

# SENTRON 3VL Molded Case Circuit Breakers

## 3VL Molded Case Circuit Breakers up to 1600 A

Accessories and spare parts

General criteria for the selection of current transformers for measurement purposes



4NC53 current transformers

<b>Standards</b>	IEC 60185, DIN VDE 0414 Parts 1 and 2
<b>Window-type current transformers</b>	The conductor to be measured (busbar or cable) is passed through the window opening and constitutes the primary circuit of the window-type current transformer. Pin-wound transformers: An economical solution especially for small primary currents of 5 ... 75 A is achieved when the conductor to be measured is pin-wound several times.
<b>Rated primary current <math>I_{pn}</math></b>	Current transformers can be continuously loaded with 1.3 times the rated primary current ( $I_{pn}$ ).
<b>Rated secondary current <math>I_{sn}</math></b> 1 A 5 A	Particularly suitable for longer measuring leads. Cable losses of only 4 % in contrast to 5 A current transformers. 5 A current transformers generate 25 times the power losses on measuring leads as compared with 1 A current transformers. These stray losses result in higher power in the case of long cables. Only recommended for use with short measuring leads.
<b>Accuracy class</b> Class 1 Class 3	Operation measurement, internal metering Current error $\pm 1\%$ at $1 \times I_{pn}$ and $1.2 \times I_{pn}$ Coarse measurement Current error $\pm 3\%$ at $0.5 \times I_{pn}$ and $1.2 \times I_{pn}$
<b>Rated power <math>P_n</math></b>	The rated power of transformers is specified in VA. The actual load rating should be similar to the rated power; a lower actual load rating (underburden) increases the overcurrent factor and measuring devices may be damaged in case of a short-circuit, a higher actual load rating (overburden) has a negative effect on the accuracy. With a frequency of 60 Hz the rated power increases to 1.2 times. With $16^{2/3}$ Hz the output power decreases to $\frac{1}{3}$ of the rated power.
<b>Maximum voltage for equipment <math>U_m</math></b>	This is the rms value of the maximum voltage between the conductors of a system. For this voltage the insulation must be rated at normal operating conditions. 4NC5 current transformers are suitable for 720 V.
<b>Overcurrent limiting factor FS</b>	The overcurrent limiting factor is expressed using the characters FS and a factor, e. g. FS5 or FS10. When a short-circuit current flows through the primary winding of a current transformer, the load on the measuring devices connected to the current transformer is the lower the smaller the overcurrent limiting factor is.
<b>Rated short-time thermal current <math>I_{th}</math></b>	The rated short-time thermal current $I_{th}$ is the rms value of the primary current with a duration of one second, whose heat effect the current transformer can resist without being damaged in the event of a short-circuited secondary winding.
<b>Rated impulse current <math>I_{dyn}</math></b>	The rated impulse current $I_{dyn}$ is the highest instantaneous value of the current after a short-circuit whose force the current transformer can resist without being damaged. The rated impulse current is specified as peak value.

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### Accessories and spare parts

