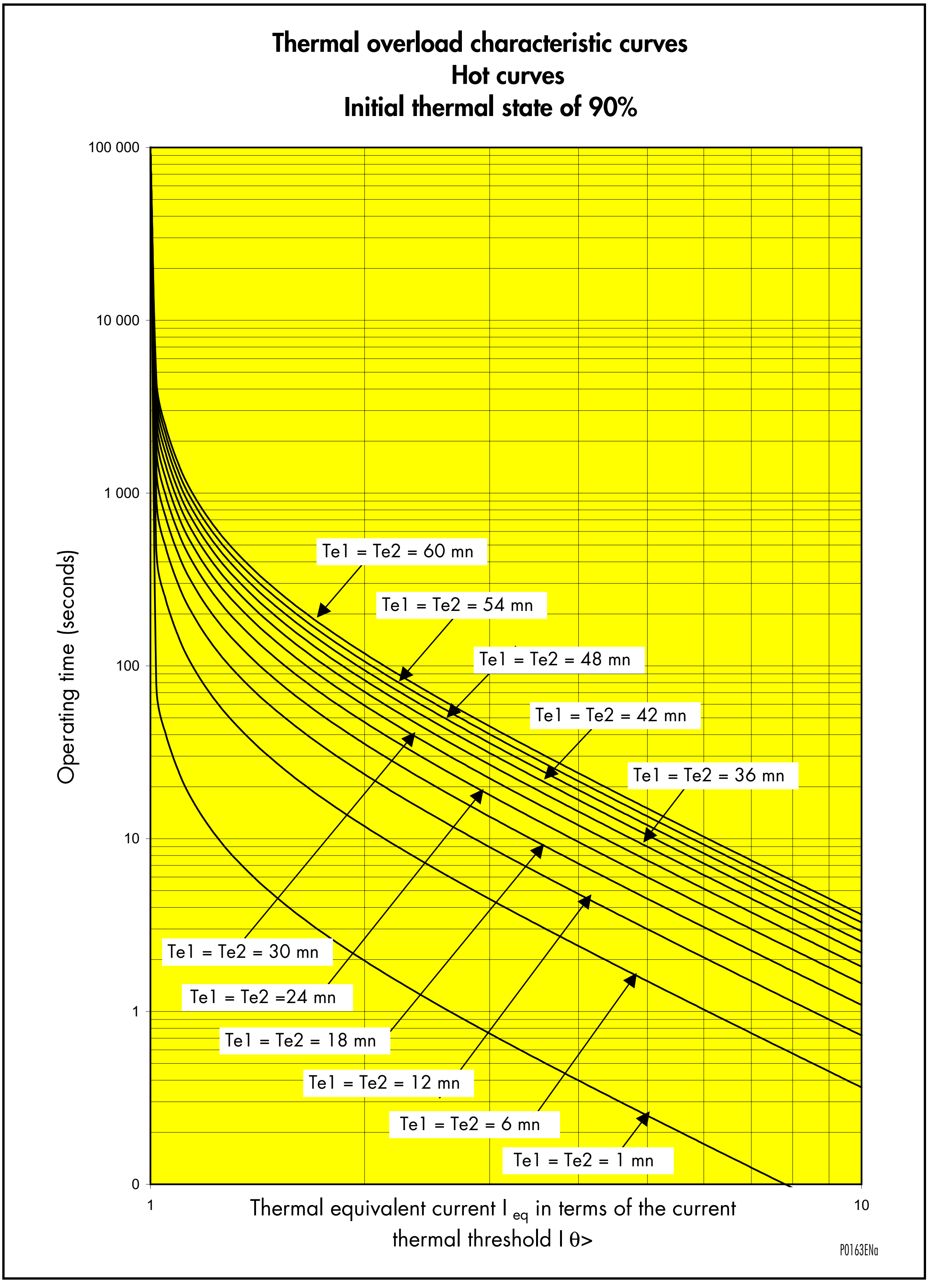


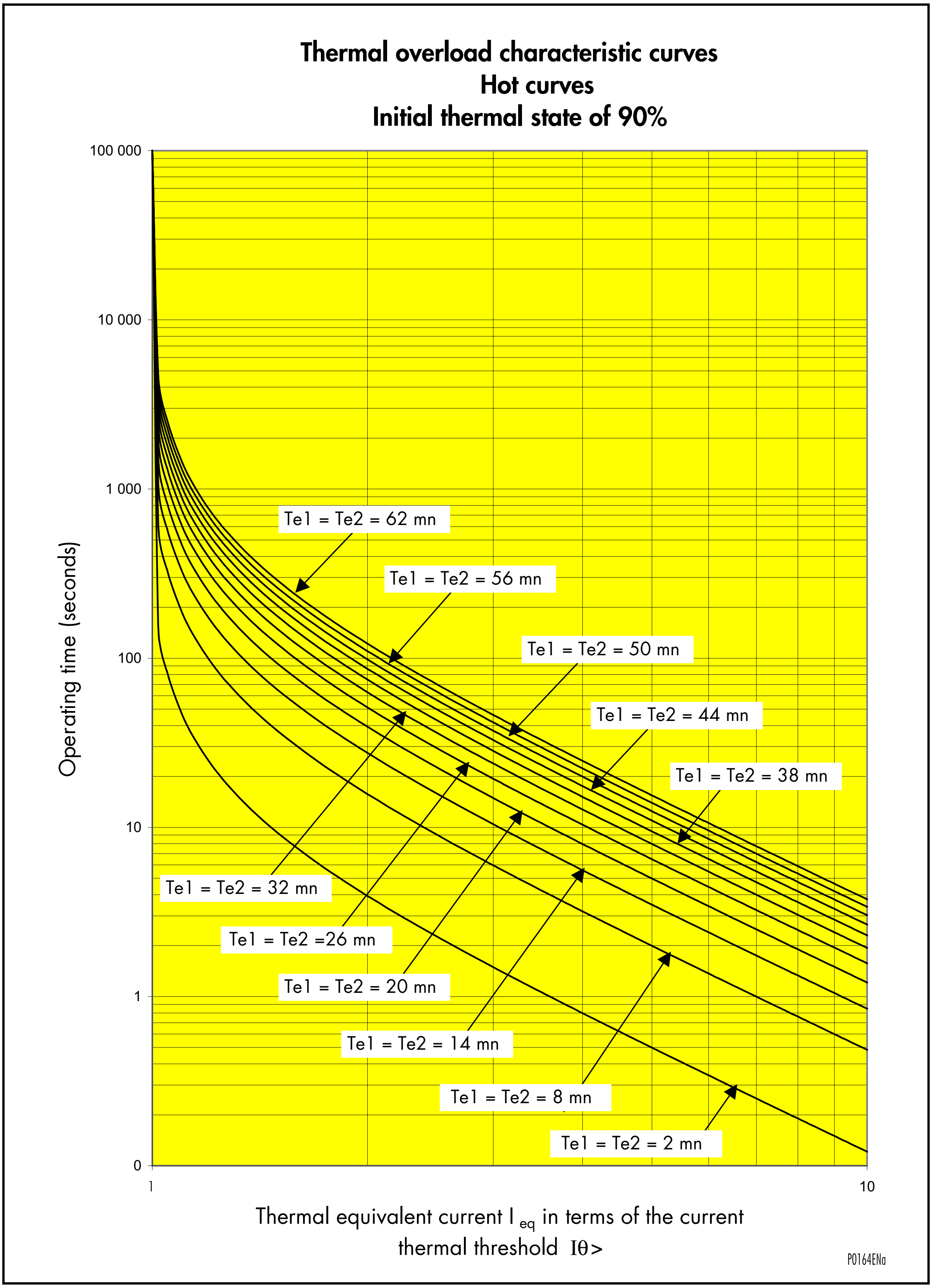


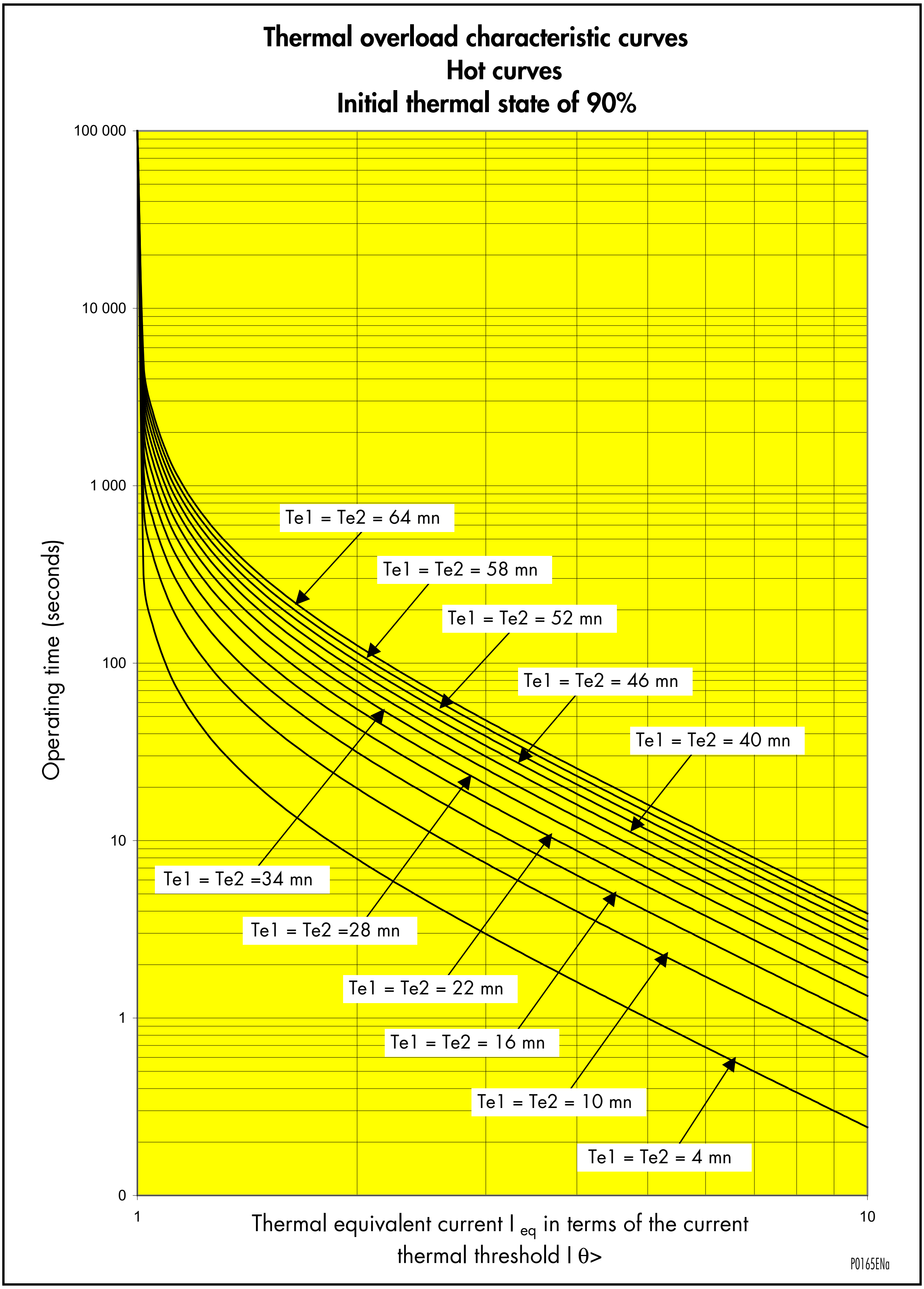
Thermal overload characteristic curves
Cold curves
Initial thermal state of 0%
100 000
10 000
1 000
100
10
1
0
Operating time (seconds)
Te1 = Te2 = 60 mn
Te1 = Te2 = 54 mn
Te1 = Te2 = 48 mn
Te1 = Te2 = 42 mn
Te1 = Te2 = 36 mn
Te1 = Te2 = 30 mn
Te1 = Te2 =24 mn
Te1 = Te2 = 18 mn
Te1 = Te2 = 12 mn
Te1 = Te2 = 6 mn
Te1 = Te2 = 1 mn
1
10
Thermal equivalent current I eq in terms of the current thermal threshold I θ>
P0160ENa

