

**Webbinariet startar
alldes strax**

Dagens ämne
Undvika ”vanliga” misstag vid
apparatskåpsdesign enligt UL 508A

Webbinarium

Undvika “vanliga” misstag vid apparatskåpsdesign enligt UL 508A

Joakim Hagernäs, 2020-12-17



Undvika “vanliga” misstag vid apparatskåpsdesign enligt UL 508A

Agenda

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- 1 Tillämpning av fel standard
- 2 Ej koll på “feeder circuit” och “branch circuit” vilket påverkar produktval
- 3 Använda ej UL-listade produkter eller UL-listade produkter fast för fel användningsområde
- 4 Förvirring gällande dvärgbrytare (MCB), “Circuit Breaker” eller “Supplementary Protector”
- 5 Fel märkning av nätspänning på märkskylten, “Delta rating” vs “Slash rating” som påverkar produktval
- 6 Ofullständig lösning för ”door locking”
- 7 Felaktigt vald skyddsprodukt av frekvensomriktare
- 8 Avsaknad av SCCR rating på märkskylten eller att den är felaktigt beräknad
- 9 Support från Siemens

Disclaimer

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The typical circuit diagrams and interpretations of the standard are not binding and do not claim to be complete regarding configuration, equipment or any other eventuality. They are not customer-specific solutions and are only intended to provide assistance with typical tasks.

Each user of this presentation is responsible for correct operation of the products described. This presentation does not relieve you of the responsibility for safe handling when using, installing, operating and maintaining equipment.

When writing these guidelines, many tables and texts were taken directly from the relevant standards. Therefore it is always important to check whether the cited passages are still up to date. The final declaration as to whether an application complies with the valid standards must be made by the user of this documentation.

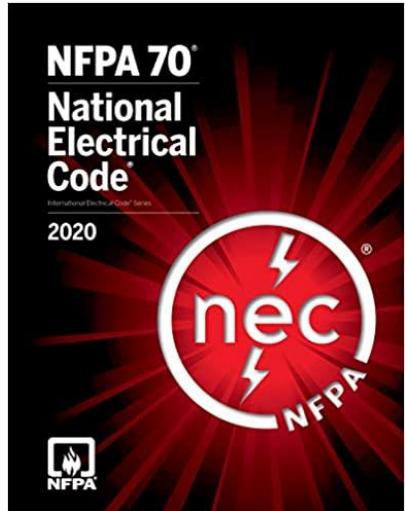
The information provided in this brochure contains merely descriptions or characteristics of performance which in case of actual use do not always apply as described or which may change as a result of further development of the products and standards. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract.

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Vanliga misstag #1

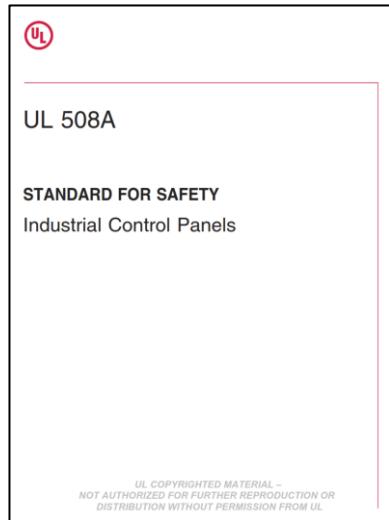
Användning av fel standard och "Code"

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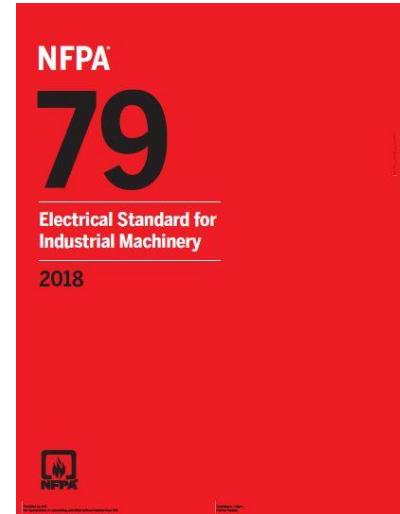
National Electrical Code or NFPA70

2020 Edition (ej pdf)



**UL508A
Industrial Control Panels**

2018 3rd Edition 3rd revision



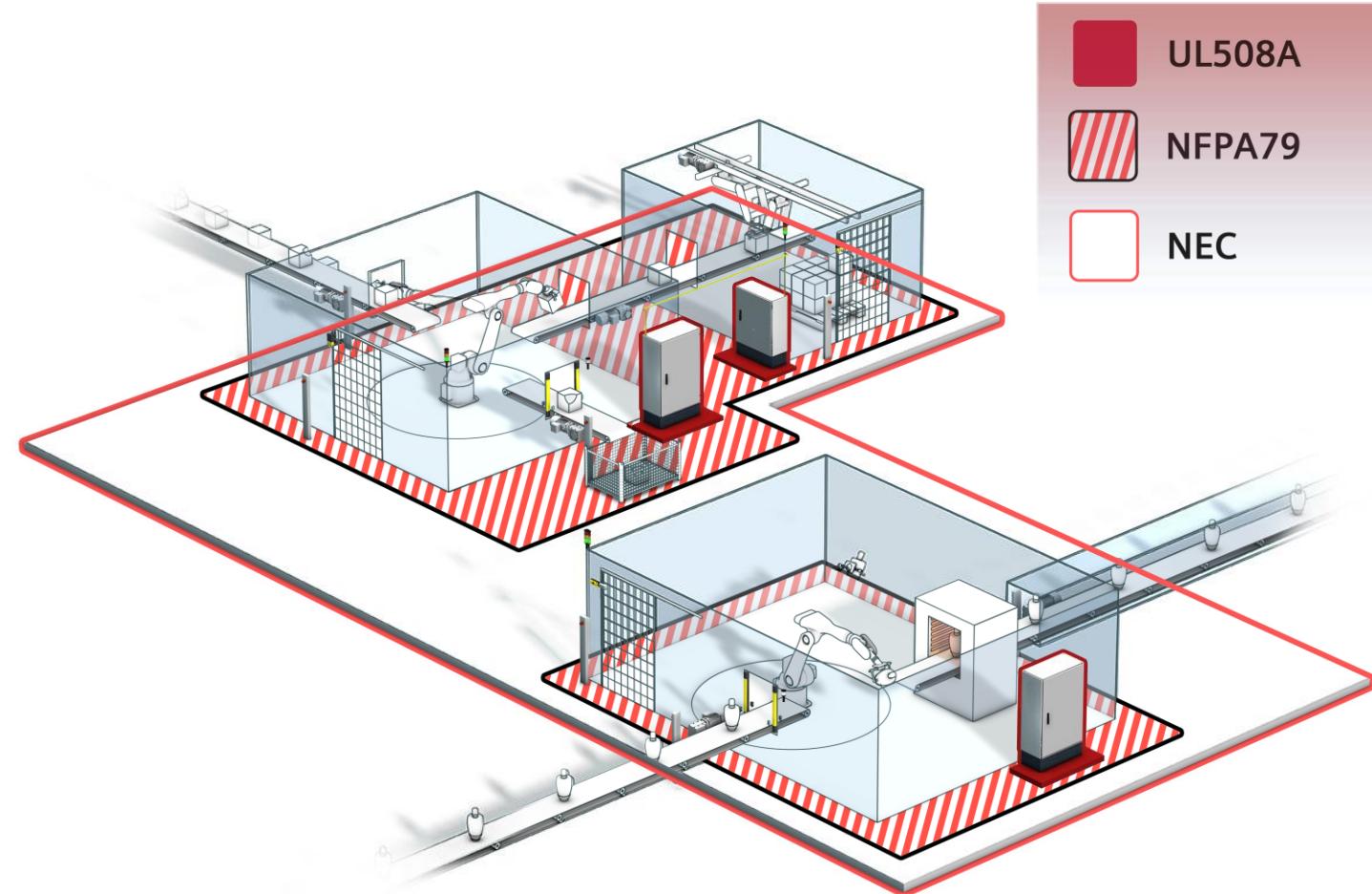
**NFPA79
Industrial Machinery**

2018 Edition (2021)

Vanliga misstag #1

Gränssnitt standarder och “code” Nordamerika

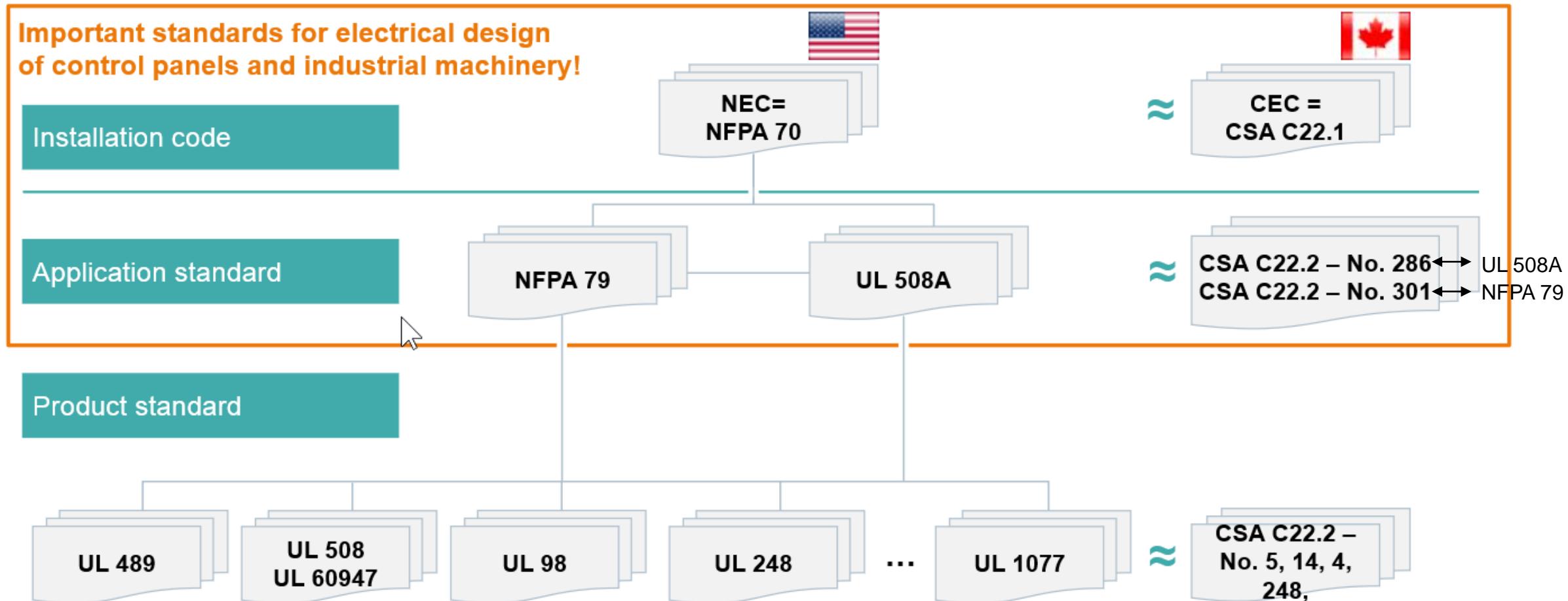
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Vanliga misstag #1