#### 4NC current transformers for measuring purposes

Rated primary current $I_{pn}$	Rating $P_n$	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
A	VA							kg
<b>Classes 1 and 3, from 50 to 1500 A</b>								
<b>Rated secondary current 1A</b>								
<b>Class 3</b>								
<ul style="list-style-type: none"> <li>For circular conductors with max. diameter 17.5 mm</li> <li>For busbars up to max. 12 mm × 10 mm</li> </ul>								
50	2.5	A	<b>4NC51 12-0BC20</b>		1	1 unit	103	0.428
60	2.5	A	<b>4NC51 13-0BC20</b>		1	1 unit	103	0.432
75	2.5	A	<b>4NC51 15-0BC20</b>		1	1 unit	103	0.425
<b>Class 1</b>								
<ul style="list-style-type: none"> <li>For circular conductors with max. diameter 17.5 mm</li> <li>For 1 busbar up to max. 12 mm × 10 mm</li> </ul>								
100	2.5	A	<b>4NC51 17-0CC20</b>		1	1 unit	103	0.335
150	2.5	A	<b>4NC51 21-0CC20</b>		1	1 unit	103	0.327
200	5	A	<b>4NC51 22-0CE20</b>		1	1 unit	103	0.356
250	5	A	<b>4NC51 23-0CE20</b>		1	1 unit	103	0.352
<ul style="list-style-type: none"> <li>For circular conductors with max. diameter 28 mm</li> <li>For 1 busbar up to max. 30 mm × 10 mm</li> <li>For 2 busbars up to max. 25 mm × 5 mm</li> </ul>								
200	5	A	<b>4NC52 22-0CE20</b>		1	1 unit	103	0.464
250	5	A	<b>4NC52 23-0CE20</b>		1	1 unit	103	0.477
300	5	A	<b>4NC52 24-0CE20</b>		1	1 unit	103	0.363
400	5	A	<b>4NC52 25-0CE20</b>		1	1 unit	103	0.373
<ul style="list-style-type: none"> <li>For circular conductors with max. diameter 36 mm</li> <li>For 1 busbar up to max. 50 mm × 10 mm</li> <li>For 2 busbars up to max. 40 mm × 5 mm</li> </ul>								
400	5	A	<b>4NC53 25-0CE20</b>		1	1 unit	103	0.469
500	5	A	<b>4NC53 26-0CE20</b>		1	1 unit	103	0.410
600	5	A	<b>4NC53 27-0CE20</b>		1	1 unit	103	0.424
750	5	A	<b>4NC53 28-0CE20</b>		1	1 unit	103	0.391
<ul style="list-style-type: none"> <li>For circular conductors with max. diameter 45 mm</li> <li>For 1 busbar up to max. 60 mm × 10 mm</li> <li>For 2 busbars up to max. 60 mm × 10 mm</li> <li>For 3 busbars up to max. 60 mm × 5 mm</li> </ul>								
1000	10	A	<b>4NC54 31-0CH20</b>		1	1 unit	103	0.644
1250	10	A	<b>4NC54 33-0CH20</b>		1	1 unit	103	0.667
1500	10	A	<b>4NC54 34-0CH20</b>		1	1 unit	103	0.713



4NC51 12-0BC20



4NC51 17-0CC20



4NC52 22-0CE20



4NC53 25-0CE20








4NC54 31-0CH20

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	Rated primary current $I_{pn}$	Rating $P_n$	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
	A	VA							kg
<b>Rated secondary current 5 A</b>									
<b>Class 3</b>									
	<ul style="list-style-type: none"> <li>For circular conductors with max. diameter 17.5 mm</li> <li>For 1 busbar up to max. 12 mm × 10 mm</li> </ul>								
	50	2.5	A	<b>4NC51 12-2BC20</b>		1	1 unit	103	0.426
	60	2.5	A	<b>4NC51 13-2BC20</b>		1	1 unit	103	0.430
	75	2.5	A	<b>4NC51 15-2BC20</b>		1	1 unit	103	0.431
4NC51 12-2BC20									
<b>Class 1</b>									
	<ul style="list-style-type: none"> <li>For circular conductors with max. diameter 17.5 mm</li> <li>For 1 busbar up to max. 12 mm × 10 mm</li> </ul>								
	100	2.5	A	<b>4NC51 17-2CC20</b>		1	1 unit	103	0.340
	150	2.5	A	<b>4NC51 21-2CC20</b>		1	1 unit	103	0.327
	200	5	A	<b>4NC51 22-2CE20</b>		1	1 unit	103	0.339
	250	5	A	<b>4NC51 23-2CE20</b>		1	1 unit	103	0.345
4NC51 17-2CC20									
	<ul style="list-style-type: none"> <li>For circular conductors with max. diameter 28 mm</li> <li>For 1 busbar up to max. 30 mm × 10 mm</li> <li>For 2 busbars up to max. 25 mm × 5 mm</li> </ul>								
	200	5	A	<b>4NC52 22-2CE20</b>		1	1 unit	103	0.467
	250	5	A	<b>4NC52 23-2CE20</b>		1	1 unit	103	0.474
	300	5	A	<b>4NC52 24-2CE20</b>		1	1 unit	103	0.356
	400	5	A	<b>4NC52 25-2CE20</b>		1	1 unit	103	0.379
4NC52 22-2CE20									
	<ul style="list-style-type: none"> <li>For circular conductors with max. diameter 36 mm</li> <li>For 1 busbars up to max. 50 mm × 10 mm</li> <li>For 2 busbars up to max. 40 mm × 5 mm</li> </ul>								
	400	5	A	<b>4NC53 25-2CE20</b>		1	1 unit	103	0.452
	500	5	A	<b>4NC53 26-2CE20</b>		1	1 unit	103	0.406
	600	5	A	<b>4NC53 27-2CE20</b>		1	1 unit	103	0.425
	750	5	A	<b>4NC53 28-2CE20</b>		1	1 unit	103	0.379
4NC53 25-2CE20									
	<ul style="list-style-type: none"> <li>For circular conductors with max. diameter 45 mm</li> <li>For 1 busbar up to max. 60 mm × 10 mm</li> <li>For 2 busbars up to max. 60 mm × 10 mm</li> <li>For 3 busbars up to max. 60 mm × 5 mm</li> </ul>								
	1000	10	A	<b>4NC54 31-2CH20</b>		1	1 unit	103	0.660
	1250	10	A	<b>4NC54 33-2CH20</b>		1	1 unit	103	0.631
	1500	10	A	<b>4NC54 34-2CH20</b>		1	1 unit	103	0.669
4NC54 31-2CH20									