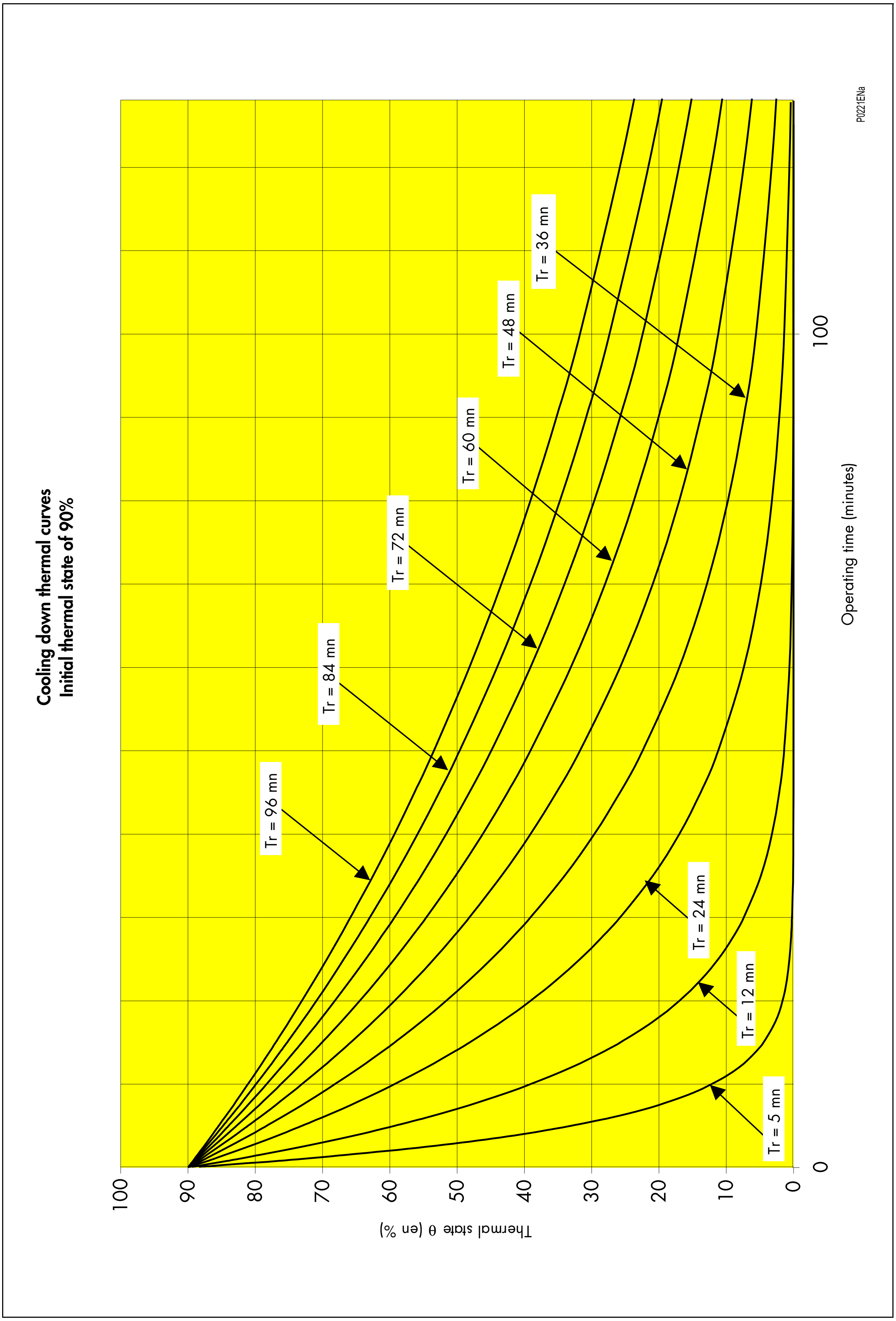

Thermal overload characteristic curve
Cold curves
Initial thermal state of 0%
100 000
10 000
1 000
100
10
1
0
Operating time (seconds)
Te1 = Te2 = 62 mn
Te1 = Te2 = 56 mn
Te1 = Te2 = 50 mn
Te1 = Te2 = 44 mn
Te1 = Te2 = 38 mn
Te1 = Te2 = 32 mn
Te1 = Te2 =26 mn
Te1 = Te2 = 20 mn
Te1 = Te2 = 14 mn
Te1 = Te2 = 8 mn
Te1 = Te2 = 2 mn
1
10
Thermal equivalent current Ieq in terms of the current
thermal threshold I q >
P0161ENa

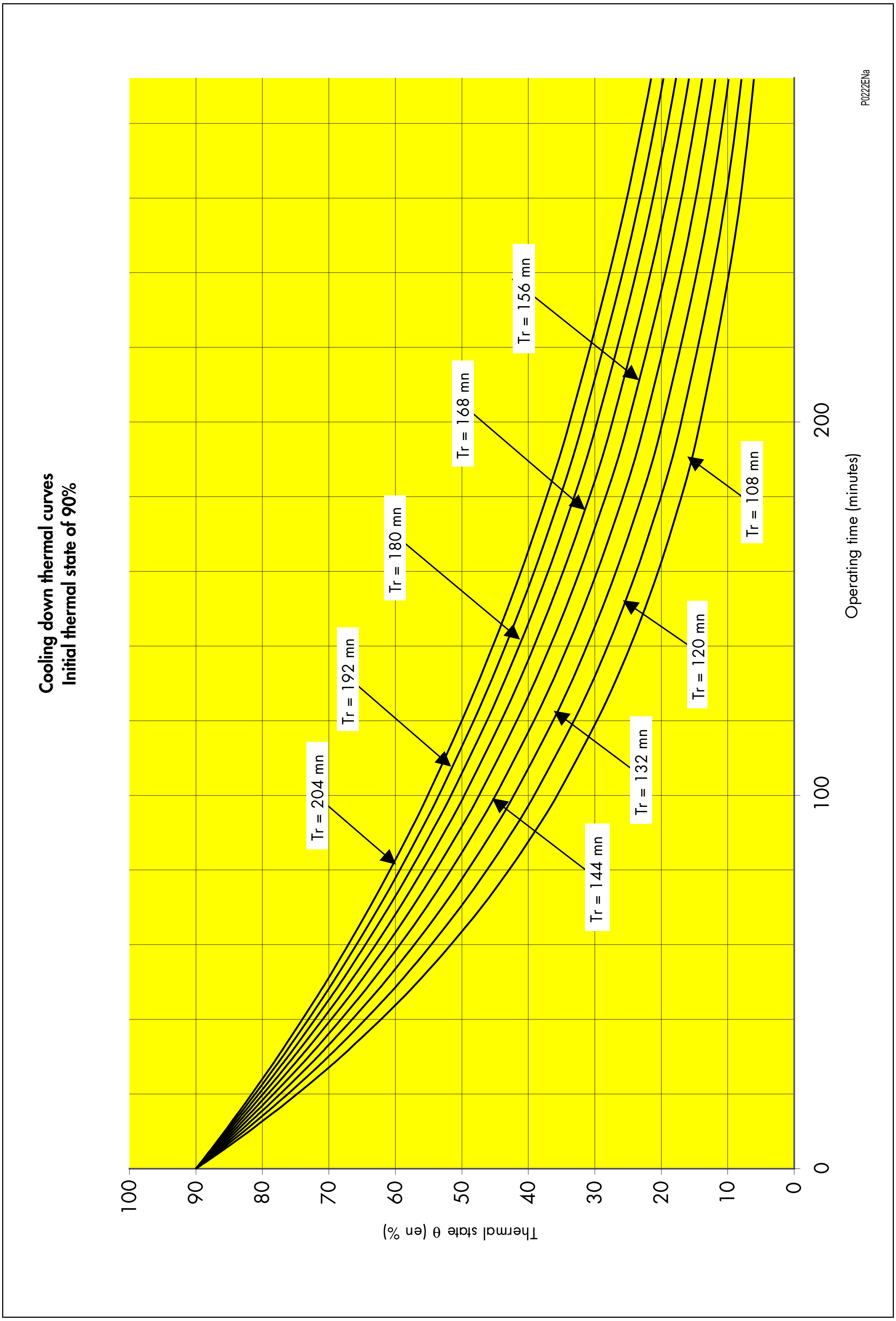

Thermal overload characteristic curves
Cold curves
Initial thermal state of 0%
100 000
10 000
1 000
100
10
1
0
Operating time (seconds)
Te1 = Te2 = 64 mn
Te1 = Te2 = 58 mn
Te1 = Te2 = 52 mn
Te1 = Te2 = 46 mn
Te1 = Te2 = 40 mn
Te1 = Te2 =34 mn
Te1 = Te2 =28 mn
Te1 = Te2 = 22 mn
Te1 = Te2 = 16 mn
Te1 = Te2 = 10 mn
Te1 = Te2 = 4 mn
1
10
Thermal equivalent current Ieq in terms of the current
thermal threshold IΘ>
P0162ENb