Gränssnitt standarder och “code” Nordamerika

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Vanliga misstag #1

Håll dig uppdaterad om senaste versionen av UL 508A

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The screenshot shows the UL Standards Sales Site interface. At the top, there's a navigation bar with links for 'Buy UL Standards Online' and 'Help | My Cart | Sign In'. Below the navigation is a search bar with dropdowns for 'English' and 'US Dollar'. The main menu includes 'Browse & Buy UL Standards', 'UL Resources', 'Other Products', and 'Sales Site Info'. On the left, a sidebar contains links for 'Complete List of UL Documents', 'View Top Sellers', 'What's New', 'Request a Quote', 'UL Certification Customer Information', and a note about developing standards for the Canadian Market. The central search results page displays a search for '508A'. The results show '1 Results' for 'Standard for Industrial Control Panels (Ed. 3)' by UL, with an edition date of April 24, 2018, and type 'ulstd'. A 'QUICK BUY' button is visible next to the result.

shopulstandards.com/catalog.aspx

Vanliga misstag #1

Håll dig uppdaterad om senaste versionen av NFPA 79

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The screenshot shows a web browser window with the URL nfpa.org/Codes-and-Standards/All-Codes-and-Standards>List-of-Codes-and-Standards?keyword=79. The page title is "List of NFPA Codes and Standard". The header includes the NFPA logo, navigation links for Catalog, Electrical Solutions, Xchange™, NFCC™, NFPA Journal®, Sparky®, Fire Sprinkler Initiative®, Firewise USA®, and NFPA Conference & Expo®. Promotional buttons for "SAVE 20% ON NEC TOOLKITS", "SIGN IN", and "CART (0)" are also present. The main content area features a banner with the text "NATIONAL FIRE PROTECTION ASSOCIATION" and "The leading information and knowledge resource on fire, electrical and related hazards". Below the banner, a red navigation bar contains links for CODES & STANDARDS, ELECTRICAL SOLUTIONS, NEWS & RESEARCH, TRAINING & CERTIFICATION, PUBLIC EDUCATION, and MEMBERSHIP. A large image of two industrial workers is displayed. The main heading "CODES & STANDARDS" is centered above the search results. The search results table has columns for "Code/Standard #" and "Name". One result is listed: "NFPA 79 Electrical Standard for Industrial Machinery". The search interface includes a search bar with the number "79", a "SEARCH" button, and filter options for "Topic", "Cycle", and "Development Stage". A "CLEAR ALL FILTERS" button is located at the bottom right of the search results table.

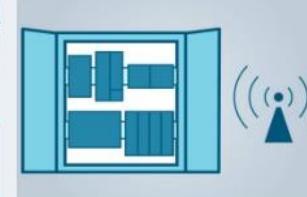
Code/Standard #	Name
NFPA 79	Electrical Standard for Industrial Machinery

Google "List of NFPA codes and standards"

Vanliga misstag #1

Håll dig uppdaterad via white papers och webbinarier

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European and international market	Market access to North America	Control panels for the global market	Tools and electrical Engineering	Temperature rise in the control panel	Electromagnetic compatibility
▼	▲	▼	▼	▼	▼

CSA- and UL-standards

White papers

- [Short-circuit current rating \(SCCR\) of industrial control panels](#)
- [Dimensioning and protection of control circuits according to UL](#)
- [Control panels for North America – changes of the relevant standards in the USA and Canada](#)
- [Control panels for Canada - changes of the relevant standards](#)
- [Type "1" and Type "2" Coordination for contactors and motor starters acc. to UL 60947-4-1](#)
- [NFPA 79 – New Edition 2018](#)
- [Changes in the UL 508A 3rd Edition standard for industrial control panels](#)



Webinars: Optimize your control panel with practice-oriented expert know-how!

Looking for additional information on standards and codes or some clever engineering tips for your control panel? Learn from our experts. Take a look at the upcoming webinars or use our recorded ones from the past.



➤ [To webinars](#)

siemens.com/controlpanel

Vanliga misstag #2

Ej koll på “feeder circuit” och “branch circuit”

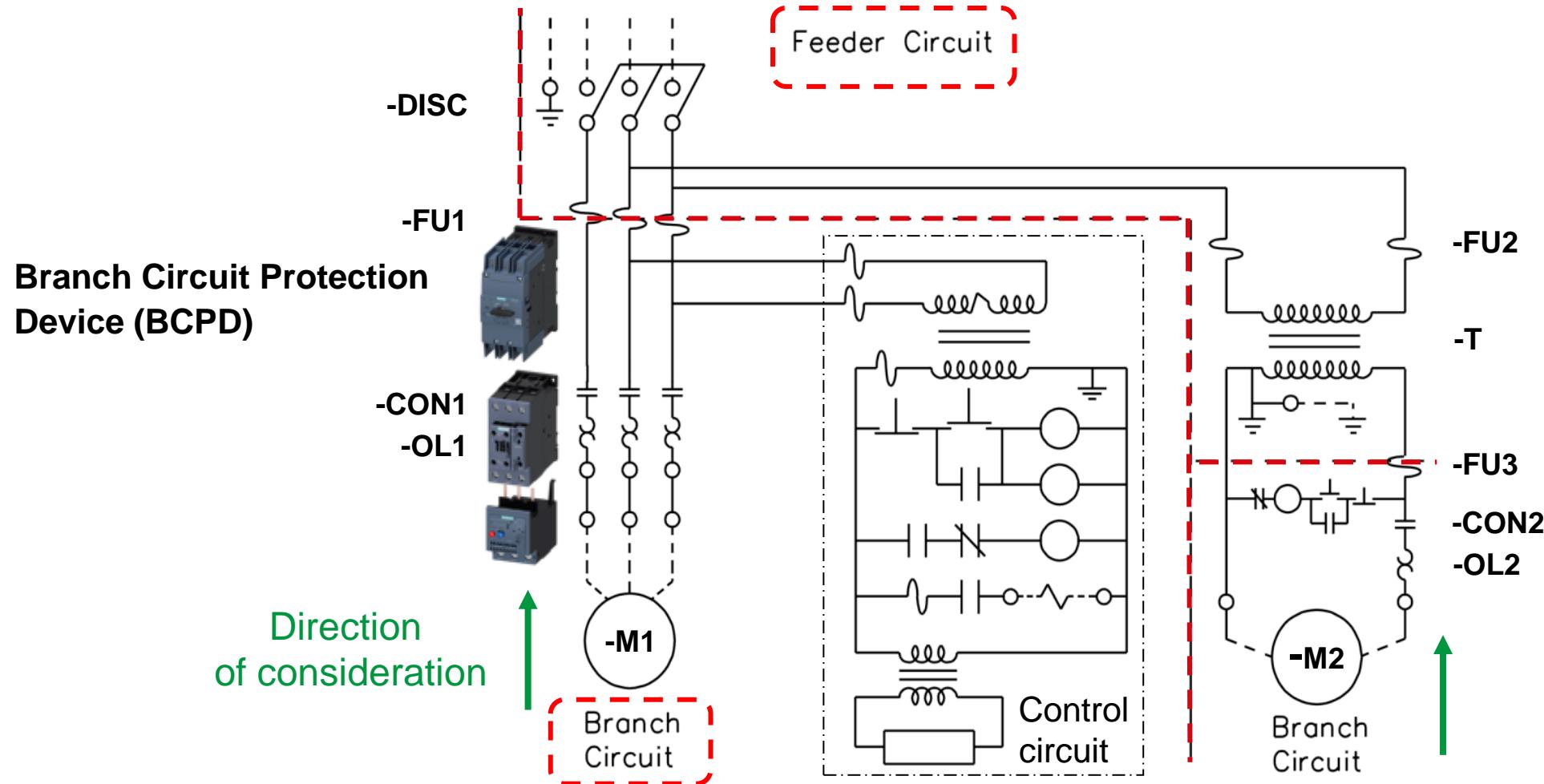
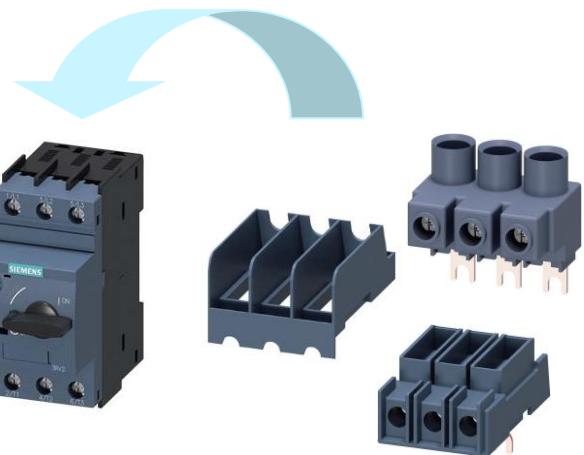
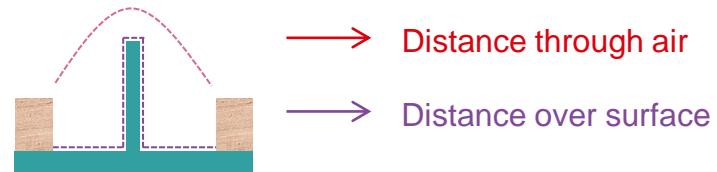


Illustration from UL508A 3rd Edition – Figure 6.3

Vanliga misstag #2

Ej koll på "feeder circuit" och "branch circuit"

“Spacings” av spänningssförande delar med olika polaritet



Feeder Circuits: UL 508A Tab. 10.2

0 – 125 V	126 – 250 V	251 – 600 V
½ in. (through air)	¾ in. (through air)	1 in. (through air)
¾ in. (over surface)	1 ¼ in. (over surface)	2 in. (over surface)

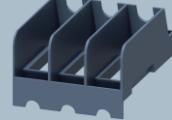
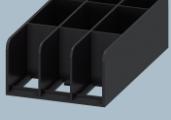
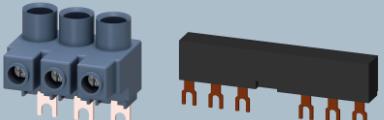
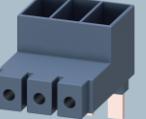
Branch circuits, (control circuits): UL 508A Table 10.1

0 – 50 V	51 – 150 V	151 – 300 V	301 – 600 V
1/16 in. (through air)	1/8 in. (through air)	1/4 in. (through air)	3/8 in. (through air)
1/4 in. (over surface)	3/8 in. (over surface)	1/2 in. (over surface)	1/2 in. (over surface)

Vanliga misstag #2

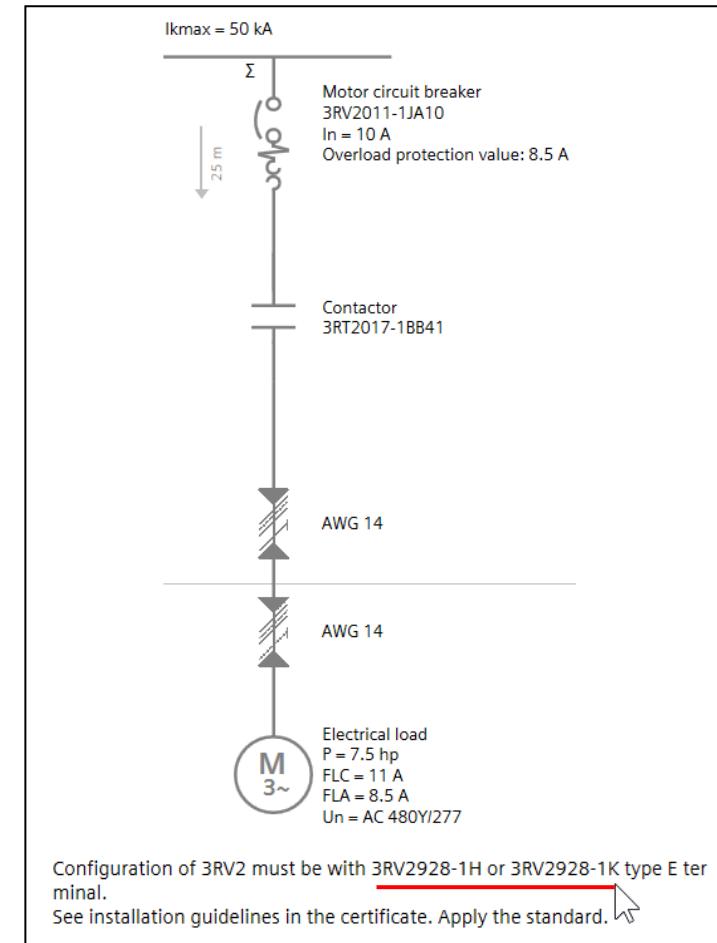
Ej koll på “feeder circuit” och “branch circuit”

