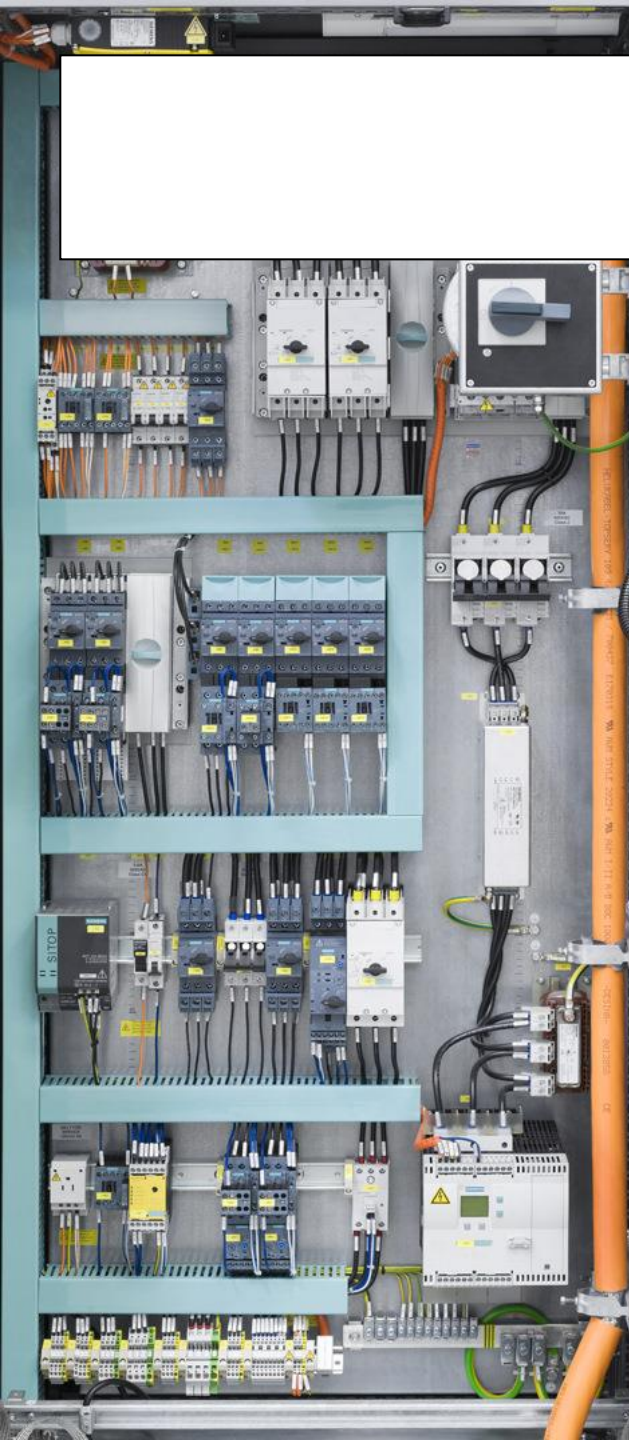


Infeed Line, Terminals and Devices for the Disconnection and Isolation of Electric Energy

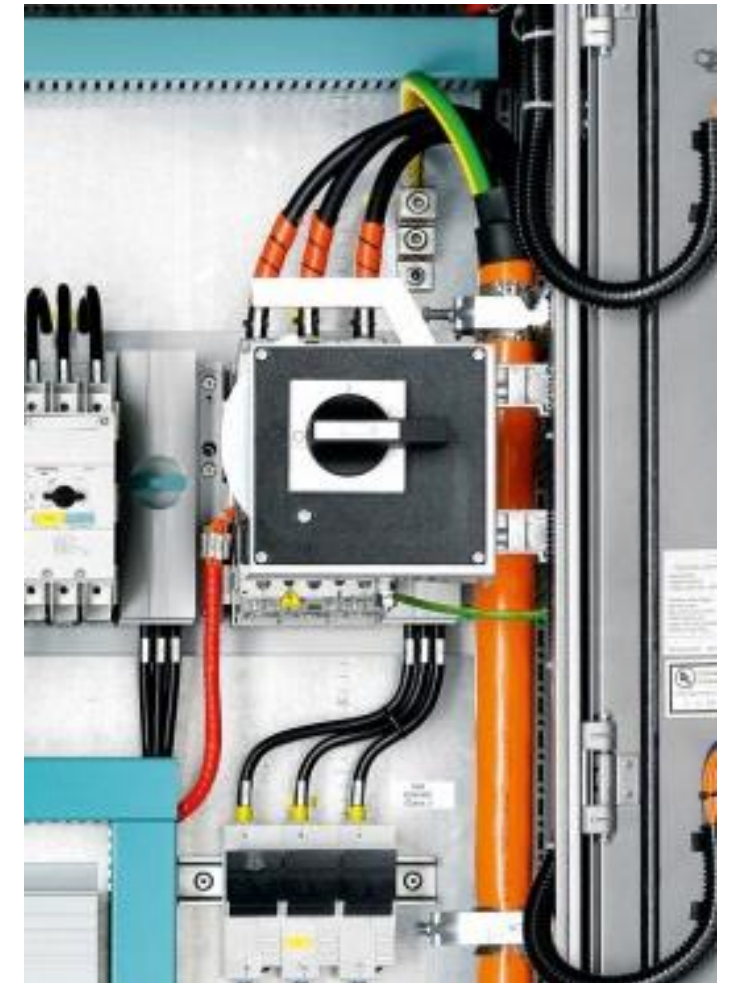
- Main Disconnecting Means
- Interlocking of Main Disconnecting Means
- Infeed Systems
- Power Distribution Blocks
- Busbar Systems