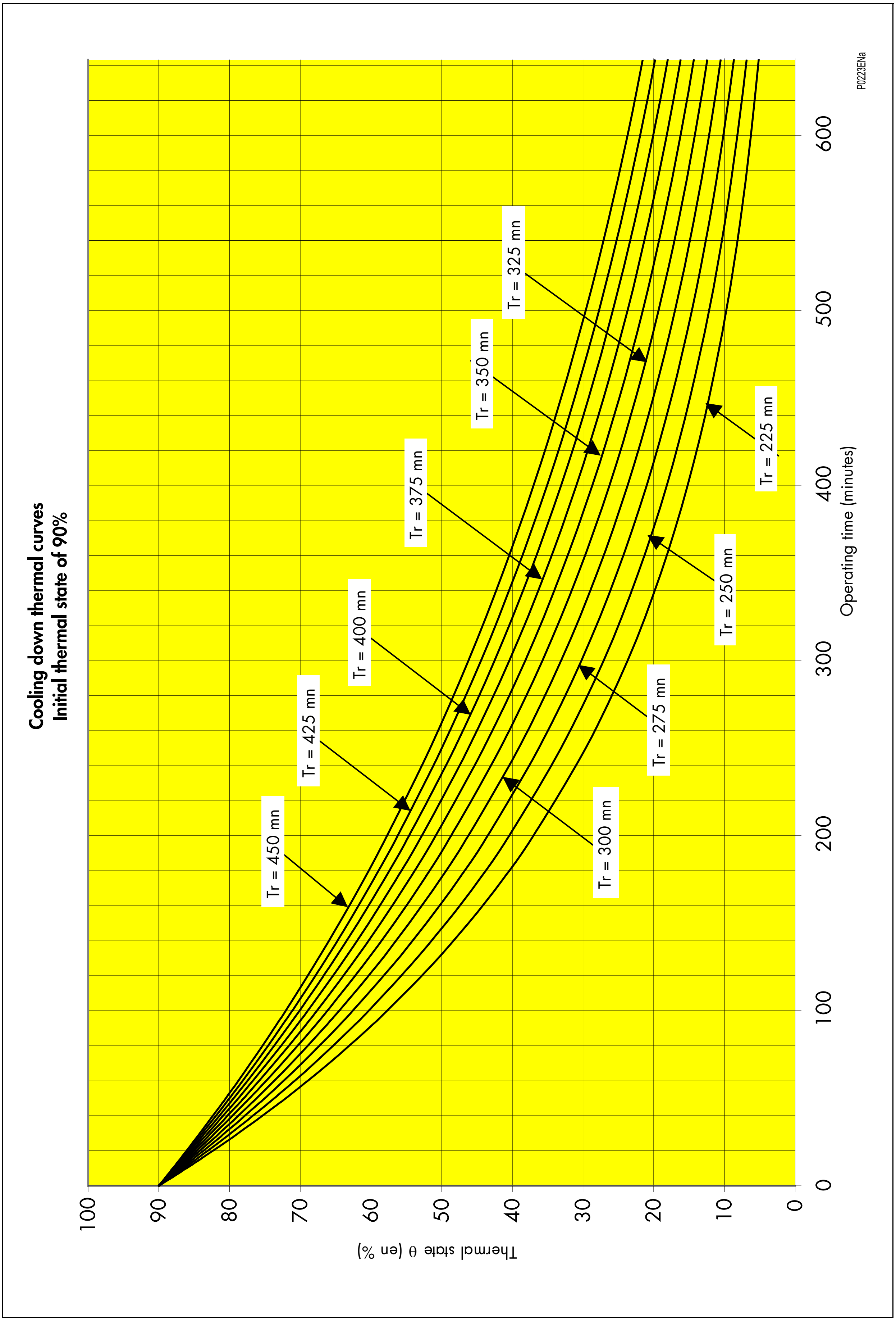

Thermal overload characteristic curves
Hot curves
Initial thermal state of 90%
100 000
10 000
1 000
100
10
1
0
Operating time (seconds)
Te1 = Te2 = 60 mn
Te1 = Te2 = 54 mn
Te1 = Te2 = 48 mn
Te1 = Te2 = 42 mn
Te1 = Te2 = 36 mn
Te1 = Te2 = 30 mn
Te1 = Te2 =24 mn
Te1 = Te2 = 18 mn
Te1 = Te2 = 12 mn
Te1 = Te2 = 6 mn
Te1 = Te2 = 1 mn
1
10
Thermal equivalent current I eq in terms of the current thermal threshold I θ>
P0163ENa

