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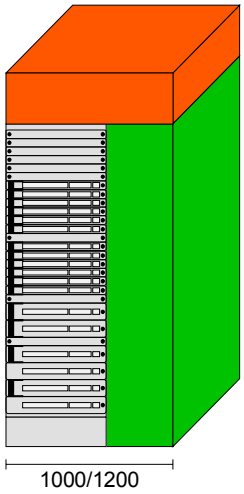
General

In-line-type switching devices with supply-side plug-in contact offer an alternative to the withdrawable unit design. With their modular design, they enable easy and quick conversion or replacement under operating conditions.

Structure and Function

The switching device compartment has a height of 1700 mm and is intended to accommodate plug-in modules with a 185 mm phase spacing. The cable connection compartment is located on the right.

Cable connection right-hand side



Form 1
Form 3b
Form 4b
≤ IP 41 ventilated

up to 630 A

OFPD

In-line type switching devices for outgoing feeders up to 630 A available in the following designs:

- Fuse module with fuses
- Switch-disconnector-fuse (single-break)
- Switch-disconnector-fuse (double-break)
  in each of the above cases with or without electronic fuse monitoring
- Switch-disconnector without fuses

Device compartment (200 mm to 400 mm high) for auxiliary devices and instruments consisting of:

- Door
- Mounting plate
- With and without 400 A connection module on plug-on bus system
- Available device installation depth 180 mm

Installation of Instruments

1 = Measuring instrument 48 x 48 mm

The plug-in modules enable to accommodate a measuring instrument 48 x 48 mm with 1-pole measuring. With 3-pole measuring the measuring instruments can be mounted into additional switching device compartment doors or into the cable compartment door. The belonging current transformers are installed on load side.

Plug-on Bus System (3 and 4 pole)

The plug-on bus system with the phase conductors L1, L2, L3 is located on the rear of the cubicle. The IP 20 degree of protection is achieved by the optional shock hazard protection with tap openings and it enables to replace the plug-in modules under operating conditions.

Rated currents of Plug-on bus system

Cross-section	Rated current I_n depending on ambient temperature [A] ventilated						
	20°	25°	30°	**35°**	40°	45°	50°
80x10	2260	2210	2155	**2100**	2045	1985	1925

Short-circuit strength
I_{pk} = 110 kA
I_{cw} = 50 kA, 1 s

PE, PEN and N conductor bars are installed in the cable connection compartment. With 4-pole network systems the N conductor is assigned to the phase conductors L1, L2, L3.

PE cross-section 1x40x5
PEN, N cross-section 1x40x10 or 2x40x10

Cable Connection Compartment

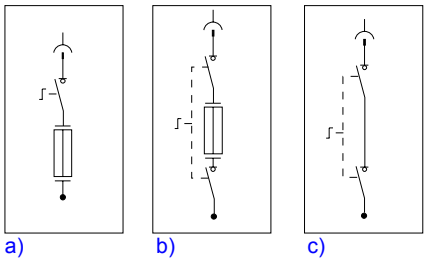
Cable connection possibilities

Plug-in module type	Rated current [A]	**max. number and cross-sections of connected cables (3 ½-conductors)** [mm²]
3NJ6110	160	1 x 95
3NJ6120	250	1 x 240
3NJ6140	400	2 x 240
3NJ6160	630	2 x 240

Switch-disconnector fuses 3NJ61

Rated currents of switch-disconnector fuses 3NJ6

3NJ61	Rated current	Rated current I_n depending on ambient temperature [A] ventilated						
Typ	[A]	20°	25°	30°	**35°**	40°	45°	50°
3NJ6110	160	137	134	130	**125**	120	112	106
3NJ6120	250	220	215	210	**200**	190	180	170
3NJ6140	400	350	340	330	**320**	305	290	270
3NJ6160	630	550	535	520	**500**	475	450	425



a) Switch-disconnector-fuse with fuse element featuring independent manually-actuated spring operating mechanism for LV HRC fuses (DIN), in sizes 00, 1, 2 and 3

b) Same as a), but with interruption on both sides of the fuses

c) Switch-disconnector with independent manually-actuated spring operating mechanism (same sizes as a)