**4NC51 window-type current transformers, used as pin-wound transformers, Classes 1 and 3, from 5 A to 75 A**

Pin-winding increases the primary current of the current transformer. Consequently, window-type current transformers can also be used for low primary currents.

Basic type		4NC51 12	4NC51 13	4NC51 15	4NC51 17	4NC51 21	4NC51 22	4NC51 23
<b>Rated primary current</b>	A	50	60	75	100	150	200	250
<b>Rating</b>	VA	2.5	2.5	2.5	2.5	2.5	5	5
<b>Primary current to be measured</b>		Number of required pin windings						
	A	<b>Class 3</b>			<b>Class 1</b>			
	5	10	--	--	--	--	--	--
	10	5	6	--	10	--	--	--
	15	--	4	5	--	10	--	--
	20	--	3	--	5	--	10	--
	25	2	--	3	4	6	8	8
	30	--	2	--	--	5	--	--
	40	--	--	--	--	--	5	--
	50	--	--	--	2	3	4	5
	75	--	--	--	--	2	--	--



\* You can order this quantity or a multiple thereof.

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## 3VL Molded Case Circuit Breakers up to 1600 A

### General data

*General criteria for the selection of current transformers for measurement purposes*



4NC53 current transformer

<b>Standards</b>	IEC 60044-1, EN 60044-1
<b>Window-type current transformers</b>	The conductor to be measured (busbar or cable) is passed through the window opening and constitutes the primary circuit of the window-type current transformer. Pin-wound transformers: An economical solution especially for small primary currents of 5 A to 75 A is achieved when the conductor to be measured is pin-wound several times.
<b>Rated primary current <math>I_{pn}</math></b>	Current transformers can be continuously loaded with 1.3 times the rated primary current ( $I_{pn}$ ).
<b>Rated secondary current <math>I_{sn}</math></b>	
1 A	Particularly suitable for longer measuring leads. Cable losses of only 4% in contrast to 5 A current transformers.
5 A	5 A current transformers generate 25 times the power losses on measuring leads as compared with 1 A current transformers. These stray losses result in higher power in the case of long cables. Only recommended for use with short measuring leads.
<b>Accuracy class</b>	
Class 1	Operation measurement, internal metering Current error $\pm 1\%$ at $1 \times I_{pn}$ and $1.2 \times I_{pn}$
Class 3	Coarse measurement Current error $\pm 3\%$ at $0.5 \times I_{pn}$ and $1.2 \times I_{pn}$
<b>Rated power <math>P_n</math></b>	The rated power of transformers is specified in VA. The actual load rating should be similar to the rated power; a lower actual load rating (underburden) increases the overcurrent factor and measuring devices may be damaged in case of a short-circuit, a higher actual load rating (overburden) has a negative effect on the accuracy. With a frequency of 60 Hz the rated power increases to 1.2 times. With $16\frac{2}{3}$ Hz the output power decreases to $\frac{1}{3}$ of the rated power.