Katalog IC10

3RV20..	Strl S00	Strl S0	Strl S2	Strl S3
Inställningsomr. överlast In [A]	0,16 ... 16	0,63 ... 40	14 ... 45	52 ... 80
Phase barrier		Behövs ej för 65 kA varianten		-----
Terminal block		Behövs ej för 65 kA varianten	-----	
3-phase infeed terminal			-----	-----

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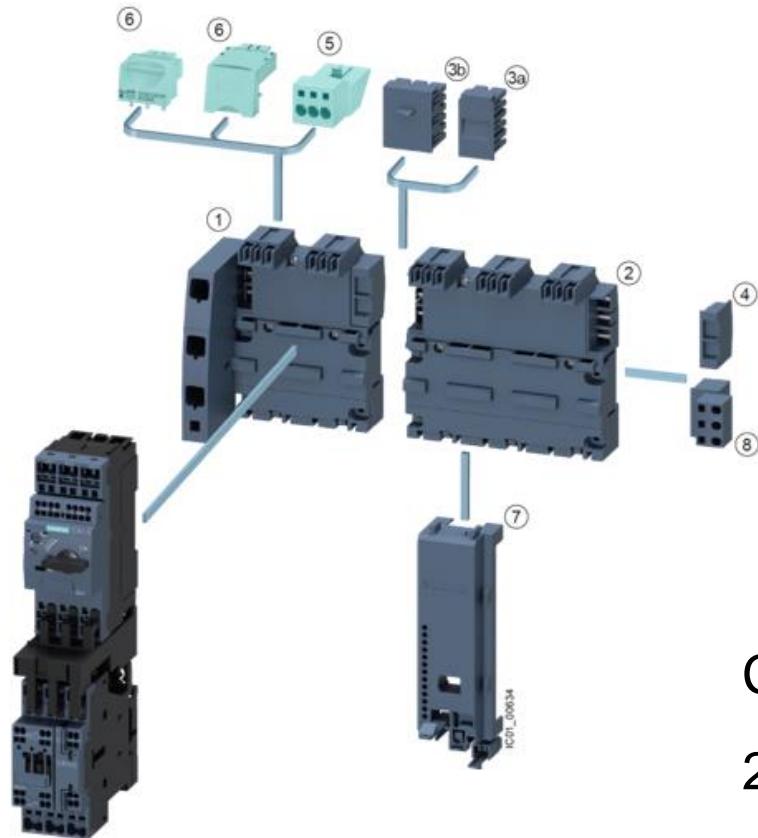
TIA Selection Tool - Load feeder
configuration + (UL)



Vanliga misstag #2

Ej koll på “feeder circuit” och “branch circuit”

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Certificate of Compliance

COC of the MSPCMC 3RV20

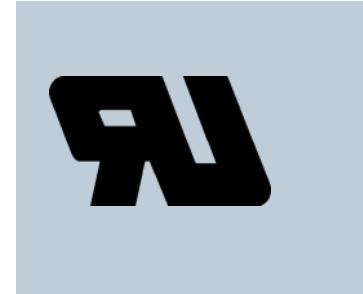
20111220-E156943



The devices may be used with Busbar systems, Cat. No. 3RV2917. In these applications, the incoming line terminal to the busbar systems has spacings not less than 2 in. (50.8 mm) measured over surface, and 1 inch (25.4 mm) through air.

Vanliga misstag #3

Använda ej UL-listade produkter eller UL-listade produkter fast för fel användningsområde



- To use recognized products, the so-called **CoA** (Conditions of Acceptability) are required
- The installation engineer requires "special" instructions = engineering supervision
- For UL-certified panel builders, UR devices must be listed in the file (Procedure described only).

Vanliga misstag #3

Använda ej UL-listade produkter eller UL-listade produkter fast för fel användningsområde

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ul.com/productiq

UL Product iQ™

SEARCH

Keyword: manual motor controller

UL Category Control Number: NLRV.E47705

Company Name: Value Contains: siemens ag

File Number: Click to view and filter values

Location: Click to view and filter values

Add Filter

Cancel Reset Save Search

Document Name	Company Name	UL CCN Description
NLRV.E47705	SIEMENS AG	Motor Controllers, Manual
NLRV.E498932	SIEMENS AG	Motor Controllers, Manual
NLRV.E302554	SIEMENS AG	Motor Controllers, Manual

UL Certificate of Compliance

siemens.com/sios

Industry Online Support International Language

Home Product Support

Filter criteria for entries

All Products My Products

Product tree All Enter search term...

Product: 3RT2016-1BB41 Entry type: Certificate (1)

Certificate type: All Certificate

3RT2016-1BB41 CONTACTOR,AC3:4KW 1NO DC24V Power contactor, AC-3 9 A, 4 kW / 400 V 1 NO, 24 V DC 3

1 Entries Filtered by '3RT2016-1BB41' and 'Certificate' and 'UL'

Entries per page: 20 | 50 | 100

Actions

Certificate General Product Approval, UL, UL

UL Certificate of Compliance 20200312-E31519 For products: 3RT201, 3RT231, 3RT251, 3RT261 All products

Entries per page: 20 | 50 | 100

Vanliga misstag #3

Använda ej UL-listade produkter eller UL-listade produkter fast för fel användningsområde



Manual motor controller



Magnetic motor controller



Solid state motor controller



Molded Case Switch UL489



Manual self-protected combination motor controller
eller
Manual motor controller



Fuse class CC



Supplementary Protector 5SY



Circuit Breaker
UL489



Vanliga misstag #3

Använda ej UL-listade produkter eller UL-listade produkter fast för fel användningsområde

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CCN code → CCN = Category Control Number

Exempel:

Produkt	Magnetic motor controllers (Kontaktorer)	Manual motor controllers
Standard	UL508 – Industrial Control Equipment (UL60947)	
	NLDX	NLRV
	NLDX2	NLRV2

Vanliga misstag #3

Använda ej UL-listade produkter eller UL-listade produkter fast för fel användningsområde

Section [30](#) - Disconnect means meeting the component selection requirements

30.1.1	Listed Molded case circuit breaker	UL 489	DIVQ	
30.1.1	Recognized Instantaneous-trip circuit breaker	UL 489	DKPU2	Procedure described only
30.1.2	Listed Molded case switch	UL 489	WJAZ	
30.1.34	Listed Enclosed switch	UL 98	WIAK	
30.1.34	Listed Open Type Switch	UL 98	WHTY	
30.1.34	Recognized Switch unit	UL 98	WHTY2	
30.1.45	Listed Manual motor controller	UL 508	NLRV	Marked "Suitable as motor disconnect"
30.1.45	Recognized Manual motor controller	UL 508	NLRV2	Procedure described only
30.1.5	Listed Combination motor controller	UL 508	NKJH	Self-protected combination motor controllers must be supplied with all required accessory parts specified with Listing mark
30.1.67	Listed Circuit Breaker Accessories, Disconnect handles	UL 489	DIHS	Any disconnect handle marked for use with circuit breaker

www.ul.com/UL508A-SupplementSA

Section [31](#) - Overcurrent protective devices meeting the component selection requirements for branch circuit protection

31.1.1	Listed Molded case circuit breaker	UL 489	DIVQ	
31.1.1	Recognized Instantaneous-trip circuit breaker	UL 489	DKPU2	Procedure described only
31.1.1	Listed Low Voltage AC Power Circuit Breakers	UL 1066	PAQX	
31.1.2	Listed Class CC fuses	UL 248-1, UL 248-4	JDDZ	
31.1.2	Listed Class G fuses	UL 248-1, UL 248-5	JDDZ	
31.1.4	Listed Self-protected combination motor controller	UL 508	NKJH	Must be supplied with all required accessory parts specified with Listing Mark
31.1.4	Listed Manual Self-protected combination motor controller	UL 508	NKJH	Must be supplied with all required accessory parts specified with Listing Mark. Separate Motor controllers must be marked for use with manual self-protected combination motor controller.

Vanliga misstag #3

Använda ej UL-listade produkter eller UL-listade produkter fast för fel användningsområde

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Molded Case Switch UL 489



Manual motor controller UL 508



Manual self-protected Combination motor controller UL 508

eller



Manual motor controller UL 508

Nedan är utdrag från UL 508A 3rd edition

32.1.3 A manual motor controller and a combination motor controller that complies with the Standard for Industrial Control Equipment, UL 508, shall not be located in the feeder circuit and shall not be relied on to provide overcurrent protection of the feeder.

30.3.3 A manual motor controller marked "Suitable as motor disconnect" shall be installed only on the load side of the branch circuit protective device.

Vanliga misstag #3

Difference of 3LD20/25 and 3LD5

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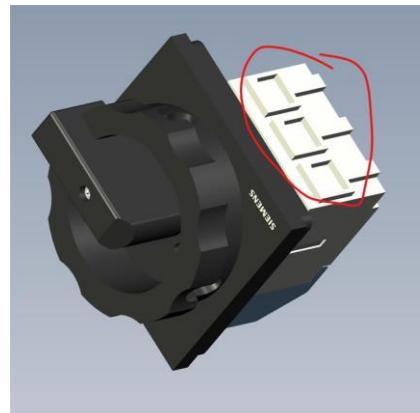
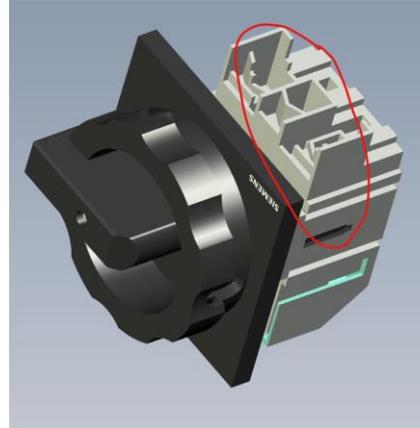
Increased air and
creepage distances



Molded Case Switch UL 489

Bigger frame size

Manual motor controller UL 508



For the respective size of 3LD2
always one frame size bigger in
3LD5 due to requirements in UL /
NFPA standards. So, for example
3LD25 (63A) = 3LD50 (30A)

Also bigger air and creepage
distances on the terminals due to
requirements in UL / NFPA
standards.