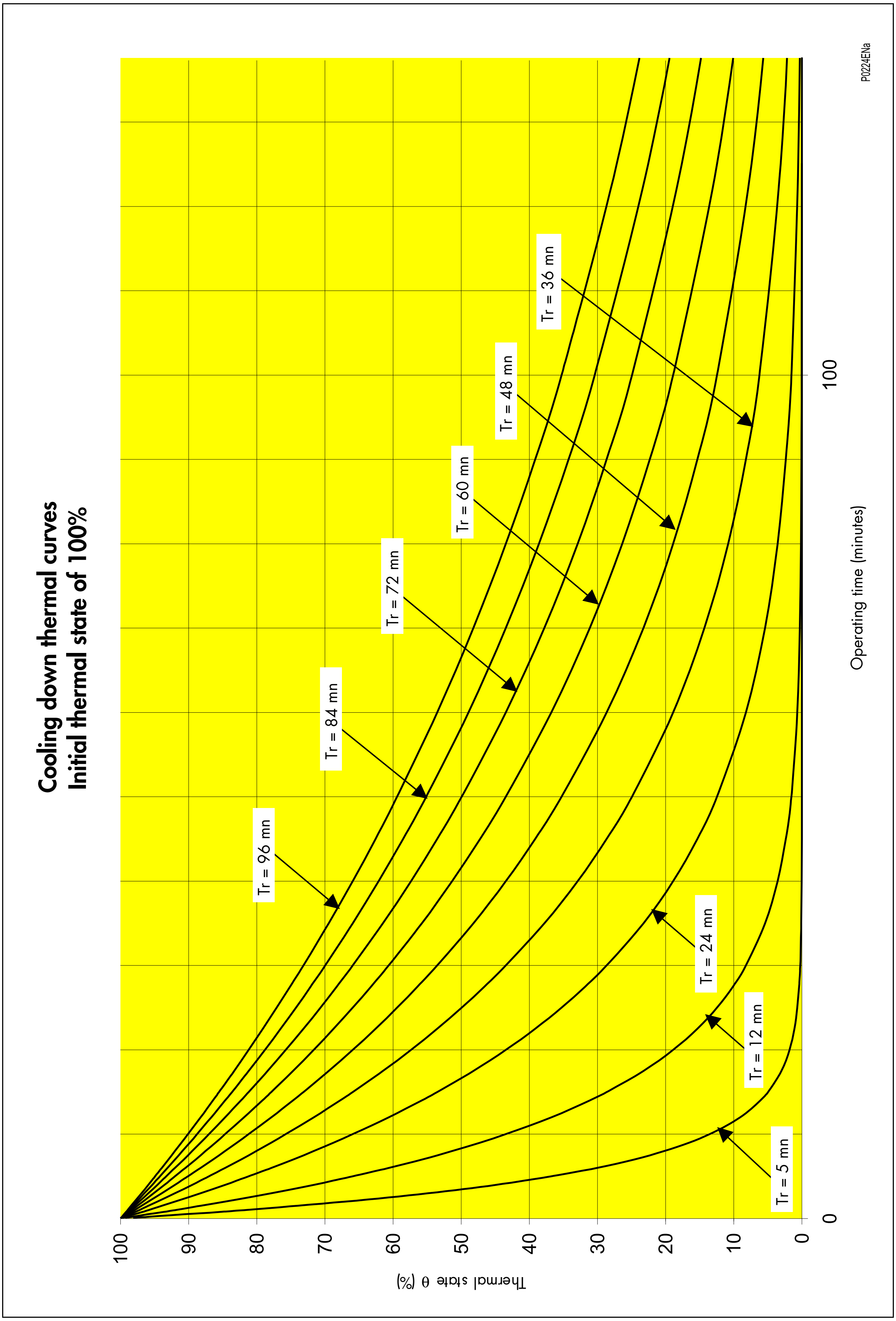

Thermal overload characteristic curves
Hot curves
Initial thermal state of 90%
100 000
10 000
1 000
100
10
1
0
Operating time (seconds)
Te1 = Te2 = 62 mn
Te1 = Te2 = 56 mn
Te1 = Te2 = 50 mn
Te1 = Te2 = 44 mn
Te1 = Te2 = 38 mn
Te1 = Te2 = 32 mn
Te1 = Te2 =26 mn
Te1 = Te2 = 20 mn
Te1 = Te2 = 14 mn
Te1 = Te2 = 8 mn
Te1 = Te2 = 2 mn
1
10
Thermal equivalent current I eq in terms of the current
thermal threshold Iθ>
P0164ENa

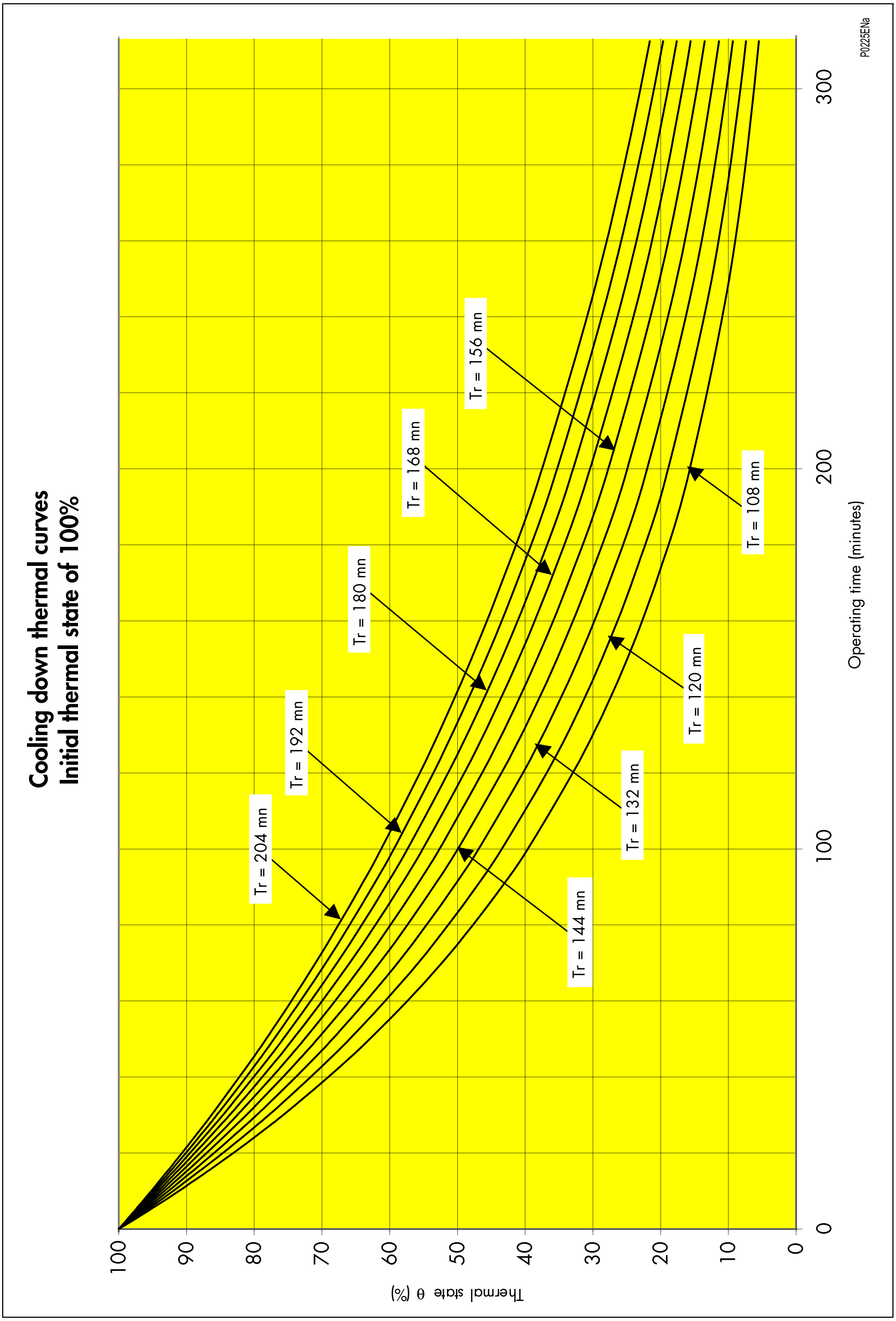

Thermal overload characteristic curves
Hot curves
Initial thermal state of 90%
Operating time (seconds)
100 000
10 000
1 000
100
10
1
0
1
10
Te1 = Te2 = 64 mn
Te1 = Te2 = 58 mn
Te1 = Te2 = 52 mn
Te1 = Te2 = 46 mn
Te1 = Te2 = 40 mn
Te1 = Te2 =34 mn
Te1 = Te2 =28 mn
Te1 = Te2 = 22 mn
Te1 = Te2 = 16 mn
Te1 = Te2 = 10 mn
Te1 = Te2 = 4 mn
Thermal equivalent current I eq in terms of the current
thermal threshold I θ>
P0165ENa