<b>Maximum voltage for equipment <math>U_m</math></b>	This is the rms value of the maximum voltage between the conductors of a system. For this voltage the insulation must be rated at normal operating conditions. 4NC5 current transformers are suitable for 720 V.
<b>Overcurrent limiting factor FS</b>	The overcurrent limiting factor is expressed using the characters FS and a factor, e. g. FS5 or FS10. When a short-circuit current flows through the primary winding of a current transformer, the load on the measuring devices connected to the current transformer is the lower the smaller the overcurrent limiting factor is.
<b>Rated short-time thermal current <math>I_{th}</math></b>	The rated short-time thermal current $I_{th}$ is the rms value of the primary current with a duration of one second, whose heat effect the current transformer can resist without being damaged in the event of a short-circuited secondary winding.
<b>Rated impulse current <math>I_{dyn}</math></b>	The rated impulse current $I_{dyn}$ is the highest instantaneous value of the current after a short-circuit whose force the current transformer can resist without being damaged. The rated impulse current is specified as peak value.

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### General data

<b>Standards</b>		IEC 60044-1, EN 60044-1
<b>Rated primary current <math>I_{pn}</math></b>	A	50 ... 1500, 5 ... 75, for use as pin-wound transformer for low currents
<b>Rated secondary current <math>I_{sn}</math></b>	A	1 or 5
<b>Maximum voltage for equipment <math>U_m</math></b>	V	720
<b>Frequency</b>	Hz	50 ... 60
<b>Rated overcurrent limiting factor FS</b>		FS5
<b>Max. uninterrupted current</b>		$1.2 \times I_{pn}$
<b>Rated short-time thermal current <math>I_{th}</math></b>		$60 \times I_{pn}$
<b>Rated impulse current <math>I_{dyn}</math></b>		$2.5 \times I_{th}$ or $150 \times I_{pn}$
<b>Accuracy class</b>		1 (3)
<b>Ambient temperature</b>	°C	+55 at $1.0 \times I_{pn}$ °C +40 at $1.2 \times I_{pn}$ °C -10 minimum value
<b>Max. busbar temperature</b>	°C	+120
<b>Molded-plastic class</b>		E (max. 120 °C continuously)
<b>Insulation</b>		Thermoplast enclosure, halogen-free
<b>Test voltage</b>	kV	3 AC
<b>Secondary terminals</b>		Double terminals using M4 captive screws, finger-safe to EN 61140
Solid	mm <sup>2</sup>	$2 \times (2.5 \dots 6)$
Two-wire	mm <sup>2</sup>	$2 \times (1.5 \dots 4)$
<b>Terminals with same polarity</b>		Primary → secondary K/P1 → k/S1 L/P2 → l/S2
<b>Mounting</b>		Either busbar or foot mounting

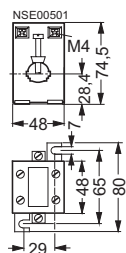
# 3VL Molded Case Circuit Breakers

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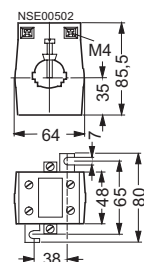
Project planning aids

### 4NC current transformers for measuring purposes

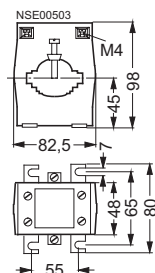
4NC51



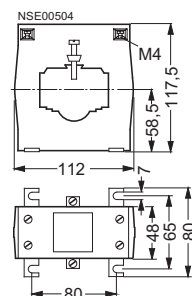
4NC52



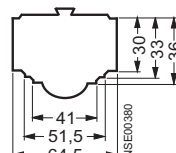
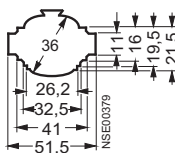
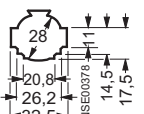
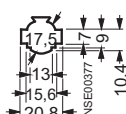
4NC53