Installation data of switch-disconnector-fuse modules 3NJ61

3NJ61 Type	Rated current [A]	Size	Height requirements of modules [mm] 3 pole	4 pole	Max. quantity per cubicle pieces 3 pole	4 pole
3NJ6110	160	00	50	100	34	17
3NJ6120	250	1	100	150	17	11
3NJ6140	400	2	200	250	8	6
3NJ6160	630	3	200	250	8	6

Further installations

Designation	**Height requirement**
Blanking covers for empty compartments/connection module	50 mm
Device compartment	200 mm *
Device compartment	300 mm *
Device compartment	400 mm *
400 A connection module for device compartment	+ 50 mm
Group alarm indicator 1 - 35 plug-in modules (AC)	--
Group alarm indicator 1 - 50 plug-in modules (DC)	--

*) max. useful device installation depth 180 mm

Rated Currents

Rated currents of device sizes = 0,8 x I_N of the largest fuse link
for total current of all feeders in the cubicles ≤ 2000 A

Size 00 50 mm high		Size 1 100 mm high		Size 2 200 mm high		Size 3 200 mm high	
I_N = 160 A Fuse	Rated current = 125 A	Fuse I_N = 250 A	Rated current = 200 A	Fuse I_N = 400 A	Rated current = 320 A	Fuse I_N = 630 A	Rated current = 500 A

Rated currents of small fuse links of one size = 0,8 x I_N of the fuse link

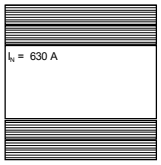
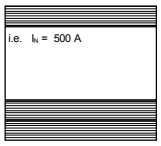
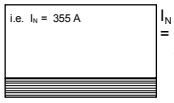
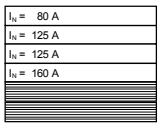
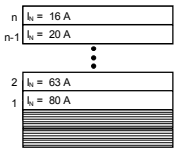
Size 00 e.g. Fuse	Continuous load current	Size 1 e.g. Fuse	Continuous load current	Size 2 e.g. Fuse	Continuous load current	Size 3 e.g. Fuse	Continuous load current
I_N = 125 A	x 0,8 =100 A	I_N = 224 A	= 180 A	I_N = 355 A	= 284 A	I_N = 500 A	= 400 A
I_N = 80 A	x 0,8 = 64 A	I_N = 125 A	= 100 A	I_N = 315 A	= 250 A	I_N = 400 A	= 320 A

Project Planning Rules

Project planning rule for ventilated cubicles with plug-in modules 3NJ6:
The diversity factor detailed in IEC 60439-1 applies to the completely assembled cubicle. If these notes are not observed, premature aging of fuses and uncontrolled release may occur as the result of local overheating.
All data refers to ambient temperatures of the switchboard amounting to 35 °C on the 24 h average.

Conversion factors for other ambient temperatures:

Ambient temperature of the system [°C]	20	25	30	**35**	40	45	50	55
Conversion factor	1,1	1,07	1,04	**1,00**	0,95	0,9	0,85	0,8

<table>
<tr><td rowspan="2">Rated current of fuse links:</td><td>Total current of all feeders in the cubicle
≤ 2000 A</td><td colspan="2">0.8 x I_N of the fuse</td></tr>
<tr><td>Permitted exceptions:
Total current of all feeders in the cubicle
≤ 1500 A</td><td colspan="2">Sizes 00 to 2 0.90 x I_N
Size 3 0.85 x I_N
Group formation is no longer permitted here.
A 50 mm high blanking cover must assigned to each size 00 and 1 device.</td></tr>
<tr><td rowspan="2">Plug-in module arrangement:</td><td></td><td colspan="2">Installed in the cubicle from bottom to top, descending from size 3 to size 00</td></tr>
<tr><td>Plug-in modules
Size 2
Size 3</td><td colspan="2">In the case of
> 280 A continuous load current
> 440 A continuous load current
If possible, distribute plug-in modules over various cubicles.</td></tr>
<tr><td>Blanking covers
with ventilation slots
50 mm high</td><td>Permissible current
(continuous load current at 35 °C system ambient temperature)</td><td>Total covered height to be assigned
(see right-hand side for recommended arrangement of blanking covers)</td><td>Arrangement of plug-in modules + belonging blanking covers</td></tr>
<tr><td rowspan="2">Plug-in modules size 3
(group formation not permitted)</td><td>≥ 440 A to 500 A
of each single device</td><td>200 mm = 4 pieces per plug-in module</td><td> 
I_N x 0.8 = 500 A
= permitted continuous load current</td></tr>
<tr><td>< 440 A
of each single device</td><td>150 mm = 3 pieces per plug-in module</td><td> 
I_N x 0.8 = 400 A
= permitted continuous load current</td></tr>
<tr><td>Plug-in modules size 2
(group formation not permitted)</td><td>≤ 320 A
of each single device</td><td>50 mm = 1 pieces per plug-in module</td><td> 
I_N x 0.8 = 284 A
= permitted continuous load current</td></tr>
<tr><td>Groups of plug-in modules
Sizes 00 and 1</td><td>≤ 400 A
= Total current of the fuse links Group x 0.8</td><td>100 mm = 2 pieces per group</td><td> 
Total I_N x 0.8
≤ 400 A
= permitted continuous load current</td></tr>
<tr><td>Groups of unlimited size with plug-in modules size 00</td><td>≤ 64 A
of each single device</td><td>100 mm = 2 pieces per group
In combination with sizes 2 and 3 in one cubicle, the Size 2 rated currents = 280 A and Size 3 = 440 A.
Blanking covers must be assigned to devices belonging to Sizes 2 and 3 (see above).</td><td> 
(Total 1 to n I_N) x α
= permitted continuous load current
α = rated load factor
n = 4 and 5 α = 0,8
n = 6 to 9 α = 0,7
n ≥ 10 α = 0,6</td></tr>
</table>

