

# Product Data Sheet: TD3 M10

Type : **1 to 4 poles and switched neutral MCB**

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**Summary :**

<b>1</b>	<b>General Characteristics .....</b>	<b>2</b>
<b>2</b>	<b>Dimensional characteristics.....</b>	<b>4</b>
2.1	Dimensions.....	4
2.2	Weight & packaging.....	4
<b>3</b>	<b>Marking.....</b>	<b>4</b>
<b>4</b>	<b>Installation.....</b>	<b>5</b>
<b>5</b>	<b>Options .....</b>	<b>6</b>
5.1	Auxiliaries : .....	6
5.2	Accessories : .....	6
<b>6</b>	<b>Standards .....</b>	<b>6</b>
<b>7</b>	<b>Power loss : .....</b>	<b>7</b>
<b>8</b>	<b>Operation in DC current.....</b>	<b>7</b>
<b>9</b>	<b>References .....</b>	<b>8</b>
<b>10</b>	<b>Tripping curve of MCB : .....</b>	<b>8</b>
<b>11</b>	<b>Energy let-through (I<sup>2</sup>t) : under 230V and 400V .....</b>	<b>8</b>
<b>12</b>	<b>Current limitation : under 230V and 400V .....</b>	<b>8</b>
<b>Appendix 1 : Temperature correction factor table .....</b>		<b>9</b>
<b>Appendix 2 : Curves at 30 °C.....</b>		<b>11</b>
<b>Appendix 3 : Energy let through at 400 V .....</b>		<b>14</b>
<b>Appendix 4 : Current limitation at 400 V .....</b>		<b>17</b>

## 1 General Characteristics

Protection against overloads and short circuits, switch control and isolation.  
In commercial and industrial electrical distribution systems.

<b>Curve :</b>	B, C, D (see <b>appendix 2</b> )
<b>Pôles :</b>	1P, P+N, 2P, 3P, 4P, 3P+N
<b>Current rating :</b>	0,5A to 63 A
<b>Voltage rating :</b>	230V to 240V / 400V to 415V and +10%

**Breaking capacity (I<sub>cn</sub>) 60898 :**

Number of poles	Voltage (V)	Breaking capacity (A)
1P, 1P+N	230 to 240	10 000
2P, 3P, 4P, 3P+N	400 to 415	10 000

**Breaking capacity (I<sub>cs</sub>) 60898 :** 75% of I<sub>cn</sub>

**Frequency :** 50 – 60 Hz

If the frequency is different, it's necessary to multiplied the magnetic value by coefficient K. But the thermal value is unchanged.

F (Hz)	16 <sup>2/3</sup> Hz – 60 Hz	100 Hz	200 Hz	400 Hz
K	1	1,1	1,2	1,5

**Rating insulation voltage (U<sub>i</sub>) :** 500 V according to EN60898-1

**Electrical endurance :** 10 000 cycles (O-C) to I<sub>n</sub> according to EN60898

**Mechanical endurance :** 20 000 cycle without load

**IP rating :** IP2x of terminals

**Temperature :**  
Calibration temperature : 30°C according to IEC / EN 60898  
Working temperature : - 25°C to + 60 °C  
Storage temperature : - 25°C to + 80 °C

**Temperature derating :** MCBs are designed and calibrated to carry their rated current and to operate within their designated thermal time/current zone at 30 °C. Testing is carried out with the breaker mounted singly in a vertical plane in a controlled environment. Therefore if the circuit breaker is required to operate in conditions which differ from the reference conditions, certain factors have to be applied to the standard data. For instance if the circuit breaker is required to operate at higher ambient temperature than 30 °C it will require progressively less current to trip within the designated time/current zone.

**Temperature Correction factor :** You will find in **Appendix 1** the correction values considering the ambient temperature

**Grouping factor :****Rated current reduced by factor K**

Consideration should also be given to the proximity heating effect of the breakers themselves when fully loaded and mounted together in groups.

There is a certain amount of watts loss from each breaker depending on the trip rating which may well elevate the ambient air temperature of the breaker above the ambient air temperature of the enclosure

No. of units n	K (grouping factor)
n = 1	1
$2 \leq n < 4$	0,95
$4 \leq n < 6$	0,9
$6 \leq n$	0,85

Note :If the design current of a circuit (Ib) is less than 0,85 times the nominal setting of the circuit breaker (In) grouping can be ignored.

**Dielectric strength :**

2,5kV according to EN 60898

**Case material :**

Thermoplastic (Polyamide)  
Compliance with IEC 695-2-1

**Glow-wire test :**

960° for casing according to IEC 60695-2-1  
750°C for toggle according to IEC 60695-2-1

**Tropicalisation :**

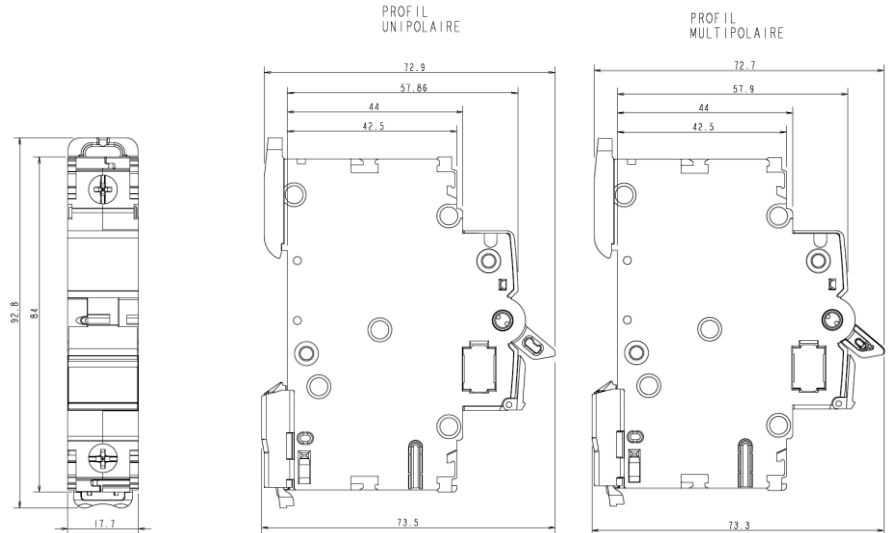
All climates, treatment 2 (relative humidity = 95% at 55°C)