4NC54

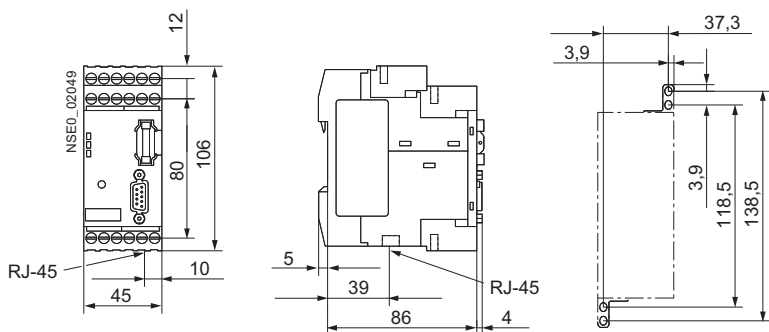


Window openings

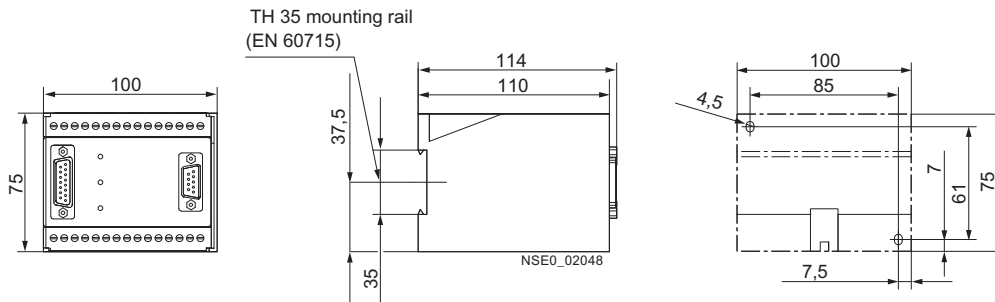


	Number	1	2	3	1	2	3	1	2	3
- For busbars		1	1	2	1	2	3	1	2	3
Width x Thickness mm		12 x 5 12 x 10 20 x 5	20 x 5 20 x 10 25 x 5 30 x 5 30 x 10	20 x 5	25 x 5 30 x 5 30 x 10 40 x 5 40 x 10 50 x 5 50 x 10	25 x 5 30 x 5 40 x 5	40 x 5	40 x 10 40 x 5 40 x 10 50 x 5 50 x 10 60 x 5 60 x 10	40 x 5 40 x 10 50 x 5 50 x 10 60 x 5 60 x 10	40 x 5 40 x 10 50 x 5 50 x 10 60 x 5 60 x 10
- For circular conductors	max. mm	17.5 Ø	28 Ø		36 Ø			45 Ø		

### COM20/COM21 (communication module for SENTRON 3VL)



### COM10/COM11 (communication module for SENTRON 3VL)



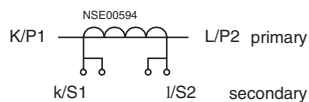
# 3VL Molded Case Circuit Breakers

## 3VL Molded Case Circuit Breakers up to 1600 A

### Project planning aids

#### *4NC current transformers for measuring purposes*

Terminal designation acc. to IEC 60185/VDE 0414-1



### More information

#### *Manual for the SENTRON 3VL circuit breaker*

This manual contains additional technical information, covering a product description, mode of operation, electrical wiring system and retrofitting.

The manual and operating instructions are available in PDF format at:

<http://www.siemens.com/lowvoltage/manuals>

#### SENTRON manual for communication solutions

Free download at

<http://www.siemens.com/lowvoltage/manuals>

See also the chapter "Air Circuit Breakers" under "3WL Air Circuit Breakers/Non-Automatic Air Circuit Breakers up to 6300 A (AC)", "Accessories/Components".