Nedan är utdrag från UL 508A 3rd edition

75.4 Disconnecting means

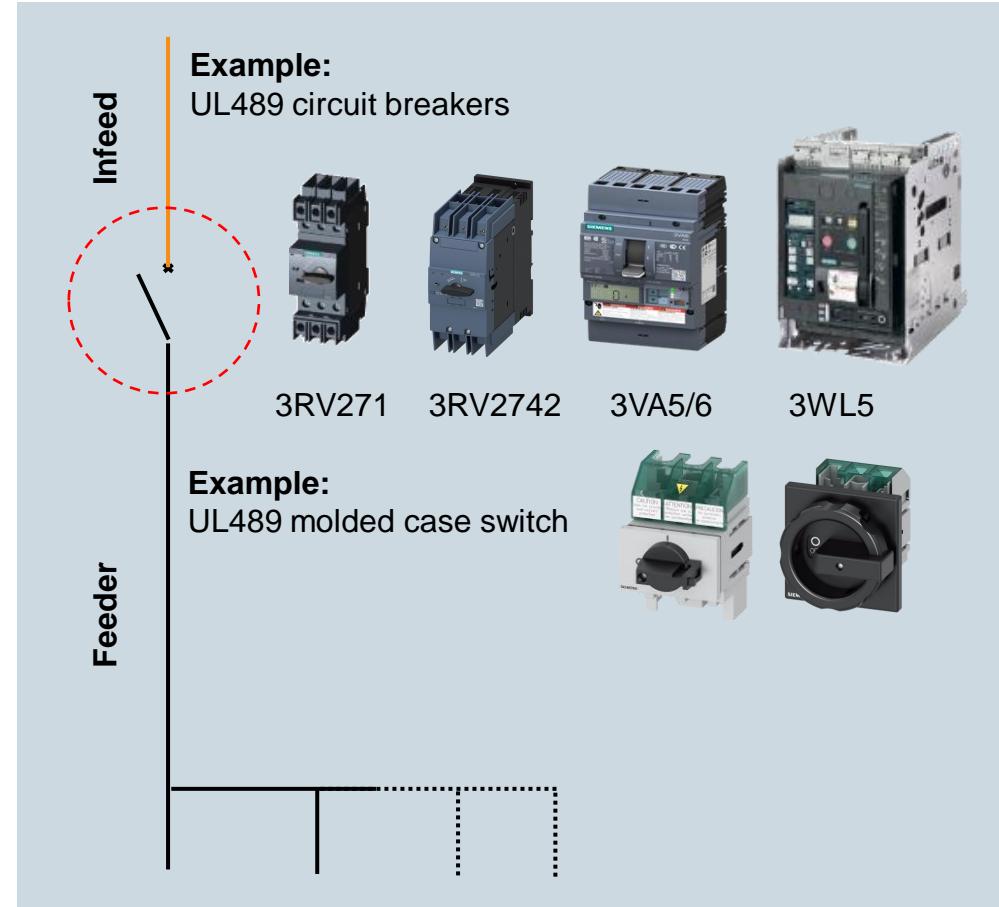
75.4.1 A disconnect switch shall comply with 30.1.1 – 30.1.4. A **manual motor controller** shall not be used as the service disconnecting means.

Vanliga misstag #3

Använda UL-listade produkter fast för fel användningsområde

Följande produkter får användas som första inkommende huvudbrytare:

- Circuit breaker acc. to UL 489 DIVQ, DKPU2
- Molded case switch and CB acc. to UL 489 WJAZ
(without overload and with short-circuit release)
- Combination motor controller acc. to UL 508 NKJH
(for max. 1 motor as only power load)
- Open and enclosed switches acc. to UL 98 WIAX, WHTY
(optionally with fuses)
- Fused power Switch acc. to UL 977 IYSR
(optionally with fuses)
- Low voltage AC Power CB acc. to UL 1066 PAQX
(optionally with fuses)
- Pullout switch UL 1429 WGEU



DKPU2 – Recognized, instantaneous trip type,

UL508A 75.4.1 A disconnect switch shall comply with 30.1.1 – 30.1.4. A manual motor controller shall not be used as the service disconnecting means.

Vanliga misstag #4

Förvirring gällande dvärgbrytare (MCB), “Circuit Breaker” eller
“Supplementary Protector”

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Circuit breakers (UL489):

- “**Listed**” – Får användas som skyddsprodukt för alla typer av laster i både “feeder circuit” och “branch circuit”
- Exempel: 5SJ4...HG4



Supplementary protectors (UL1077):

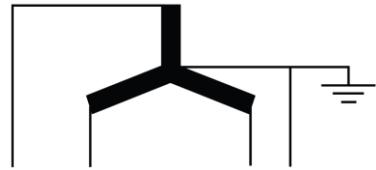
- “**Recognized**” – Begränsat användning i form av kontrollkretsar som har en uppströms skyddsprodukt i form av “circuit breaker” eller “fuse”. “Recognized” menas också att ytterligare villkor/instruktioner måste tas hänsyn till!
(CoA – Conditions of Acceptability)
- Exempel: 5SY



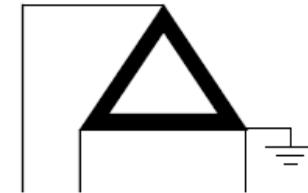
Vanliga misstag #5

Fel märkning av nätspänning på märkskylten, "Delta rating" vs "Slash rating" som påverkar produktval

Slash rating = 480Y/277V



Delta rating = 480V



Viktigt: "grounding wires" = skyddsjord (PE) nämns ej

Exempel:

- 480Y/277V; 3Ø; 4w, 60Hz: **SLASH rating**
- 480V; 3p; 3w, 60Hz: **DELTA rating**

Namn och förkortningar:

- Phase: "phase"; "p", "Ø"
- Conductor: "wire"; "w"

- PE conductor: Grounding conductor
- N conductor: Grounded UL 508A, (Neutral NEC) conductor
- Phase conductor: Ungrounded conductor

Vanliga misstag #5

Fel märkning av nätspänning på märkskylten, "Delta rating" vs "Slash rating" som påverkar produktval

Slash Rating:

- ex 480Y/277V, solidly grounded wye
- 3 phase; 4 wire
- 3 phase; 3 wire

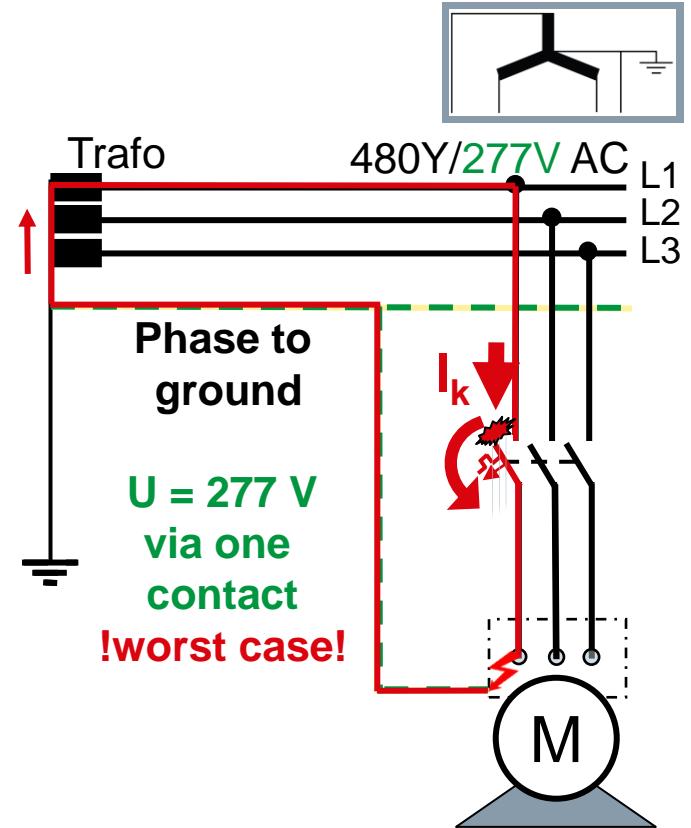


Produkter som får användas:

480Y/277V; 600Y/347V

480V; 600V

Detta system är lika som våra TN-S system



Vanliga misstag #5

Fel märkning av nätspänning på märkskylten, "Delta rating" vs "Slash rating" som påverkar produktval

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DELTA rating:

- e.g. 480V
- 3 phase - 3 wire
- 3 phase; 4 wire



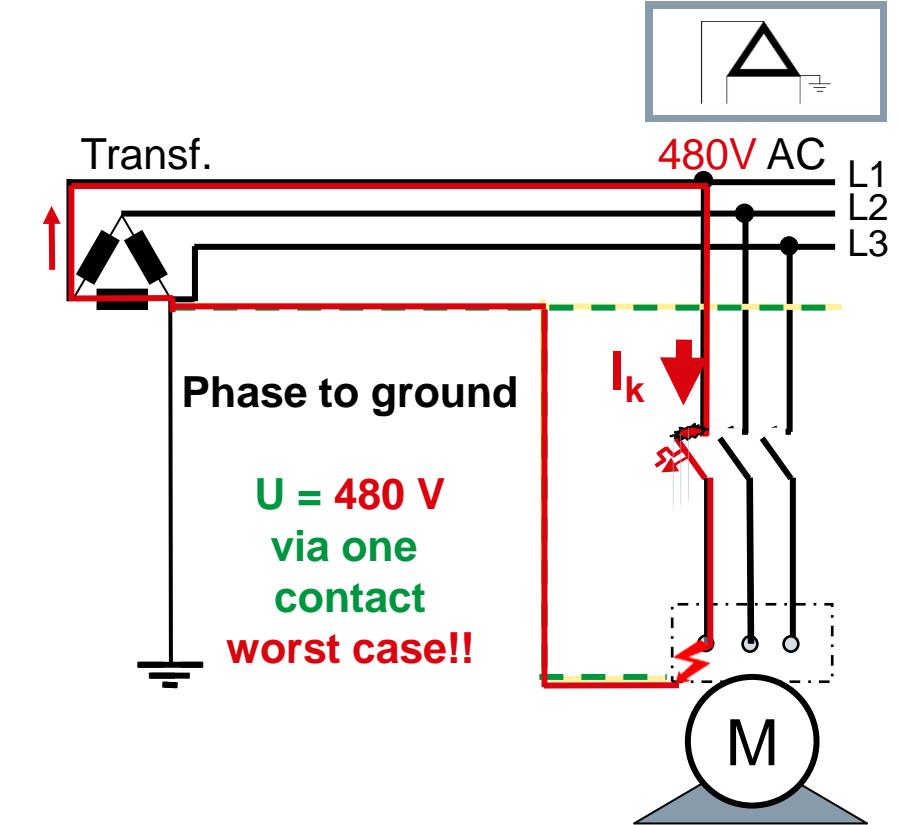
600V
up to 15A
480V
up to 30A



Produkter som får användas:

480V; 600V

~~480Y/277V; 600Y/347V~~



Vanliga misstag #5

Fel märkning av nätspänning på märkskylten, "Delta rating" vs "Slash rating" som påverkar produktval

Ratings of CB:

Type X3RV1742 or X3RV2742

Voltage: 600Y/347Vac

Current: 70A; 100 % Continuous Current

Short Circuit Ratings: 10kA at 600Y/347Vac
65kA at 480Y/277Vac

Type N3RV1742 or N3RV2742

Voltage: 600Y/347 Vac

Current: 35A through 60A; 100 % Continuous Current

Short Circuit Ratings: 20kA at 600Y/347 Vac
65kA at 480Y/277 Vac

Type H3RV1742 or H3RV2742

Voltage: 600Y/347 Vac, 480Vac

Current: 10A through 30A; 100 % Continuous Current

Short Circuit Ratings: 20kA at 600Y/347 Vac
65kA at 480 Vac

Type L3RV2742

Voltage: 600 Vac, 480Vac

Current: 10A through 15A; 100 % Continuous Current

Short Circuit Ratings: 20kA at 600 Vac
65kA at 480 Vac

CoC 3RV2742, 10 to 70A

Slash

DELTA



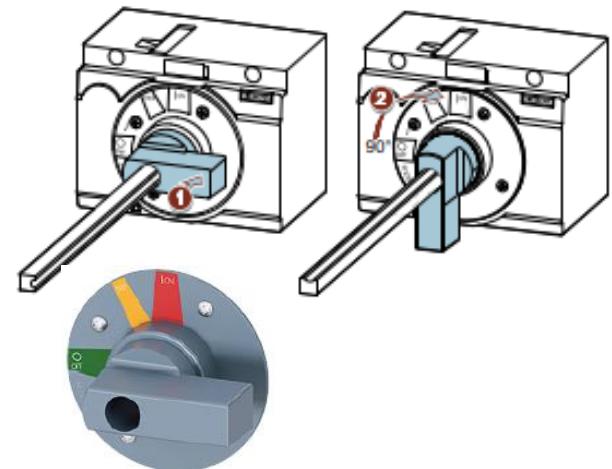
Vanliga misstag #6

Ofullständig lösning för “door interlocking”

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Dörrar till apparatskåp för maskiner (industrial machinery) måste läsas mha huvudbrytaren (main disconnecting mean) NFPA 79.