## 2 Dimensional characteristics

### 2.1 Dimensions

Poles	Lg (Nb. Modules)*
1P	1
2P, 1P+N	2
3P	3
4P, 3P+N	4

\* Width of 1 Mod 17,6 ±0,1

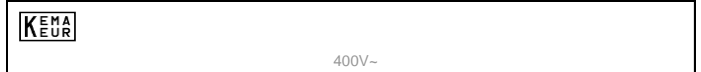
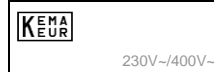


### 2.2 Weight & packaging

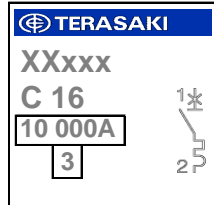
No. of pole	1P	1P+N	2P	3P	3P+N	4P
Weight (g)	114	228	228	340	452	454
Number of products per box	x12	x6	x6	x4	x3	x3

## 3 Marking

On the shoulder :



On the face :



On the side (right & left) :

## 4 Installation

**Mounting :** Din rail EN 50.022-35

**Supply :** Feed either top or bottom

**Connection capacity :** Rigid conductor : 35 mm<sup>2</sup>  
Flexible conductor : 25 mm<sup>2</sup>

On a bottom, there is a bi-connect terminal

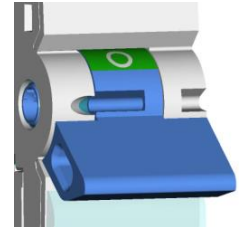
**Tightening torque :** 2,8 Nm nominal with Screw head pozidrive size 2 and slot 6 mm  
3,5 Nm maximal with Screw head pozidrive size 2 and slot 6 mm

**Type of cable :** Copper

**Sealable :** The locking kit allows locking MCB in the "OFF" and "ON" position.  
The locking kit is sealable.

The MCB can be lock in the "OFF" and "ON" position with max.∅ 1,5mm leading wire

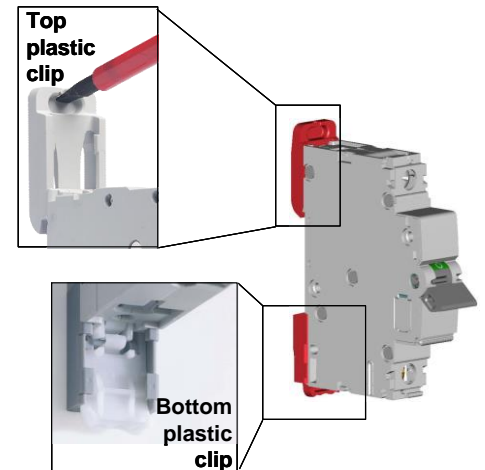
**Flag indicator :** The state of isolation is clearly indicated by the "OFF" mechanical position on the toggle with the green colour



**Installation altitude :** 2 000 meters max

**Working position :** Product performances not affected if installed vertically, horizontally or flat

**Din clip type :** Plastic Din clips on the Top & Bottom



**Auxiliaries :** Yes

## 5 Options

### 5.1 Auxiliaries :

Earth leakage add-on blocks : please see the catalogue

Auxiliary contacts :

Auxiliary contact

+ alarm indication :

Shunt trip :

Under voltage release :

Remote control :

Remote control and auto reclosing :

### 5.2 Accessories :

Terminal and screw shield :

Inter-pole barrier :

Locking kit :


Locking wire :

Fork Busbar :

Connectors :

## 6 Standards

Complies with : EN 60898 and IEC 60898

Approval laboratory	Logo	Countries
Kema		Netherland

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## 7 Power loss :

The power loss of MCB's is closely controlled by the standards and is calculated on the basis of the voltage drop across the main terminals measured at rated current.  
The table below gives the watts loss per pole at rated current.

MCB rated current (A)	0.5	1	2	3	4	6	10	13	16	20	25	32	40	50	63
Watts loss per pole (W)	1.2	1.3	1.5	2.0	1.8	1.4	1.9	2.1	2.5	2.8	3.2	3.8	4.0	4.5	5.1
Resistance R (mΩ)	4800	1300	375	222	113	39	18.9	12.3	9.84	7	5.1	3.7	2.45	1.77	1.28
Impedance L (μH)	174	42	42	13	4.2	7.2	6.20	4.75	4.00	1.54	1.5	1.21	1.58	0.60	0.51
Reactance L <sub>ω</sub> (mΩ)	55	13	13	4.1	1.32	2.26	1.95	1.49	1.26	0.48	0.47	0.38	0.50	0.19	0.16
Impedance Z (mΩ)	4800	1300	375	222	113	39.1	19.0	12.4	9.92	7.02	5.12	3.72	2.50	1.78	1.29

## 8 Operation in DC current

Because of their quick make and break design and excellent arc quenching capabilities Terasaki circuit breakers are suitable for DC applications.

The following parameters must be considered :

**Max voltage per pole :** 125V (15kA)

**Network voltage :** determined by the number of poles connected in series.

**Short circuit current :** determined the breaking capacity in relation to the network voltage and the number of poles connected in series.

No. of poles in series	Breaking capacity (kA) L/R= 15 ms		
	≤ □60 V	≤ □125 V	≤ □250 V
1	15	15	-
2	20	15	15
3	25	20	15
4	35	25	15

**Tripping characteristics :** the thermal trip remains unchanged.  
the magnetic trip will become less sensitive requiring derating by  $\sqrt{2}$  the AC value.