Connection of the Infeed Line

General:

- **One** infeed line should be generally used
- Further supply points (e.g. for electronics, magn. coupling) should be tapped off within the machine (e.g. transformers, converters)
- The infeed line should be directly connected to the main disconnecting means
- Connection to upstream terminals only for special circuits (lighting, maintenance, etc.) or further infeed lines
- Terminals for more than one conductor must be marked (**Attention**: field wiring!)
- N-conductors must be marked and connected to a separate terminal
- Input terminals must be marked in a readable manner and must correspond to the documentation



Caution:

Disconnection of the infeed line generally must effect the disconnection of all circuits, including all control circuits

Exceptions:

The following circuits ***need not*** be disconnected together with the main disconnecting means:

- Lighting circuits for maintenance works
- Connectors and receptacles for exclusive connection of maintenance tools and equipment (e.g. hand drill, test equipment)
- Undervoltage protection for automatic disconnection in case of supply faults
- Operational processes (e.g. measuring devices for temperature control, memory elements, running heaters)

Assembly of excluded circuits:

- (1) **Separate main disconnecting means, isolation transformer, overcurrent protection**
Installation in separate enclosure or in the actual industrial control panel close to the actual main disconnecting means

- (2) Wires on the input side must be **routed separately** within the enclosure;
with wire lengths ≥ 460 mm (18 in.), an (additional) cable duct must be used

Note:

The circuit for the doors' interlocking circuit must be disconnectable in the respective industrial control panel via which it is supplied

Disconnection of the Infeed Line (Main Disconnecting Means)

Caution:

With the exception of connectors and receptacles, main disconnecting means must always be mounted inside or adjacent to the industrial control panel

Exception:

Main disconnecting means outside the industrial control panel for machines with **max. 2 hp** may be mounted in a distance of up to **max. 6 m (20 ft)** or **in sight of**, irrespective of interlocking with the industrial control panel

Disconnection of the Infeed Line (Main Disconnecting Means)

The following devices may be used as main disconnecting means:

- Switch disconnectors with HP rating (UL98)
- Circuit breakers (UL489)
- Molded-case circuit breakers (UL489)
- Circuit breakers (UL489) with adjustable short-circuit release (instantaneous trip circuit breaker) as part of a tested assembly
- "Molded case switch" disconnectors (UL489)
- "Type E" motor starters (UL508) when **only 1 motor** is controlled
- Plug connection for cord connections

Main Disconnecting Means Portfolio ≤ 70 A



**3RV27 /28
acc. to UL489**



**5SJ...HG4 "MCBs"
acc. to UL489**



**3RV20
acc. to UL508
„type E“**



**3RA6
compact starters
acc. to UL508
"type E"**

Type E motor starter protector only with max. 1 motor per panel!