- Skall kunna öppnas mha verktyg när spänningssatt
 - Skall kunna spänningssättas utan verktyg genom medveten handling när dörrarna är öppna
- Detaljer, se NFPA79 och UL508A



Vanliga misstag #6

Ofullständig lösning för “door interlocking”

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Siemenslösningar:

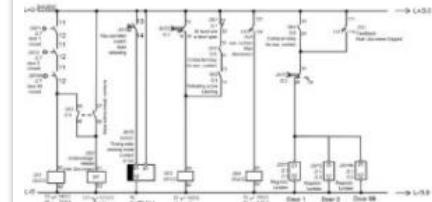
- Färdigkonfigurerade lösningar som möter standarderna UL 508A och NFPA 79
- Med inkopplingsdiagram, EPLAN makro och BOM-lista
- Detaljerad beskrivning
- Videobeskrivning

För mer information

www.siemens.com/controlpanel/northamerican-standards

www.siemens.com/controlpanel/tips

Our solution for any number of control panel doors



Electric door interlocking >



Electronic door interlocking >



Application solution

exceeds the design requirements
of ANSI/UL508A and NFPA79



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Industrial Control Panel Design Solution
verified by UL

Vanliga misstag #7

Felaktigt vald skyddsprodukt av frekvensomriktare

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Utdrag från UL 508A 3rd Edition:

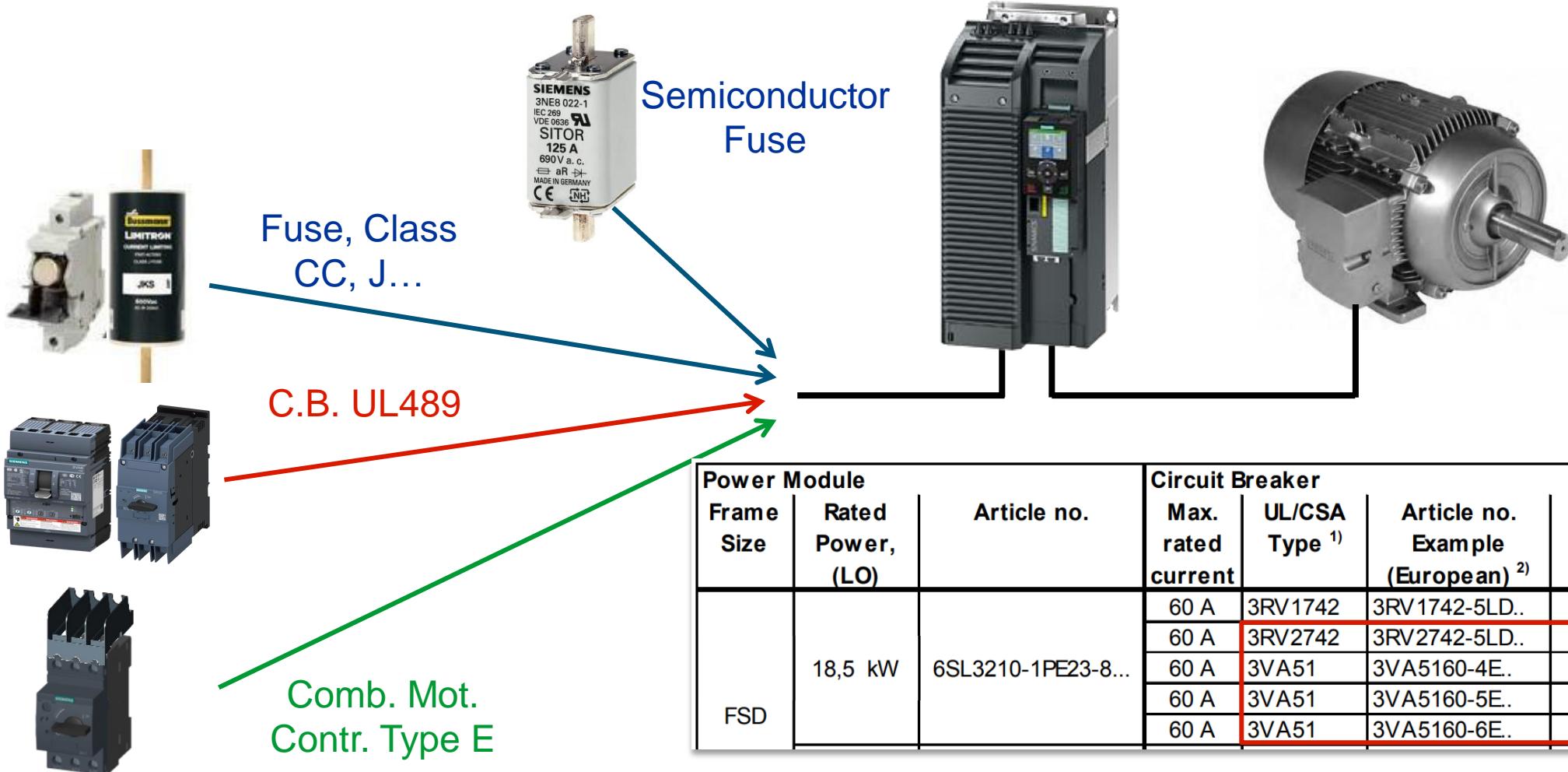
31.3.2 The branch circuit protection for a single-motor circuit provided with a variable-speed drive shall be of the type and size specified by the manufacturer's instructions provided with the drive.



Vanliga misstag #7

Felaktigt vald skyddsprodukt av frekvensomriktare

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Vanliga misstag #8

Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad



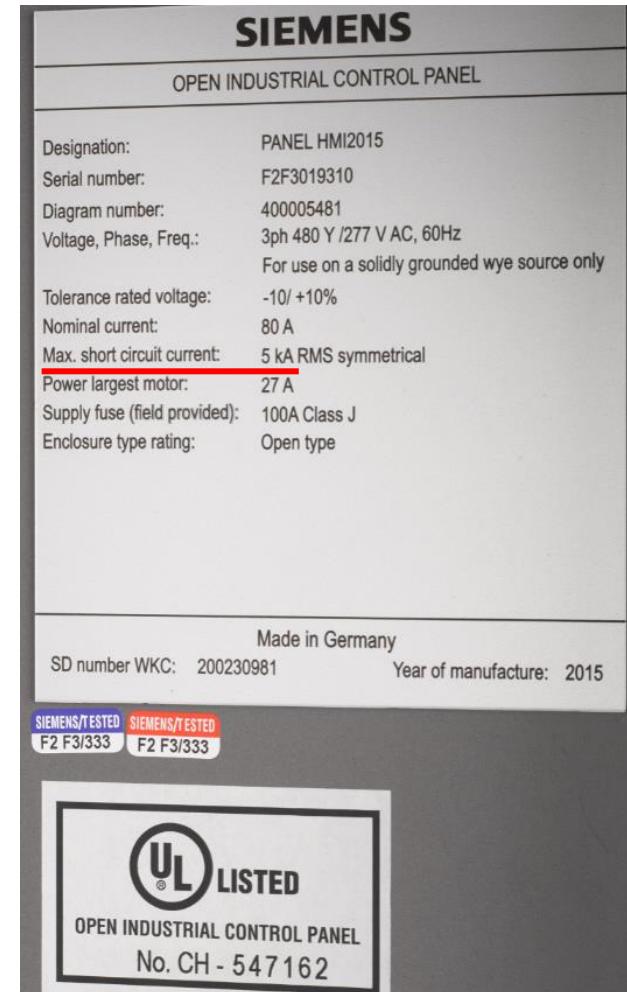
Vanliga misstag:

- Information om kortslutningsströmmen på märkskylten och i dokumentation saknas (mandatory acc. to NEC)
- SCCR värdet för apparatskåpet = brytförstågan på huvudbrytare till skåpet
- Värdet på SCCR tas fram genom samma tillämpning som i IEC 61439-1 eller annat fel i beräkningen
- Använder IEC värdena på produkerna för kortslutningsbrytförståga

Kraven:

§409.22 (A): An industrial control panel shall **not be installed**, where the available short-circuit current exceeds its short-circuit current rating as marked on its name plate

§409.22 (B): The **available short-circuit current** at the industrial control panel and **the date the short-circuit current calculation was performed** shall be documented and made available to those authorized to inspect the installation.



Vanliga misstag #8

Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad



Relevanta produkter för SCCR beräkningen i huvudkretsen:

- Circuit breaker, magnetic motor controller, soft starter, overload relay
- Terminals, busbars
- Short circuit protection device of control transformer (primary side)
- variable-speed drive, power conversion equipment...

Produkter som får bortses ifrån i SCCR beräkningen:

- Control circuit
- Power transformers, reactors, current transformers, dry-type capacitors, resistors, surge protection devices (one-port SPDs), voltmeters
- The “S” contactor of a wye-delta motor controller
- Enclosure air conditioners
- Wiring ferrules
- IMC-Filter on both sides of power converter

Tips

Mer info i Supplement SB i UL 508A

Vanliga misstag #8

Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad

Hur beräknas då SCCR värdet?

Steg 1: → Mandatory!

SCCR of the installed and UL-listed components

SCCR based on the standard values

Minsta värdet bestämmer SCCR värdet för hela apparatskåpet!

Steg 2 → Optional, enkelt och ger mycket hjälp i praktiken!