Magnetic trip	C Curve	
	50 Hz	DC
I <sub>rm1</sub>	5 I <sub>n</sub>	5 I <sub>n</sub>
I <sub>rm2</sub>	10 I <sub>n</sub>	15 I <sub>n</sub>

## 9 References

### 10 Tripping curve of MCB :

The curve in **Appendix 2** gives the time of tripping in relation to the prospective current.

### 11 Energy let-through ( $I^2t$ ) : under 230V and 400V

The energy let-through of a circuit breaker is expressed in ampere squared seconds and referred as to as  $I^2t$ .  
The curve in **Appendix 3 and 3'** gives the maximum values of  $I^2t$  as a function of the prospective current.

### 12 Current limitation : under 230V and 400V

The energy limiting characteristics of circuit breakers reduce the damage that might otherwise be caused by short-circuits.  
The curves in **Appendix 4 and 4'** show energy limiting characteristics of our circuit breakers.



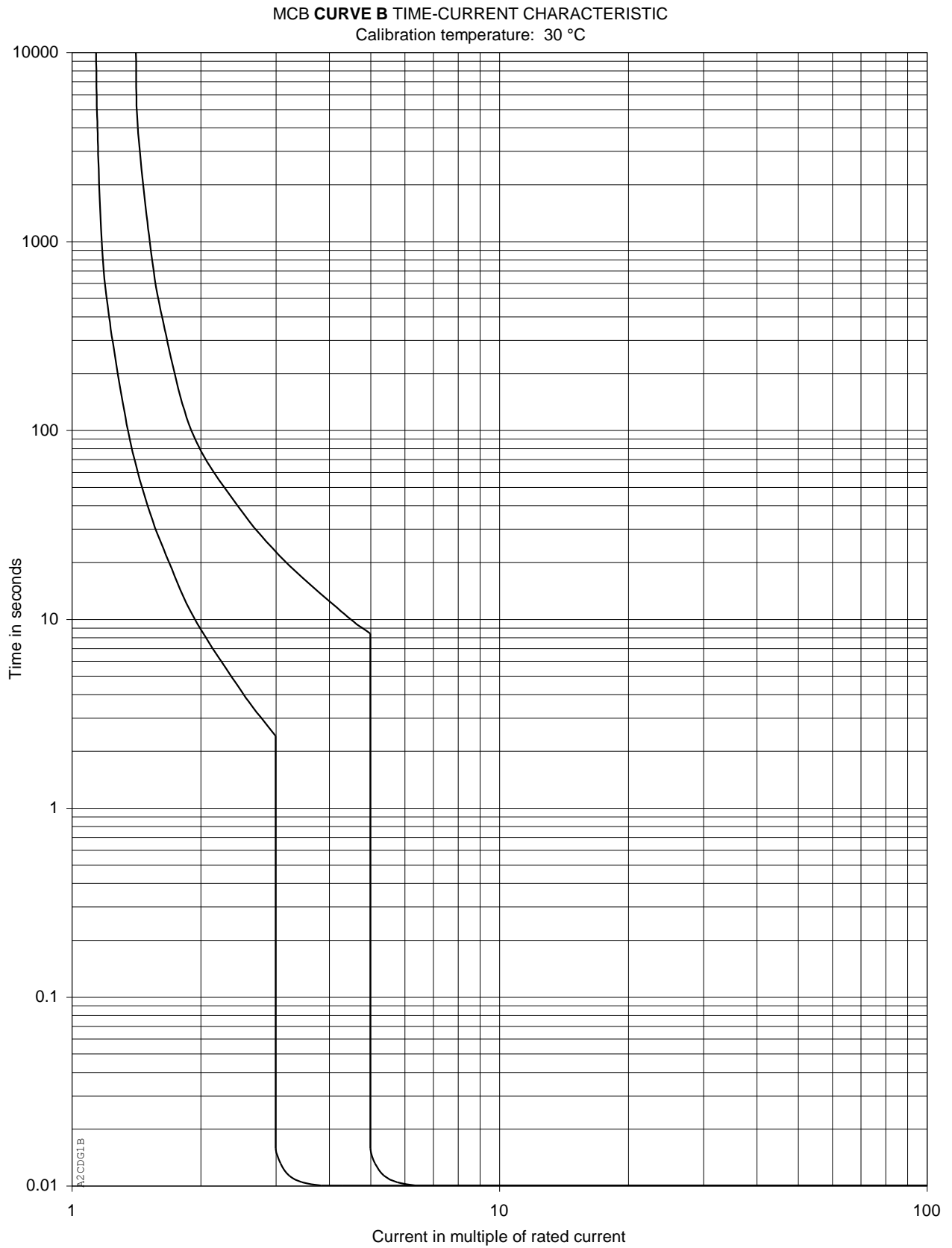
## Appendix 1 : Temperature correction factor table