Main Disconnecting Means Portfolio ≥ 70 A



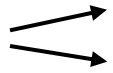
**3VL acc. to UL489
20A....1600A**

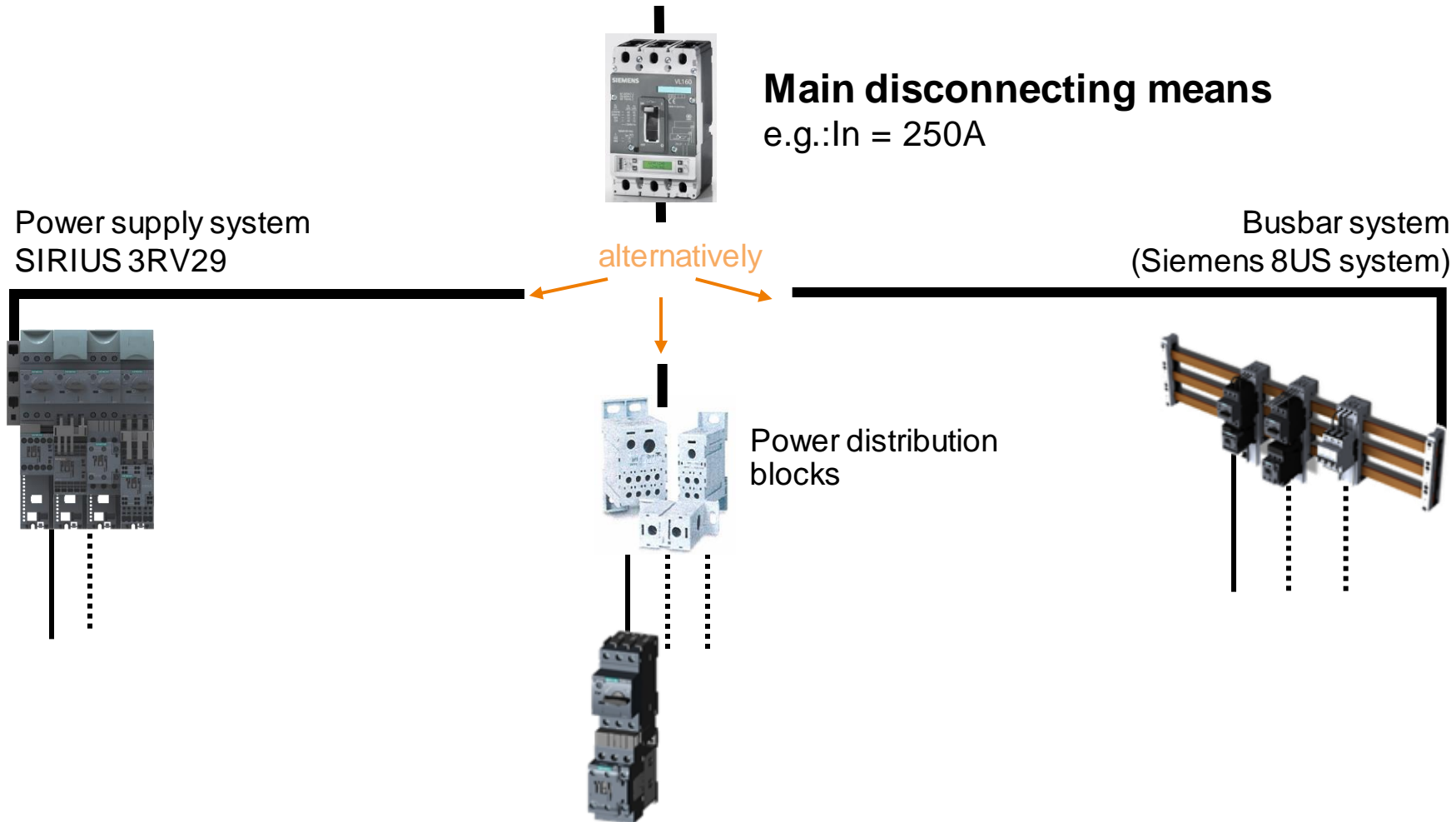


**3WL5 acc. to UL489
1000A....5000A**

Disconnection of the Infeed Line (Main Disconnecting Means)

Requirements for *Industrial Control Equipment*

- (1) Disconnection of the supply and "ON-OFF" position;
circuit breakers and type E starters may feature a "tripped" position
- (2) External operating handle
Exception: Power-driven industrial control equipment (e.g. with motorized drive)
- (3) Lockable only in the "OFF" position, independent of the door position
- (4) Simultaneous switching of all ungrounded supply wires
- (5) Operability by qualified persons, independent of the door position and without auxiliary means
- (6) Dimensioning
 - a) Rated current at least 115% of the total FLC (simultaneity!)
 - b) HP rating – dimensioning according to [NEC Table 430.251\(B\) for LRC /430.250 for FLC:](#)
**LRC/FLC of the main disconnecting means \geq  LRC of all motors which can be simultaneously started
FLC of remaining motors and loads**
 - c) Rated voltage \geq supply voltage of the infeed
- (7) The "ON" and "OFF" positions must be clearly marked



Load Feeder on Busbar

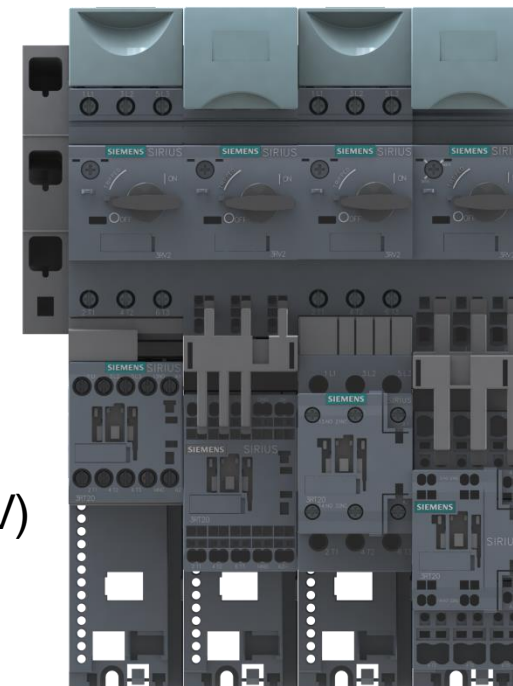
Infeed systems - SIRIUS 3RV2917 infeed system