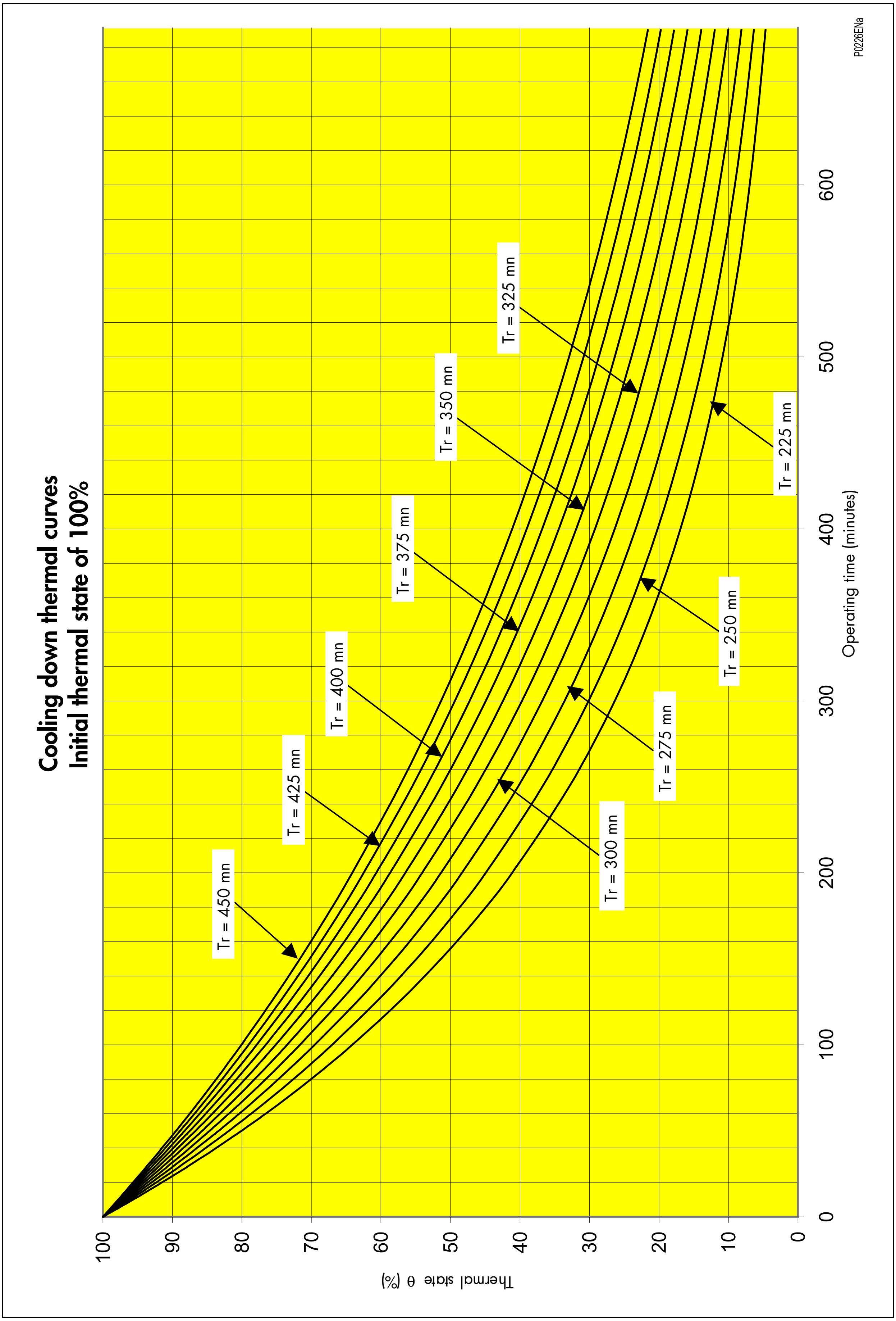

Cooling down thermal curves
Initial thermal state of 90%
Tr = 96 mn
Tr = 84 mn
Tr = 72 mn
Tr = 60 mn
Tr = 48 mn
Tr = 36 mn
Tr = 24 mn
Tr = 12 mn
Tr = 5 mn
Thermal state θ (en %)
Operating time (minutes)
0
100
10
20
30
40
50
60
70
80
90
P0221ENa


Cooling down thermal curves
Initial thermal state of 90%
Thermal state θ (en %)
Operating time (minutes)
Tr = 204 mn
Tr = 192 mn
Tr = 180 mn
Tr = 168 mn
Tr = 156 mn
Tr = 144 mn
Tr = 132 mn
Tr = 120 mn
Tr = 108 mn
0
10
20
30
40
50
60
70
80
90
100
0
100
200
P0222ENa