High-SCCR av testade kombinationer

Steg 3: → Optional, svårt att använda i praktiken

Använda "current-limiting devices"

(transformer, fuse or circuit breaker)

Table SB4.1
Assumed maximum short circuit current rating for unmarked components

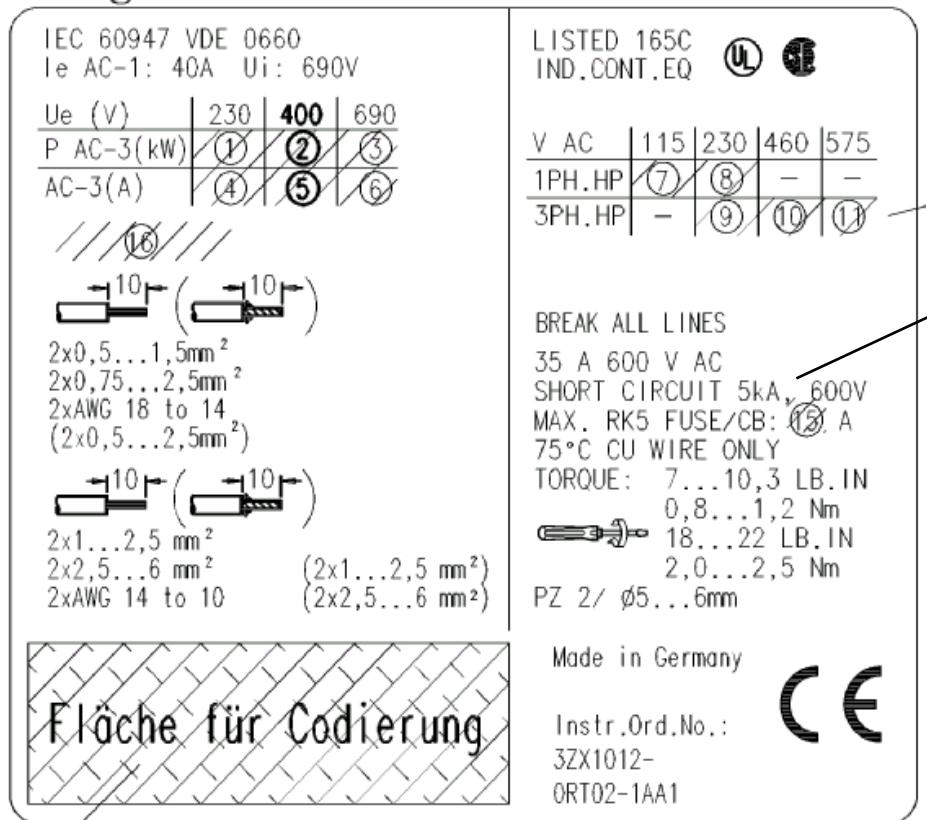
Component	Short circuit current rating, kA
Bus bars	10
Circuit breaker (including GFCI type)	5
Current meters	a
Connectors for Use in Data, Signal, Control and Power Applications	10
Current shunt	10
Fuseholder	10
Motor controller, (including combination motor controllers, float and pressure operated motor controllers, power conversion equipment and solid state motor controllers), rated in horsepower (kW) ^d	
a. 0 – 50 (0 – 37.3)	5 ^c
b. 51 – 200 (38 – 149)	10 ^c
c. 201 – 400 (150 – 298)	18 ^c
Supplementary protector	0.2
Switch unit	5
Terminal block or power distribution block	10

Vanliga misstag #8

Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad

Steg 1:

SCCR av installerade UL-listade produkter



Tabell i UL 508A

Table SB4.1
Assumed maximum short circuit current rating for unmarked components

Component	Short circuit current rating, kA
Bus bars	10
Circuit breaker (including GFCI type)	5
Current meters	a
Connectors for Use in Data, Signal, Control and Power Applications	10
Current shunt	10
Fuseholder	10
Motor controller, (including combination motor controllers, float and pressure operated motor controllers, power conversion equipment and solid state motor controllers), rated in horsepower (kW) ^d	
a. 0 – 50 (0 – 37.3)	5 ^c
b. 51 – 200 (38 – 149)	10 ^c
c. 201 – 400 (150 – 298)	18 ^c
Supplementary protector	0.2
Switch unit	5
Terminal block or power distribution block	10

Steg 1 = 5kA = ej tillräckligt? → **steg 2**

Vanliga misstag #8

Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad

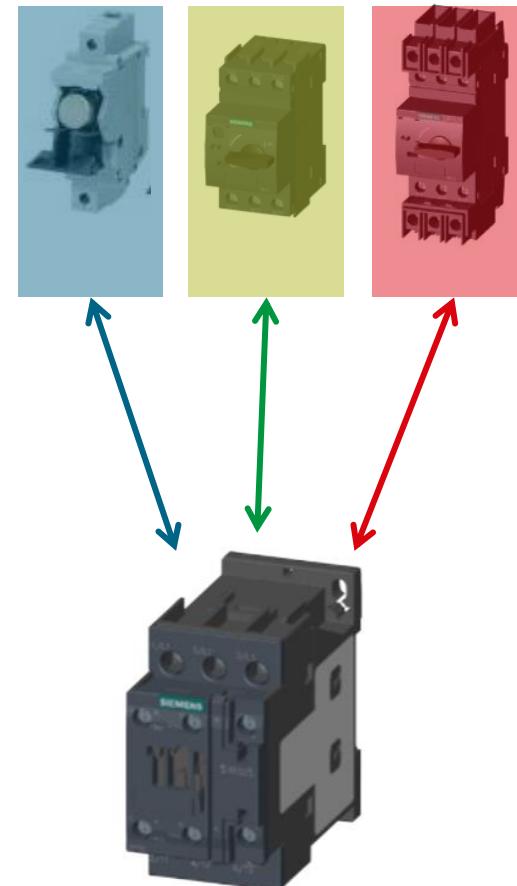
Steg 2: Testade kombinationer = high short circuit ratings = Certificate of Compliance

Short Circuit Ratings: = Standardvärden

Type No.	Fuse Class		Comb. Mot. Ctr. 3RV201 or 3RV202 ²⁾	Circuit Breaker		Short Circuit Current	Voltage
	RK5, K5, CC	J		Bkr TM ¹⁾	Bkr I		
3RT2023	-	-	16 A	-	-	5 kA	480 V
	60 A	125 A	12.5 A	70 A	-	5 kA	600 V
3RT2024	-	-	16 A	-	-	5 kA	480 V
	60 A	125 A	12.5 A	70 A	-	5 kA	600 V

High Capacity Short Circuit Ratings:

*Type No.	Fuse Class J	Comb. Mot. Ctr. 3RV201 or 3RV202 ¹⁾	Circuit Breaker				Voltage
			Bkr TM 3RV1742	Bkr TM 3RV1721, 3RV1821	Bkr TM 3RV27, 3RV28	Bkr I	
3RT2023	60 A	-			-	100 kA	600 V
	-	12.5 A	22 A	22 A	-	50 kA	480 V
				15 A	-	65 kA	480 V
			8 A	12.5 A	-	10 kA	600 V
		12.5 A			-	20 kA	600 V
					-	30 kA	600 V



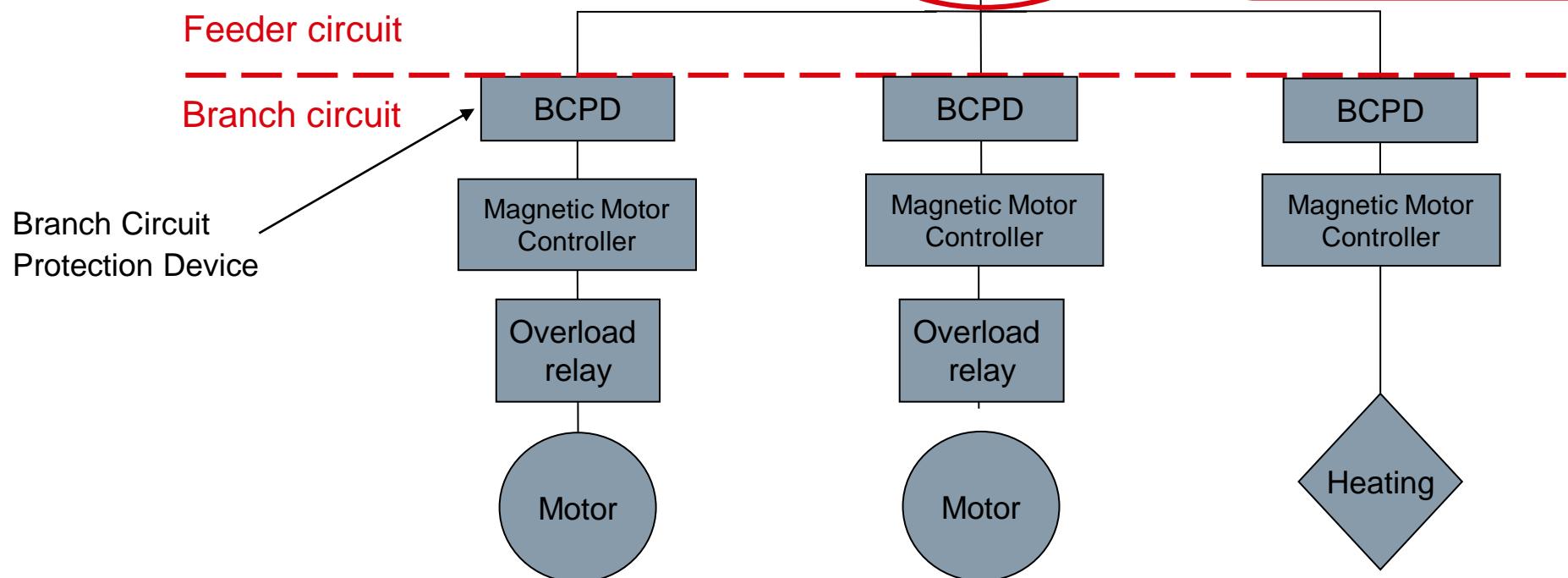
Vanliga misstag #8

Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad

Steg 3:

Använda current-limiting components

Krav, installerad i feeder circuit!



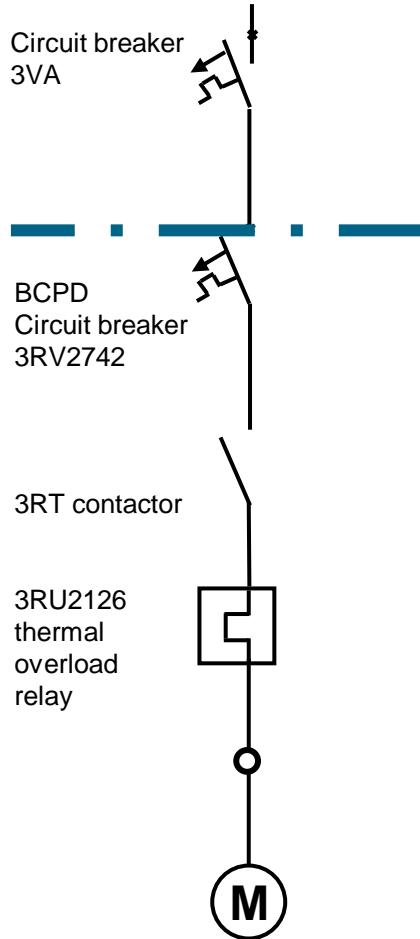
OBS. Om Fuse och circuit breaker agerar som strömbegränsande produkt får ej dessa lyfta upp värdet på BCPD (Bransch Circuit Protection Device)

Vanliga misstag #8

Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad

Vilket är SCCR värdet i detta exempel?