Miniature circuit breaker  
Standard EN 60898  
Curve B, C and D

In (A)	-25°C	-20°C	-15°C	-10°C	-5°C	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
<b>0.5</b>	0.72	0.7	0.68	0.66	0.64	0.62	0.6	0.58	0.56	0.54	0.52	0.5	0.48	0.46	0.44	0.42	-	-
<b>1</b>	1.44	1.4	1.36	1.32	1.28	1.24	1.2	1.16	1.12	1.08	1.04	1	0.96	0.92	0.88	0.84	0.8	0.76
<b>2</b>	2.88	2.8	2.72	2.64	2.56	2.48	2.4	2.32	2.24	2.16	2.08	2	1.92	1.84	1.76	1.68	1.6	1.52
<b>3</b>	4.32	4.2	4.08	3.96	3.84	3.72	3.6	3.48	3.36	3.24	3.12	3	2.88	2.76	2.64	2.52	2.4	2.28
<b>4</b>	5.76	5.6	5.44	5.28	5.12	4.96	4.8	4.64	4.48	4.32	4.16	4	3.84	3.68	3.52	3.36	3.2	3.04
<b>6</b>	8.64	8.4	8.16	7.92	7.68	7.44	7.2	6.96	6.72	6.48	6.24	6	5.76	5.52	5.28	5.04	4.8	4.56
<b>10</b>	14.4	14	13.6	13.2	12.8	12.4	12	11.6	11.2	10.8	10.4	10	9.6	9.2	8.8	8.4	8	7.6
<b>13</b>	18.7	18.2	17.7	17.2	16.6	16.1	15.6	15.1	14.6	14.0	13.5	13	12.5	12.0	11.4	10.9	10.4	9.9
<b>15</b>	21.6	21	20.4	19.8	19.2	18.6	18	17.4	16.8	16.2	15.6	15	14.4	13.8	13.2	12.6	12	11.4
<b>16</b>	23.0	22.4	21.8	21.1	20.5	19.8	19.2	18.6	17.9	17.3	16.6	16	15.4	14.7	14.1	13.4	12.8	12.2
<b>20</b>	28.8	28	27.2	26.4	25.6	24.8	24	23.2	22.4	21.6	20.8	20	19.2	18.4	17.6	16.8	16	15.2
<b>25</b>	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19
<b>32</b>	46.1	44.8	43.5	42.2	41.0	39.7	38.4	37.1	35.8	34.6	33.3	32	30.7	29.4	28.2	26.9	25.6	24.3
<b>40</b>	57.6	56	54.4	52.8	51.2	49.6	48	46.4	44.8	43.2	41.6	40	38.4	36.8	35.2	33.6	32	30.4
<b>50</b>	-	-	-	-	-	62	60	58	56	54	52	50	48	46	44	42	40	38
<b>63</b>	-	-	-	-	-	-	-	-	-	-	-	63	60.5	58.0	55.4	52.9	50.4	47.9

## Appendix 2 : B Curve at 30 °C

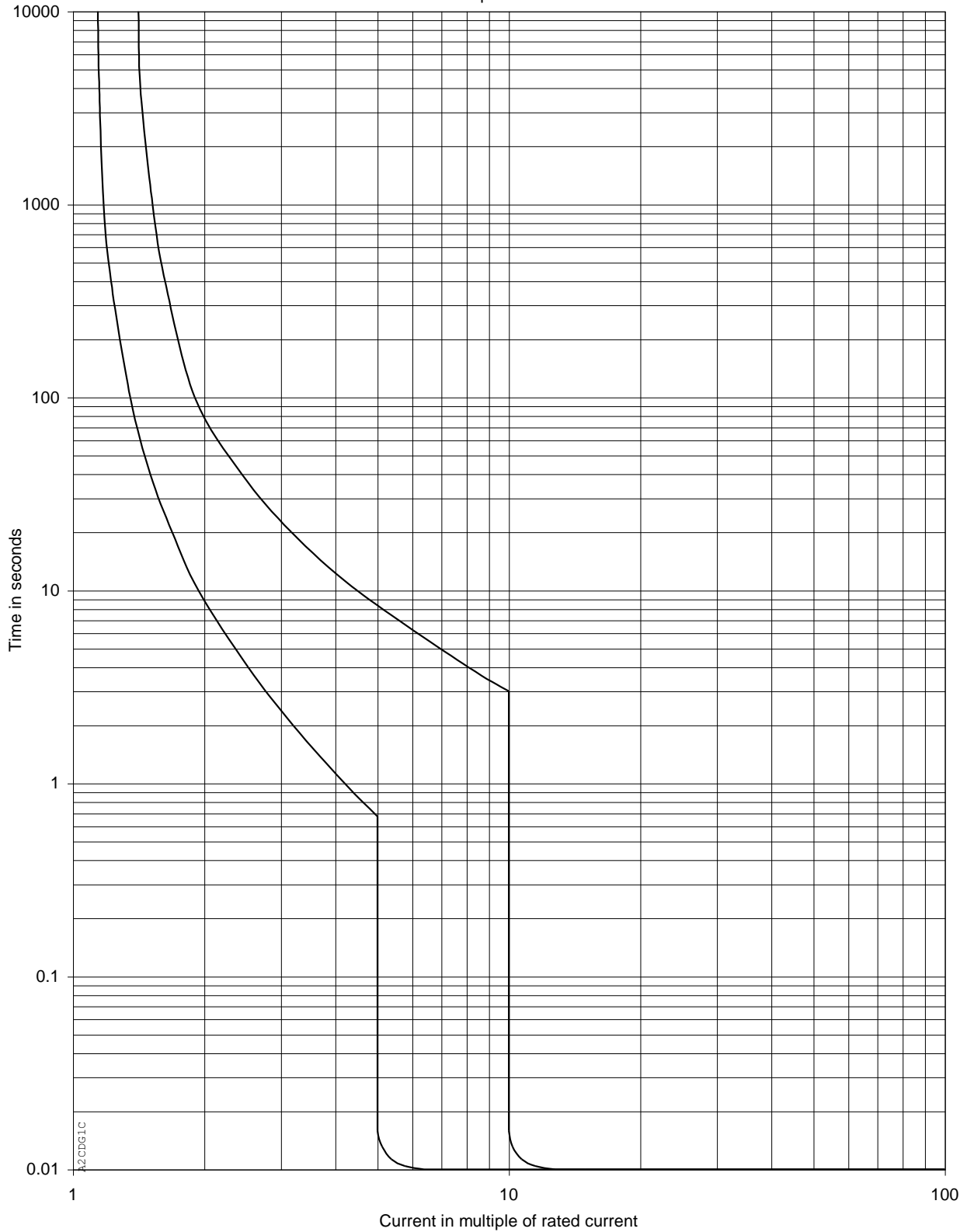
Miniature circuit breaker  
Standard EN 60898