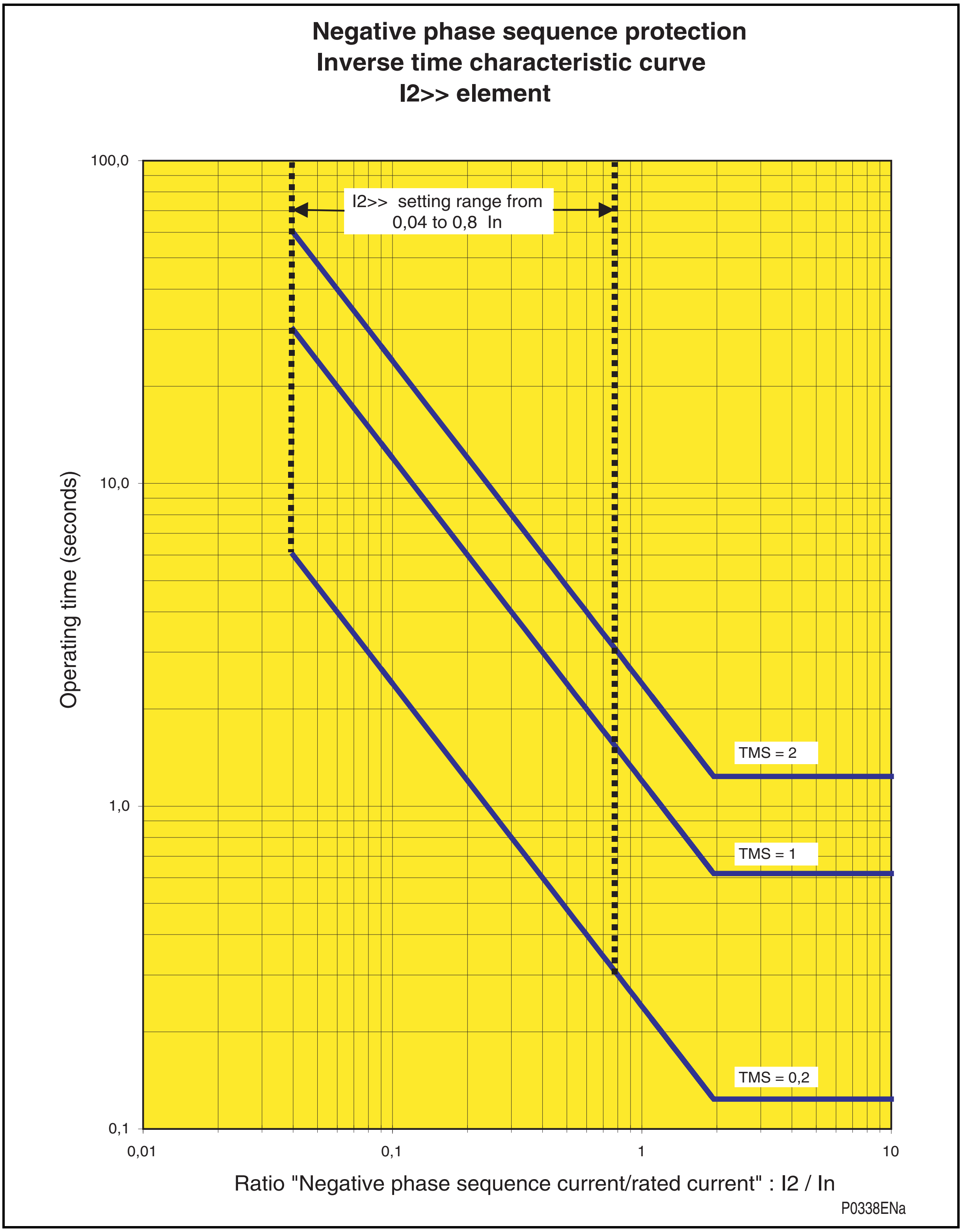

Cooling down thermal curves
Initial thermal state of 90%
Thermal state θ (en %)
Operating time (minutes)
Tr = 450 mn
Tr = 425 mn
Tr = 400 mn
Tr = 375 mn
Tr = 350 mn
Tr = 325 mn
Tr = 300 mn
Tr = 275 mn
Tr = 250 mn
Tr = 225 mn
0
10
20
30
40
50
60
70
80
90
100
0
100
200
300
400
500
600
P0223ENa


Cooling down thermal curves
Initial thermal state of 100%
Tr = 96 mn
Tr = 84 mn
Tr = 72 mn
Tr = 60 mn
Tr = 48 mn
Tr = 36 mn
Tr = 24 mn
Tr = 12 mn
Tr = 5 mn
Thermal state θ (%)
100
90
80
70
60
50
40
30
20
10
0
Operating time (minutes)
0
100
P0224ENa


Cooling down thermal curves
Initial thermal state of 100%
Thermal state θ (%)
Operating time (minutes)
0
100
200
300
100
90
80
70
60
50
40
30
20
10
0
Tr = 204 mn
Tr = 192 mn
Tr = 180 mn
Tr = 168 mn
Tr = 156 mn
Tr = 144 mn
Tr = 132 mn
Tr = 120 mn
Tr = 108 mn
P0225ENa



Cooling down thermal curves
Initial thermal state of 100%
Tr = 450 mn
Tr = 425 mn
Tr = 400 mn
Tr = 375 mn
Tr = 350 mn
Tr = 325 mn
Tr = 300 mn
Tr = 275 mn
Tr = 250 mn
Tr = 225 mn
Thermal state θ (%)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
Operating time (minutes)
P0226ENa


Negative phase sequence protection
Inverse time characteristic curve
I2>> element
I2>> setting range from
0,04 to 0,8 In
100,0
10,0
1,0
0,1
0,01
0,1
1
10
Operating time (seconds)
TMS = 2
TMS = 1
TMS = 0,2
Ratio "Negative phase sequence current/rated current" : I2 / In
P0338ENa

15. EQUIVALENCE TABLE BETWEEN THE RTD IMPEDANCE MEASURED VALUE AND TEMPERATURE

Temperature (°C)	100 OHM Platinum (Ω)	100 OHM Nickel (Ω)	120 OHM Nickel (Ω)	10 OHM Copper (Ω)
-40	84.27	79.13	92.76	7.490
-30	88.22	84.15	99.41	7.876
-20	92.16	89.23	106.41	8.263
-10	96.09	94.58	113.0	8.649
0	100.0	100.0	120.0	9.035
10	103.9	105.6	127.2	9.421
20	107.8	111.2	134.5	9.807
30	111.7	117.1	142.1	10.19
40	115.5	123.0	149.8	10.58
50	119.4	129.1	157.7	10.97
60	123.2	135.3	165.9	11.35
70	127.1	141.7	174.3	11.74
80	130.9	148.3	182.8	12.12
90	134.7	154.9	191.6	12.51
100	138.5	161.8	200.6	12.90
110	142.3	168.8	209.9	13.28
120	146.1	176.0	219.3	13.67
130	149.8	183.3	228.9	14.06
140	153.6	190.9	238.8	14.44
150	157.3	198.7	249.0	14.83
160	161.0	206.6	259.3	15.22
170	164.8	214.8	269.9	15.61
180	168.5	223.2	280.8	16.00
190	172.2	231.6	291.9	16.38
200	175.8	240.0	303.5	16.78

16. EQUIVALENCE TABLES BETWEEN ANALOGUE OUTPUT SIGNAL VALUE AND REMOTE MEASUREMENT

The following two tables provide equivalence data between the value of current signal in mA generated at the analogue outputs of the MiCOM P220/P225 and the corresponding measurement value:

Measurement Type	HMI Sign	Unit	Variation Range	Rating 0 - 20 mA
Phase A current	IA RMS	Ampere	0 to 2 In	Ias * 2 In/20 mA
Phase B current	IB RMS	Ampere	0 to 2 In	Ias * 2 In/20 mA
Phase C current	IC RMS	Ampere	0 to 2 In	Ias * 2 In/20 mA
Earth current	IN RMS	Ampere	0 to 2 In	Ias * 2 In/20 mA
Motor thermal state	THERM ST	%	0 to 150 %	Ias * 150/20 mA
Load in % of the full load current	% I LOAD	%	0 to 150 %	Ias * 150/20 mA
Time before a permitted start	TbefSTART	Minute	0 to 120 Minutes	Ias * 120/20 mA
Time before a thermal trip	TbefTRIP	Minute	0 to 120 Minutes	Ias * 120/20 mA
Phase A phase C voltage (range 57- 130 V)	VAC RMS	Volt	0 to 130 V	Ias * 130/20 mA
Phase A phase C voltage (range 220 - 480 V)	VAC RMS	Volt	0 to 480 V	Ias * 480/20 mA
Power factor	POWER FACT		-1 to 1	[Ias * 2/20 mA] - 1
Active power (WATT)	WATTs	W	- AO to AO	[Ias * 2 * MVA/20 mA] - AO
Réactive power (VAR)	VARs	VAR	- AO to AO	[Ias * 2 * MVA/20 mA] - AO
RTD’s temperature	T°C RTD	°C	- 40 to 215 °C	[Ias * 255/20 mA] - 40°C
Hottest RTD number	No Hottest RTD		0 to 10	Ias * 10/20 mA