SCCR = 5kA



**Inverse-time CB,
3VA51, 3VA5150 -4..**
Rated current 50A/480V,
Interrupting rating **35kA** at 480V



Inverse-time CB acc. to UL489:
Rated current 25A/480V,
Interrupting rating **65kA** at 480V



Contactor/
rated current 21A/480V
Standard SCCR: 5kA@480V



Overload relay/
OL setting current 11 to 16 A
Standard SCCR: 5kA@480V



Terminal block:
Standard SCCR: 10kA



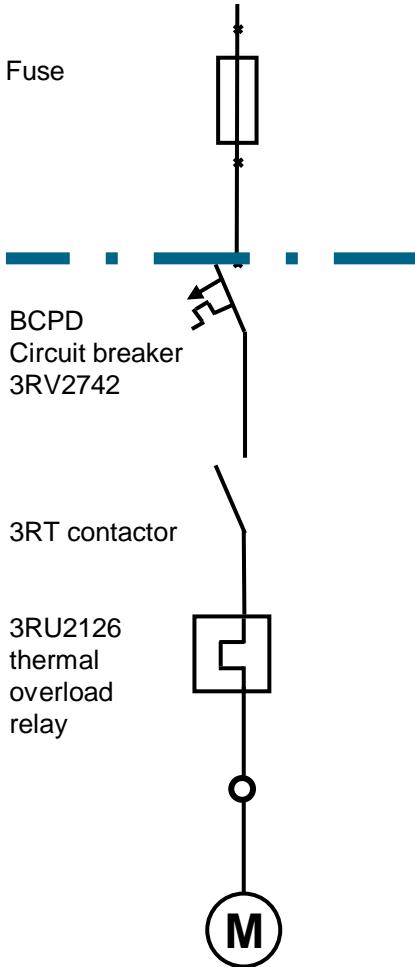
Motor, P = 15hp/480V
→ FLC = 21A, FLA = 15.3 A

Vanliga misstag #8

Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad

Vilket är SCCR värdet i detta exempel?

SCCR = 65kA



Fuse is current limiting:
Rated current 20A,
Interrupting rating **100kA**
Let-through current **4kA** (Class CC)
(per UL508A; Table SB4.2)



Inverse-time CB acc. to UL489:
Rated current 25A/480V,
Interrupting rating **65kA at 480V**



Contactor/
rated current 21A/480V
Standard SCCR: 5kA@480V



Overload relay/
OL setting current 11 to 16 A
Standard SCCR: 5kA@480V



Terminal block:
Standard SCCR: 10kA



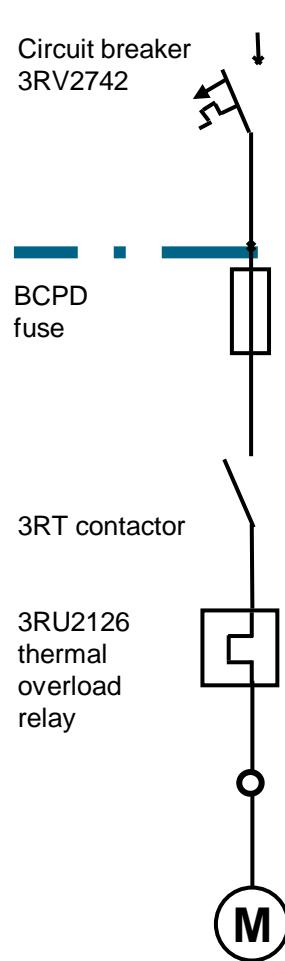
Motor, P = 15hp/480V
→ FLC = 21A, FLA = 15.3 A

Vanliga misstag #8

Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad

Vilket är SCCR värdet i detta exempel?

SCCR = 5kA



Inverse-time CB acc. to UL489:

Rated current 25A/480V,
Interrupting rating **65kA** at 480V

Fuse is current limiting:

Rated current 20A,
Interrupting rating = **100kA**

Let-through current **4kA** (Class CC)
(per UL508A; Table SB4.2)

Contactor/
rated current 21A/480V
Standard SCCR: 5kA@480V

Overload relay/
OL setting current 11 to 16 A
Standard SCCR: 5kA@480V

Terminal block:
Standard SCCR: 10kA

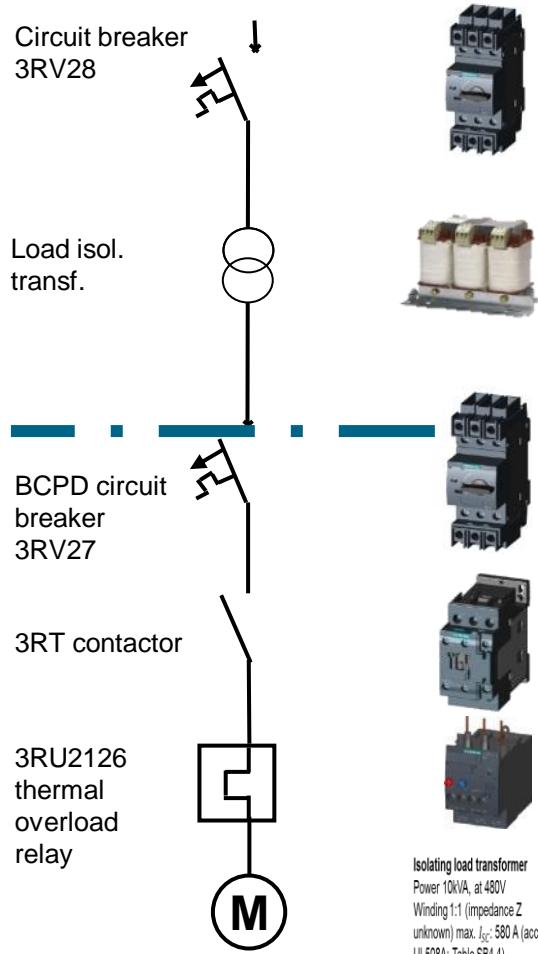
Motor, P = 15hp/480V
→ FLC = 21A, FLA = 15.3 A

Vanliga misstag #8

Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad

Vilket är SCCR värdet i detta exempel?

SCCR = 50kA



Inverse-time CB acc. to UL489:

Rated current 20A/480V,
Interrupting rating **50kA** at 480V

Isolating load transformer

Power 10kVA, at 480V
Winding 1:1 (impedance Z
unknown) max. I_{SC} : **580 A** (acc. to
UL508A; Table SB4.4)

Inverse-time CB acc. to UL489:

Rated current 15A/480V,
Interrupting rating **65kA** at 480V

Contactor/
rated current 21A/480V
Standard SCCR: **5kA** @ 480V

Overload relay/

OL setting current 9 to 12.5 A
Standard SCCR: **5kA** @ 480V

Motor, P = 15hp/480V
→ FLC = 21A, FLA = 10.1 A

Vanliga misstag #8

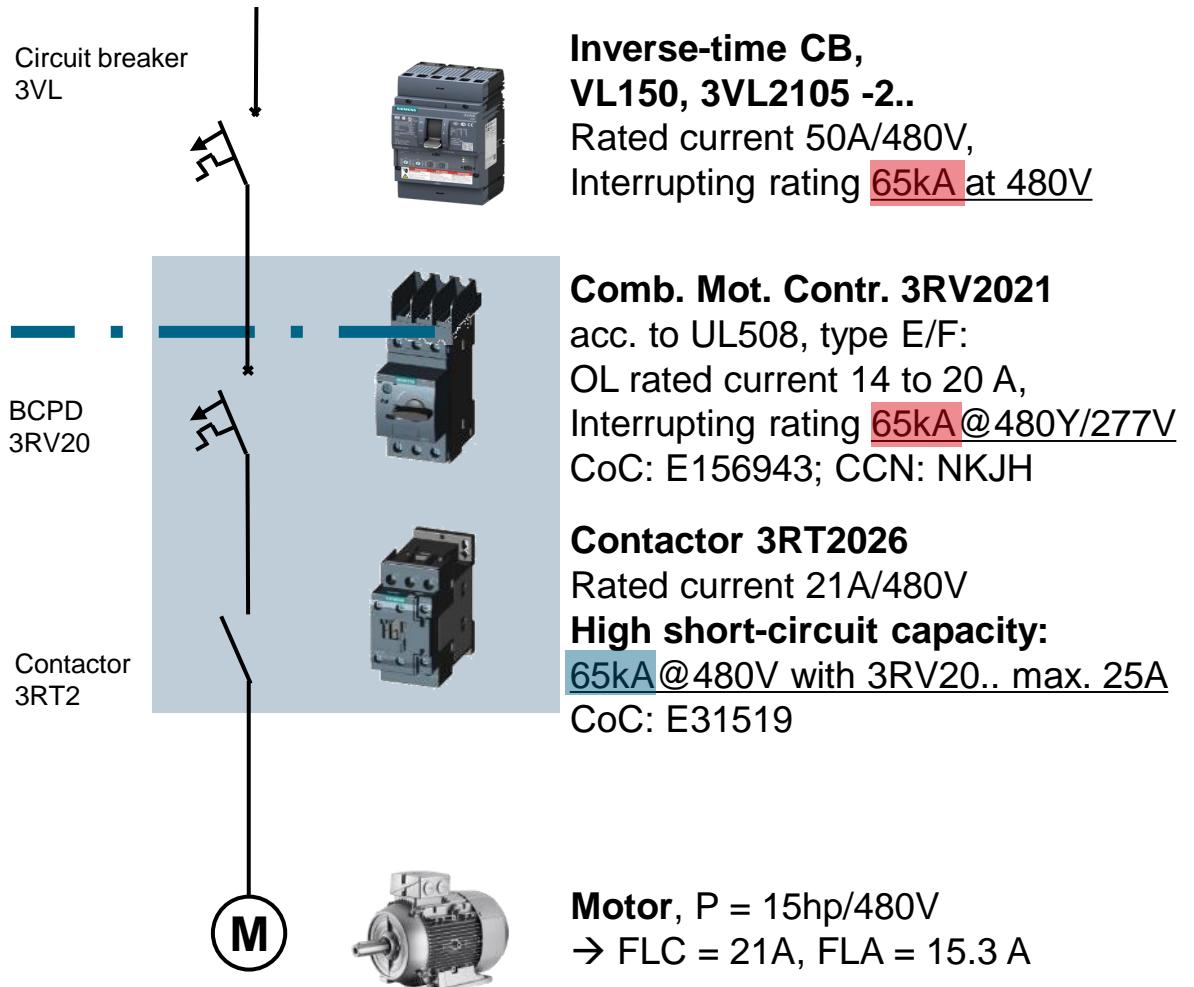
Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad

Vilket är SCCR värdet i detta exempel?

SCCR = 65kA

Viktigt

Upp till max. 480Y/277V



Vanliga misstag #8

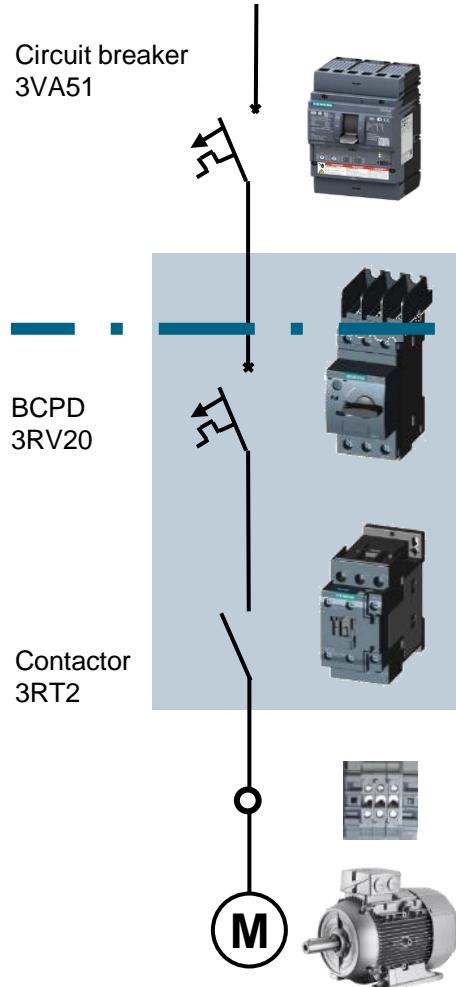
Avsaknad av SCCR rating på märkskylten eller felaktigt beräknad

Vilket är SCCR värdet i detta exempel?