## Appendix 2' : C Curve at 30 °C

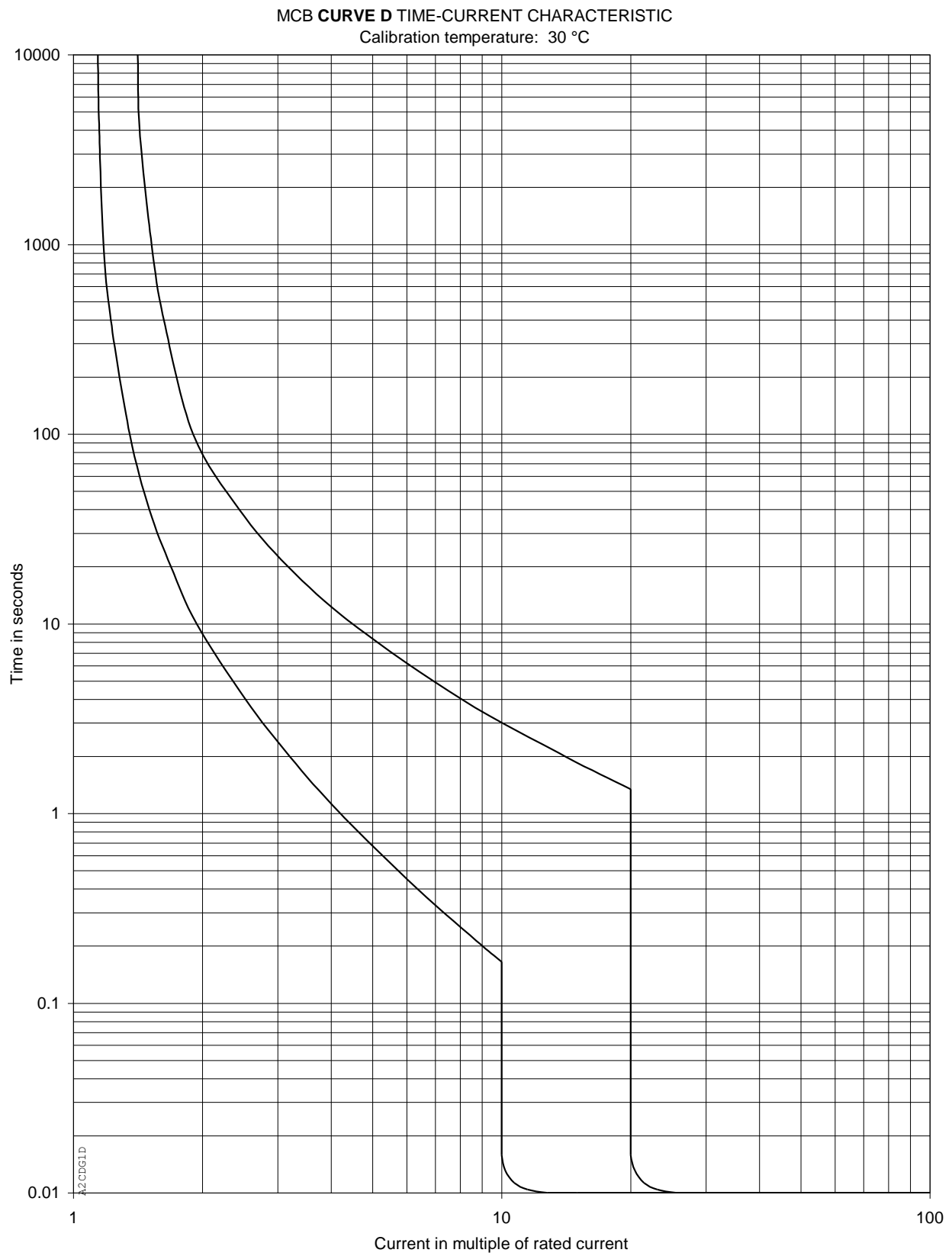
Miniature circuit breaker  
Standard EN 60898