Measurement Type	HMI Sign	Unit	Variation Range	Rating 4 - 20 mA
Phase A current	IA RMS	Ampere	0 to 2 In	(Ias - 4 mA) * 2 In/16 mA
Phase B current	IB RMS	Ampere	0 to 2 In	(Ias - 4 mA) * 2 In/16 mA
Phase C current	IC RMS	Ampere	0 to 2 In	(Ias - 4 mA) * 2 In/16 mA
Earth current	IN RMS	Ampere	0 to 2 In	(Ias - 4 mA) * 2 In/16 mA
Motor thermal state	THERM ST	%	0 to 150 %	(Ias - 4 mA) * 150/16 mA
Load in % of the full load current	% I LOAD	%	0 to 150 %	(Ias - 4 mA) * 150/16 mA
Time before a permitted start	TbefSTART	Minute	0 to 120 Minutes	(Ias - 4 mA) * 120/16 mA
Time before a thermal trip	TbefTRIP	Minute	0 to 120 Minutes	(Ias - 4 mA) * 120/16 mA
Phase A phase C voltage (range 57- 130 V)	VAC RMS	Volt	0 to 130 V	(Ias - 4 mA) * 130/16 mA
Phase A phase C voltage (range 220 - 480 V)	VAC RMS	Volt	0 to 480 V	(Ias - 4 mA) * 480/16 mA
Power factor	POWER FACT		-1 to 1	(Ias - 12 mA) * 2/16 mA
Active power (WATT)	WATTs	W	- AO to AO	{[(Ias - 12 mA) * 2]/16 mA} * AO
Reactive power (VAR)	VARs	VAR	- AO to AO	{[(Ias - 12 mA) * 2]/16 mA} * AO
RTD's temperature	T°C RTD	°C	- 40 to 215 °C	[(Ias - 4 mA) * 255/16 mA] - 40°C
Hottest RTD number	No Hottest RTD		0 to 10	(Ias - 4 mA) * 10/16 mA

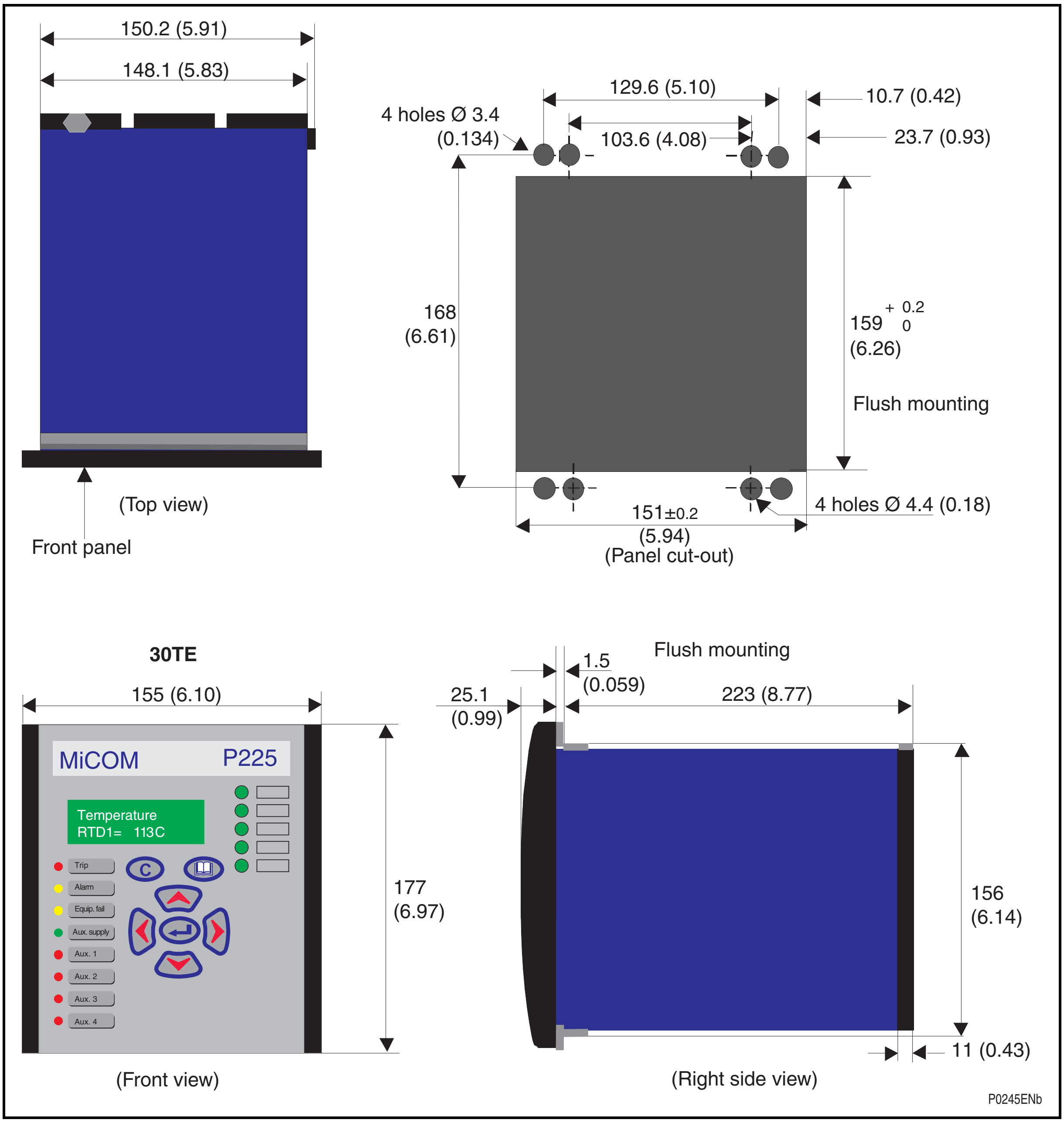
N.B.:
- Ias is the value of the current signal in mA generated by the analogue output.
- In the case where the measurement value to remote through the analogue output is outside the permissible variation range, the current signal is restricted to the limit value of the variation range.
- In the case where there is no thermal alarm "θ ALARM", the current signal value meaning the time before a thermal trip "Tbef TRIP" is equal to 20 mA.
- AO: Maximum rating of the power value (Active and/or reactive) transmitted by the analogue output ANALOG OUTPUT setting within the CONFIG. SELECT submenu).

P22x CASE DIMENSIONS

MiCOM P220/P225 relays are available in a 4U metal case for panel or flush mounting.

Weight: about 3.7 Kg

External size:			
	Height	Case	156 mm
		Front panel	177 mm
	Width	Case	148,1 mm
		Front panel	155 mm
	Depth	Case (flush part)	223 mm
		Case + Front panel	250 mm



SOFTWARE SUPPORT

MiCOM S1 Studio software makes it possible to pre-set all MiCOM P22x relay parameters from a PC. The relay is then accessed via the RS232 port on the front panel.

MiCOM S1 Studio software is fully compatible with Windows™ (95, 98, NT, 2000, XP), and can download relay settings, pull up current relay settings and upload measurement values, diagnostic data, fault records, disturbance records, start-up current and voltage shapes and event logging data.

HARDWARE DESCRIPTION

> Case

The MiCOM P220/P225 relays are housed in a 4U case and suitable for either rack or flush-mounted.
The relay can be withdrawn from its case with the supply voltage on due to the presence of internal shorting links protecting the current circuits.

> Weight

- P220 / P225: 3.7kg

AREVA TRACK RECORD - MOTOR AND OVERCURRENT PROTECTION RELAY
>> Over 30 years experience in motor protection.
>> MiCOM range introduced in 1999 derived from previous successful range and user feedback.
>> Employ latest technology to enhance relay efficiency and reliability. World-wide application with over 14000 units delivered.

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