SCCR = 10kA

Important

Up to max. 480Y/277V



**Inverse-time CB,
3VA51, 3VA5150 -4..**
Rated current 50A/480V,
Interrupting rating **65kA at 480V**

Motor starter 3RV2021
acc. to UL508, type E/F:
OL rated current 14 to 20 A,
Interrupting rating **65kA@480Y/277V**
CoC: E156943; CCN: NKJH

Contactor 3RT2026
Rated current 21A/480V
High short-circuit capacity:
65kA@480V with 3RV20.. max. 25A
CoC: E31519

Terminal block:
max. standard SCCR: **10kA**

Motor, P = 15hp/480V
→ FLC = 21A, FLA = 15.3 A

Support från Siemens Short-Circuit Current Rating (SCCR) Siemens white paper

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<https://new.siemens.com/global/en/markets/panel-building/control-cabinet/preferences/ul508a-shortcircuit-whitepaper.html>

Industrial Control Panels for North America
Determining the short-circuit current rating (SCCR)

White Paper | February 2018
This White Paper provides guidance for determining the short-circuit current rating (SCCR) of industrial control panels as required by UL 508A standards for the required short-circuit circuit. Moreover, it includes practical information and references additional information sources in the appendix.

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www.siemens.com/controlepanel

SCCR calculation according to UL 508A, Supplement SB4.

In accordance with Supplement SB4.2, excluding certain exceptions, all components in the power circuit shall have an SCCR in amperes or kiloamperes with specification of the voltage.

Components which are not relevant for SCCR

The following components in the power circuit are excluded from SCCR consideration:

- Disconnect switches
- Supplementary protectors
- Bus bars
- Load limiters
- Current meters
- Surge arresters
- Current shunts
- Power distribution pluglays
- Switching devices
- Terminal blocks or power distribution blocks

The primary protective device of the power supply for the industrial control panel is the main switch. This protective device also applies for SCCR consideration. For control circuits which are tapped directly from the power circuit without being connected to the main switch, the SCCR of the source following tapping also remains a part of the power circuit, unless no longer the case for downstream components.

SCCR-relevant

Red

SCCR-relevant

SCCR 30 kA 480V

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White paper | Components and control cabinets in North America | February 2018

The present components in the power circuit to decide
Of all SCCR-relevant components, the component with the lowest SCCR value generally determines the overall SCCR value. Components with higher SCCR values than the lowest SCCR-relevant components shall be approved for at least the short-circuit at the incoming supply.

Example of overall SCCR for an industrial control panel

If the SCCR of one or more SCCR-relevant components does not comply with the short-circuit at the incoming supply, then the SCCR of the entire industrial control panel may nevertheless be used.

Step 1: Determination of the SCRRs for the components in the power circuit

The short-circuit current rating of individual power circuit components shall be determined by applying one of the following methods:

- Based on device marking or component data sheets
- Based on tested device combinations
- Based on tested device combinations

The majority of control devices and protective devices for the power circuit are certified by UL. The following table lists the SCCR of the components for the entire industrial control panel.

Example from the handbook "Protective Devices for SIMATIC 3120 Line Modules"

Component	SCCR
UL 508A	30 kA
UL 508B	30 kA
UL 508C	30 kA
UL 508D	30 kA
UL 508E	30 kA
UL 508F	30 kA
UL 508G	30 kA
UL 508H	30 kA
UL 508I	30 kA
UL 508J	30 kA
UL 508K	30 kA
UL 508L	30 kA
UL 508M	30 kA
UL 508N	30 kA
UL 508O	30 kA
UL 508P	30 kA
UL 508Q	30 kA
UL 508R	30 kA
UL 508S	30 kA
UL 508T	30 kA
UL 508U	30 kA
UL 508V	30 kA
UL 508W	30 kA
UL 508X	30 kA
UL 508Y	30 kA
UL 508Z	30 kA

Example from the Certificate of Compliance for Siemens 3120 Line Modules

Frequency converters to be protected in accordance with manufacturer's specifications as prescribed in UL 508A, section 31.3. Siemens' corresponding manuals can be obtained from the **Siemens Industry Online Support**.

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For components which are not marked with a SCCR, the SCCR is to be defined on the basis of UL 508A, Table 584.1.

Example from UL 508A, Table 584.1, "Assumed maximum short-circuit current rating for unmarked components"

Component	SCCR
Power transformer	30 kA
Current transformers	30 kA
Relays	30 kA
Voltmeters	30 kA
Transformers of a wye-delta combination	30 kA
Enclosure air conditioners that are cold-and-heating coil plug connected	30 kA
Fuses	30 kA
Cables, wires and cables, auxiliary, conductor protection devices that are guaranteed to withstand short-circuit currents	30 kA
Loads in the field (e.g. motors, heaters, etc.)	30 kA

Step 2: Reduction of maximum possible short-circuit fault parts of the power circuit by using current-limiting components in the feeder circuit

In accordance with UL 508A, Supplement SB4.2, the maximum possible short-circuit fault parts of the power circuit must be reduced by using current-limiting components in the feeder circuit. These components must be located such that the current-limiting components are situated entirely within the branch circuit.

Transformers with known relative short-circuit voltage (= impedance 2 according to UL 508A)

The short-circuit current which can occur on the secondary side of the transformer is calculated as follows:

$$\text{Secondary short-circuit current (I}_2\text{)} = \frac{\text{Transformer performance (PF)}}{\text{Secondary short-circuit voltage (U}_2\text{)}} \cdot \text{Impedance (Z}_2\text{)}$$

Factor (F) is not applicable for single phase transformers

Transformers with unknown relative short-circuit voltage (= impedance 2 according to UL 508A)

The short-circuit current which can occur on the secondary side of the transformer is calculated as follows:

$$\text{Secondary short-circuit current (I}_2\text{)} = \frac{\text{Transformer performance (PF)}}{\text{Secondary short-circuit voltage (U}_2\text{)}} \cdot \text{Impedance (Z}_2\text{)}$$

Transformers with unknown relative short-circuit voltage (= impedance 2 according to UL 508A)

The maximum secondary short-circuit current can either be determined by applying the following formulas with the assumed impedance $Z = 2\%$, or determined using the following tables. The tables apply to both "transformer" or "S4A" ("secondary short-circuit current three-phase formula").

1. The transformer capacity shall be that of column 1 and
2. The secondary voltage may be less than the value in column 2. If the secondary voltage is between values, the column with the next lowest voltage shall be selected.

Current limitation by transformers

Load side of the transformer: the short-circuit for all components on the load side of the transformer.

In this regard, a distinction is to be made between:

1. Transformers with known relative short-circuit voltage (= impedance 2 according to UL 508A) and
2. Transformers with unknown relative short-circuit voltage (= impedance 2 according to UL 508A)

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Step 3: Reduction of maximum possible short-circuit fault parts of the power circuit by using current-limiting components in the feeder circuit

The power circuit is subdivided into branch circuit and feeder circuit. The exact threshold between branch circuit and feeder circuit is determined by the distance between the point of connection of the branch circuit and the point of connection of the feeder circuit. In this regard, the following must be observed:

Transformers with known relative short-circuit voltage (= impedance 2 according to UL 508A)

The maximum secondary short-circuit current can either be determined by applying the following formulas with the assumed impedance $Z = 2\%$, or determined using the following tables. The tables apply to both "transformer" or "S4A" ("secondary short-circuit current three-phase formula").

1. The transformer capacity shall be that of column 1 and
2. The secondary voltage may be less than the value in column 2. If the secondary voltage is between values, the column with the next lowest voltage shall be selected.

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Support från Siemens

Tips om webbinarium med samma tema

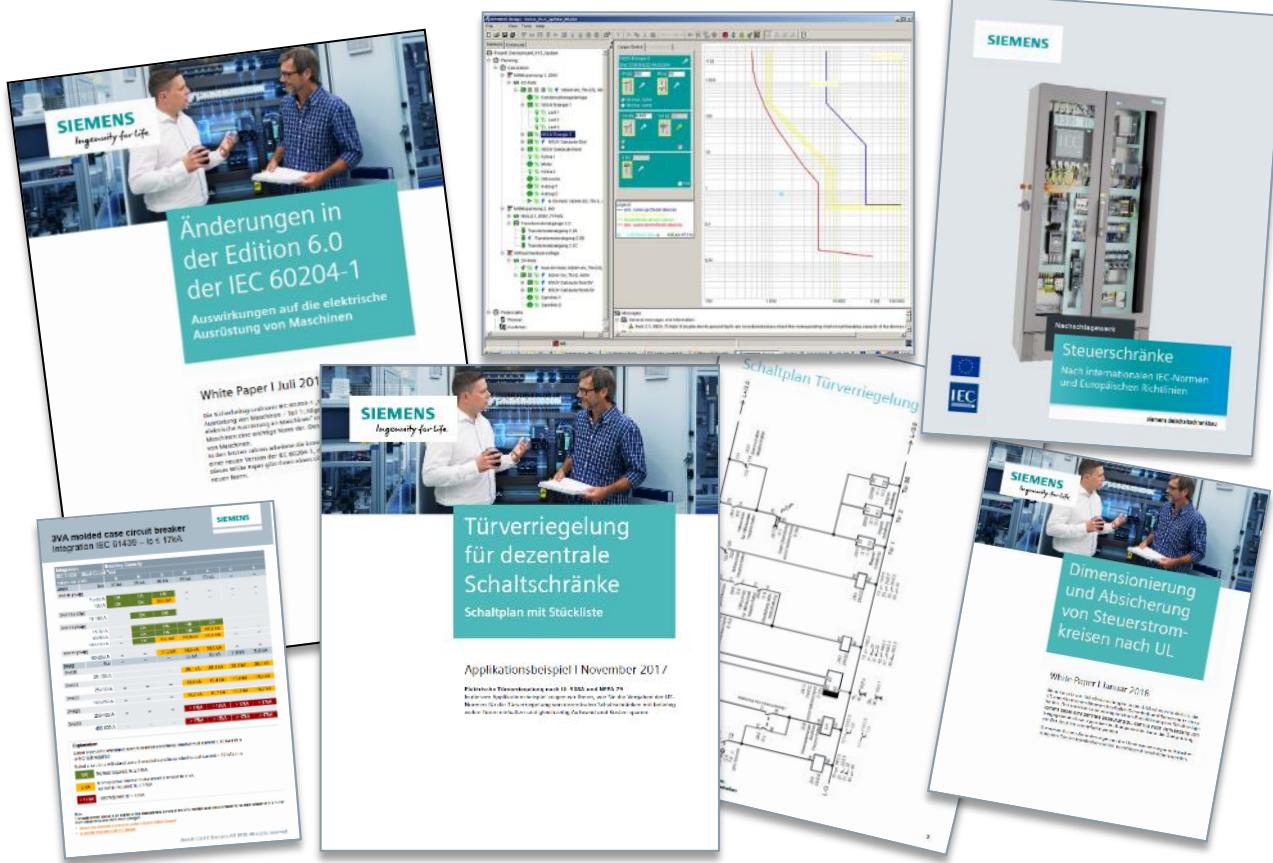
siemens.com/controlpanel/webinars

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- Whitepaper
- Reference works: Control panels compliant with IEC, UL/CSA standards
- Handy tips on configuring control panels (including tips for US and Canada)
- Configuration manuals
- Assistance with verification
- Web-based training/webinars

Market portal for control panel building: www.siemens.com/controlpanel

Topic page for North America: www.siemens.com/controlpanel/northamerican-standards

Note/exclusion of liability

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Tack för visat intresse!



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