MCB **CURVE C** TIME-CURRENT CHARACTERISTIC  
Calibration temperature: 30 °C



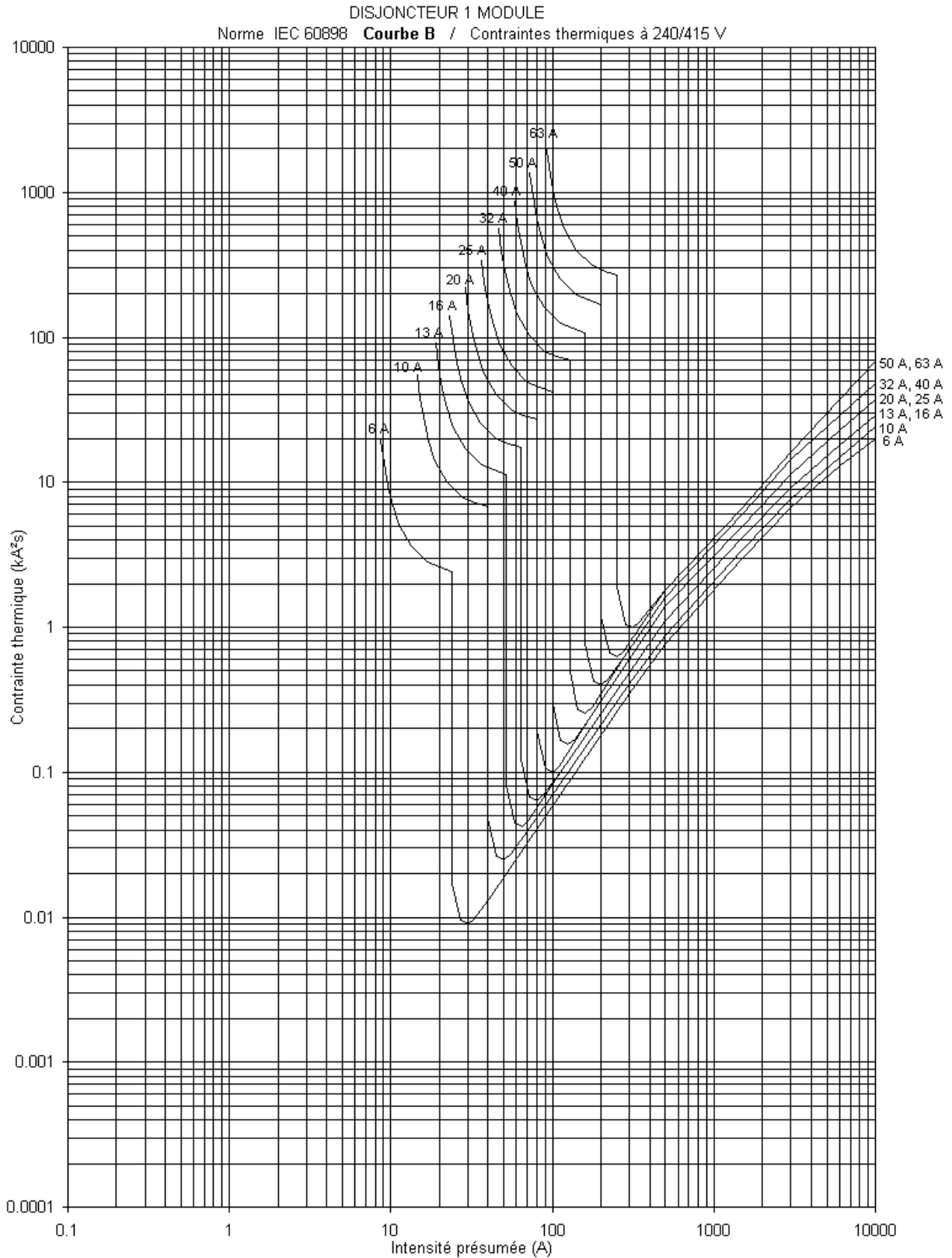
## Appendix 2'' : D Curve at 30 °C

Miniature circuit breaker  
Standard EN 60898



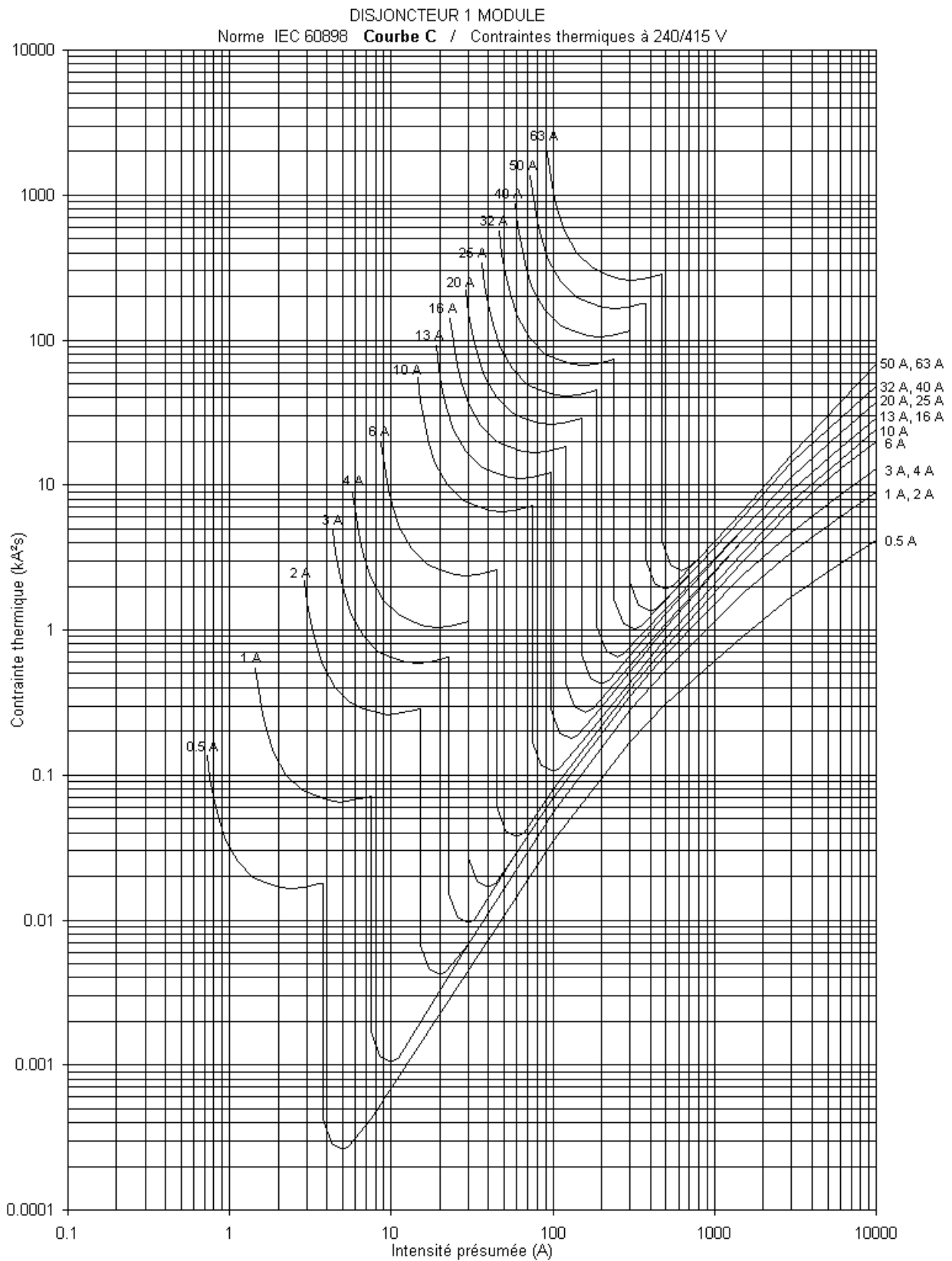
### Appendix 3 : Energy let through at 400 V