Allocation of blanking covers with ventilation slots, 50 mm high:

Group Size 00 Total current of group **≤ 500 A**	Permitted continuous load current **≤ 400 A**	**Group Size 1** Total current of group **= 500 A**	Permitted continuous load current **≤ 400 A**	**Single device Size 2**	Permitted continuous load current of each single device **≤ 320 A**	**Single device Size 3**	Permitted continuous load current of each single device **≤ 440 A**
I_N = 80 A I_N = 125 A I_N = 125 A I_N = 160 A blanking cover	Total current of group 490 A x 0,8 = 392 A ✓ 2 blanking covers/group	Fuse I_N = 250 A Fuse I_N = 250 A blanking cover blanking cover	Total current of group 500 A x 0,8 = 400 A ✓ 2 blanking covers/group	e.g. Fuse I_N = 355 A blanking cover	0.8 x I_N = 280 A ✓ 1 blanking cover/device	blanking cover e.g. Fuse I_N = 500 A blanking cover blanking cover	0.8 x I_N = 400 A ✓ 3 blanking covers/device
		Group **Size 00 and 1**				blanking cover blanking cover e.g. Fuse I_N = 630 A blanking cover blanking cover	440 A > I **≤ 500 A** 0.8 x I_N = 500 A ✓ 4 blanking covers/device
		I_N = 40 A I_N = 100 A I_N = 100 A Fuse I_N = 250 A blanking cover blanking cover	Total current of group 490 A x 0,8 = 392 A ✓ 2 blanking covers/group				

Group Size 00 Size 00 with $I_N \leq$ 80 A	Permitted continuous load current of the single device **≤ 64 A** Any group size, up to 33 plug-in modules/cubicle	**Example:** Group Size 00 and Size 2 and 3	For combinations of Size 00 with $I_N \leq$ 80 A with other sizes, in the cases of sizes 2 to 3 the rated currents must be reduced to 0.7 x I_N:
I_N = 20 A	16 A	I_N = 20 A	The allocations of blanking covers for device sizes 1 to 3 must be observed (see adjacent example of an incomplete line-up of cubicle components)!
I_N = 32 A	26 A	I_N = 32 A	
I_N = 32 A	26 A	I_N = 32 A	
I_N = 40 A	32 A	I_N = 40 A	
I_N = 40 A	32 A	I_N = 40 A	
I_N = 50 A	40 A	I_N = 50 A	
I_N = 50 A	40 A	I_N = 50 A	
I_N = 80 A	64 A	I_N = 80 A	
I_N = 80 A	64 A	I_N = 80 A	
I_N = 80 A	64 A	I_N = 80 A	
I_N = 80 A	64 A	I_N = 80 A	
I_N = 80 A	64 A	I_N = 80 A	
blanking cover blanking cover	2 blanking covers/group	blanking cover blanking cover	
		Size 2 I_N = 400 A blanking cover blanking cover	Rated current: **280 A**
		Size 3 I_N = 630 A blanking cover blanking cover	Rated current: **440 A**