Miniature circuit breaker  
Standard EN 60898  
Curve B



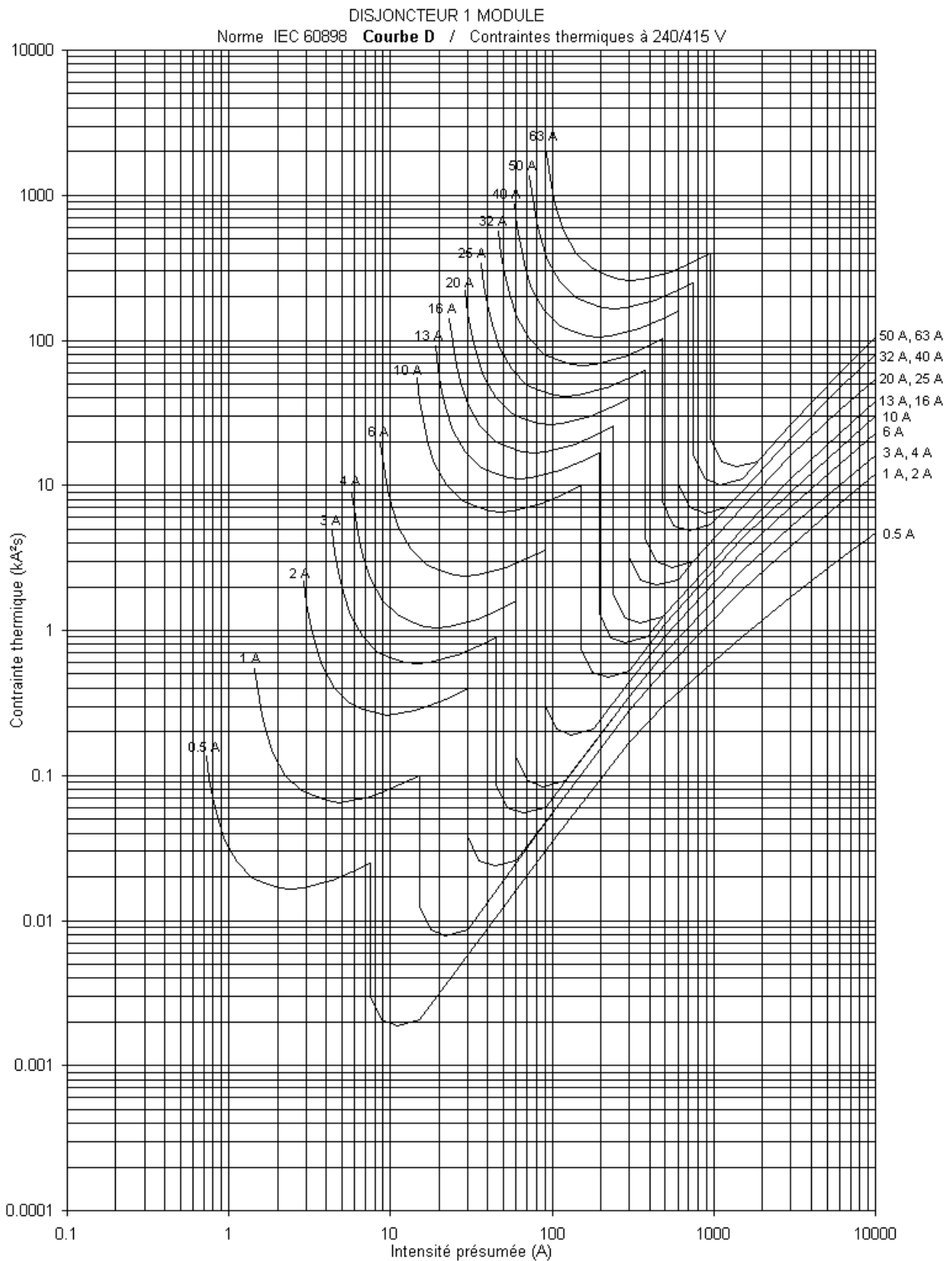
### Appendix 3' : Energy let through at 400 V

Miniature circuit breaker  
Standard EN 60898  
Curve C



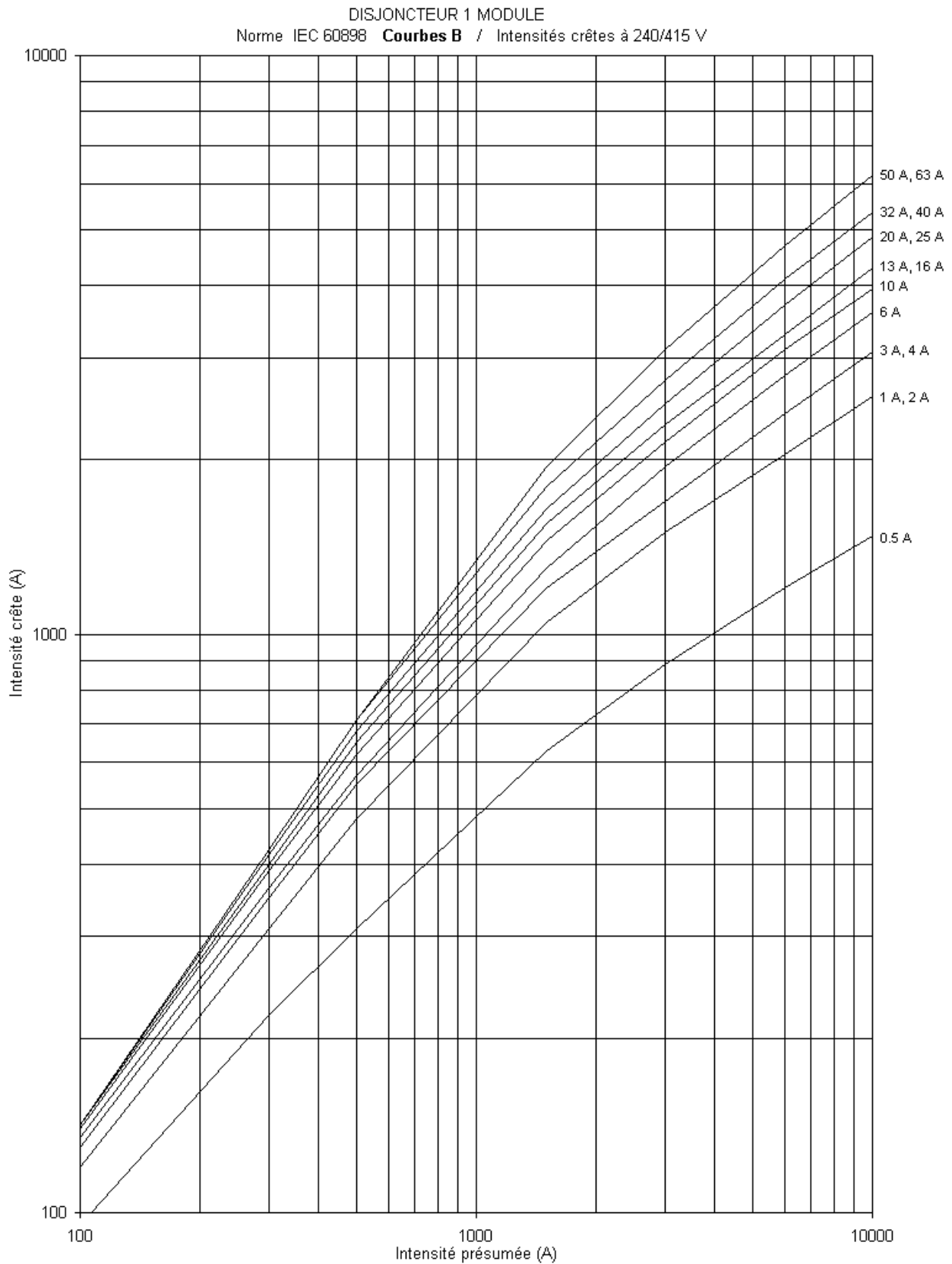
### Appendix 3'' : Energy let through at 400 V

Miniature circuit breaker  
Standard EN 60898  
Curve D



## Appendix 4 : Current limitation at 400 V

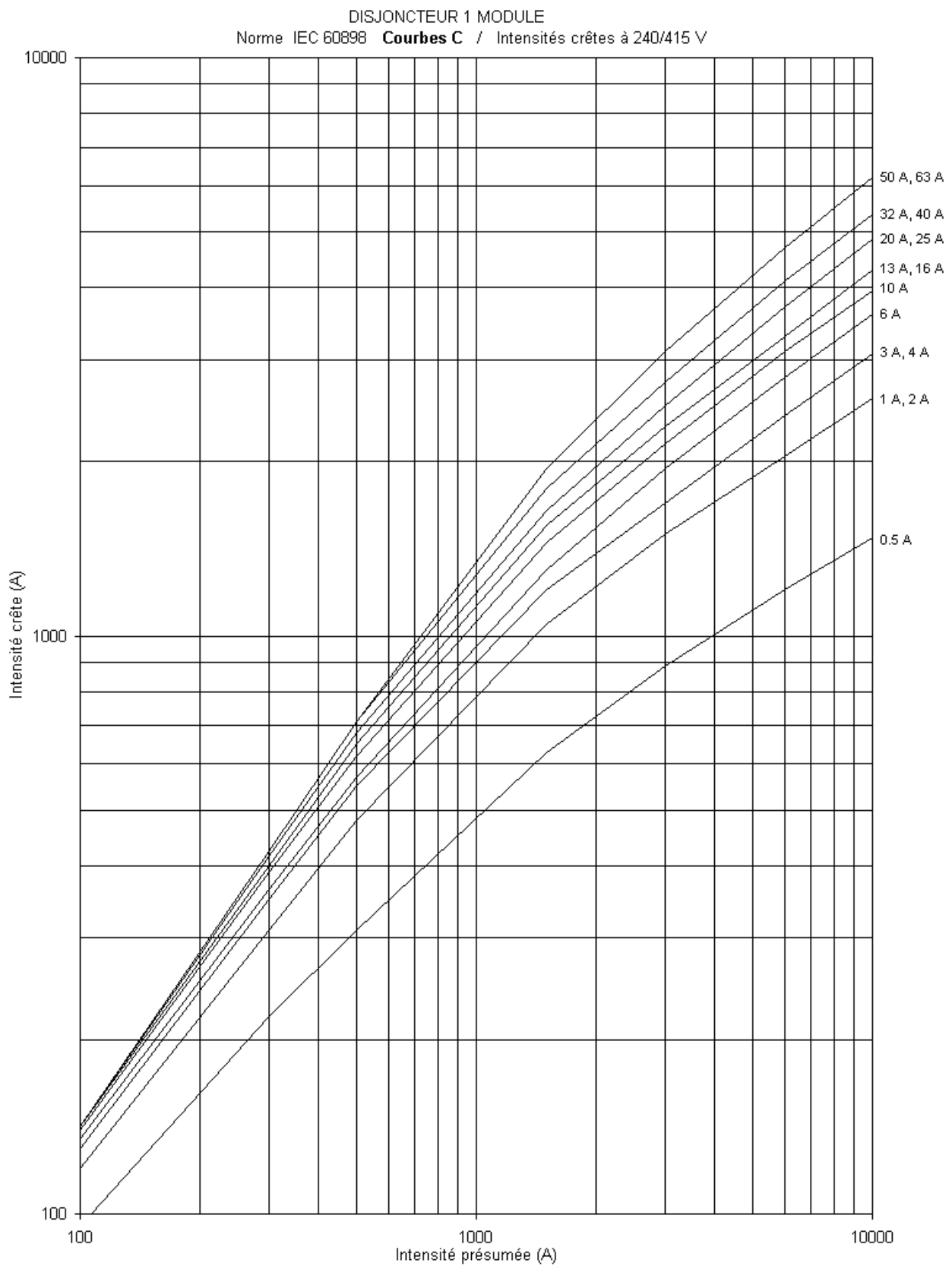
Miniature circuit breaker  
Standard EN 60898  
Curve B





## Appendix 4' : Current limitation at 400 V

Miniature circuit breaker  
Standard EN 60898  
Curve C



## Appendix 4 : Current limitation at 400 V

Miniature circuit breaker  
Standard EN 60898  
Curve D