SIRIUS infeed system - technology

- Up to 63A for S00/S0
- IEC: up to 500V
- UL: up to 600V
- Motor branch circuit up to 25A (without derating)
- UL/CSA
Approval as „self protected combination motor controller“ according UL 508 Type E
- IEC: short-circuit capacity, tested assembly up to a breaking capacity of 150kA (400V)
- UL: **65 kA** at 480V

System

- Modules with 2 or 3 load feeders in 45 mm grid
- Easy, fault-free installation, plug&play
- Easy disassembling, applicable as visible isolation gap



Busbars (Unlisted and un-recognized)

Own-made System

SIEMENS

UL508A treats busbar systems consisting of copper or aluminum busbars and retainers as standard busbar systems due to a missing UL report – see SB4.1

This results in:

- Max. current load
 - = 1000 A per sqinch
 - = 1000 A for 654 mm²
 - = **1,55 A per 1 mm²**

- Short-circuit strength
 - SCCR = 10kA**

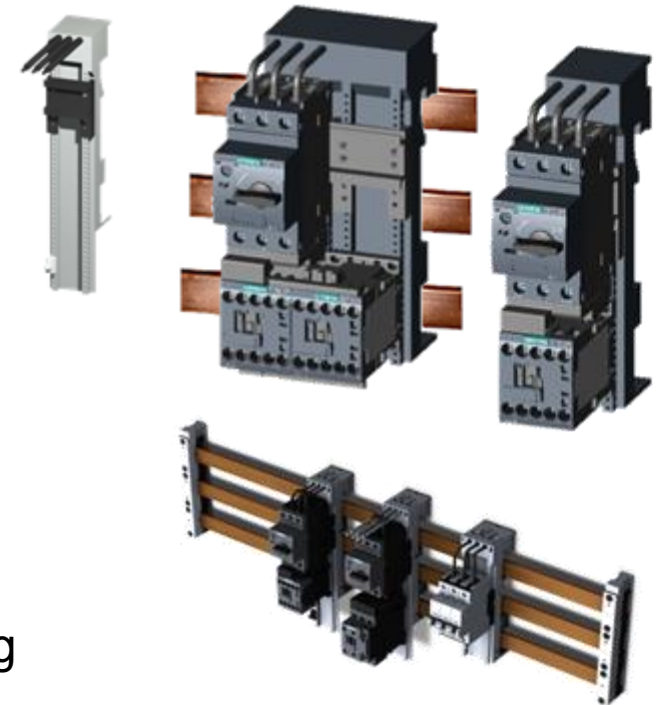
Busbar System

Infeed systems – 8US busbar system

SIEMENS

8US system → tested and listed system acc. to UL
→ technical values specified in the UL report are applicable

- Up to approx. 600A / 600V
- 40 mm busbar distance for branch circuits
- 60 mm busbar distance for feeder and branch area
- Adapter for 3VL are short-circuit proof up to 100kA (depending on installation)
- IEC and UL/CSA
- IEC: short-circuit proof, tested assembly up to 153kA (400V), up to 690V
- SCCR in acc. with UL up to 100kA (480V) depending on devices busbar testing and distance between supports



Required considerations of BCPD for:

- infeed area (feeder)
- motor branch circuit (branch)

Busbar Systems

Infeed systems - SIRIUS 3-phase busbars



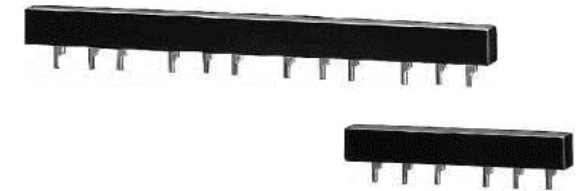
SIRIUS 3-phase busbars

- Up to approx. 63A for S00/S0 and up to 108A only for S2
- Up to 690V
- IEC and UL/CSA
- Short-circuit proof, tested assembly, same as breaking capacity of the circuit breaker

System

- Applied with machines for infeed with motor branch circuits
- For 2-, 3-, 4- and 5 Circuit Breakers
- Infeed with 3-phase busbars 3RV19 .5

For this purpose, the below-listed 3-phase feeder terminal has to be used. This terminal complies with the distances through air and over surfaces required in acc. with UL508 for types E / F

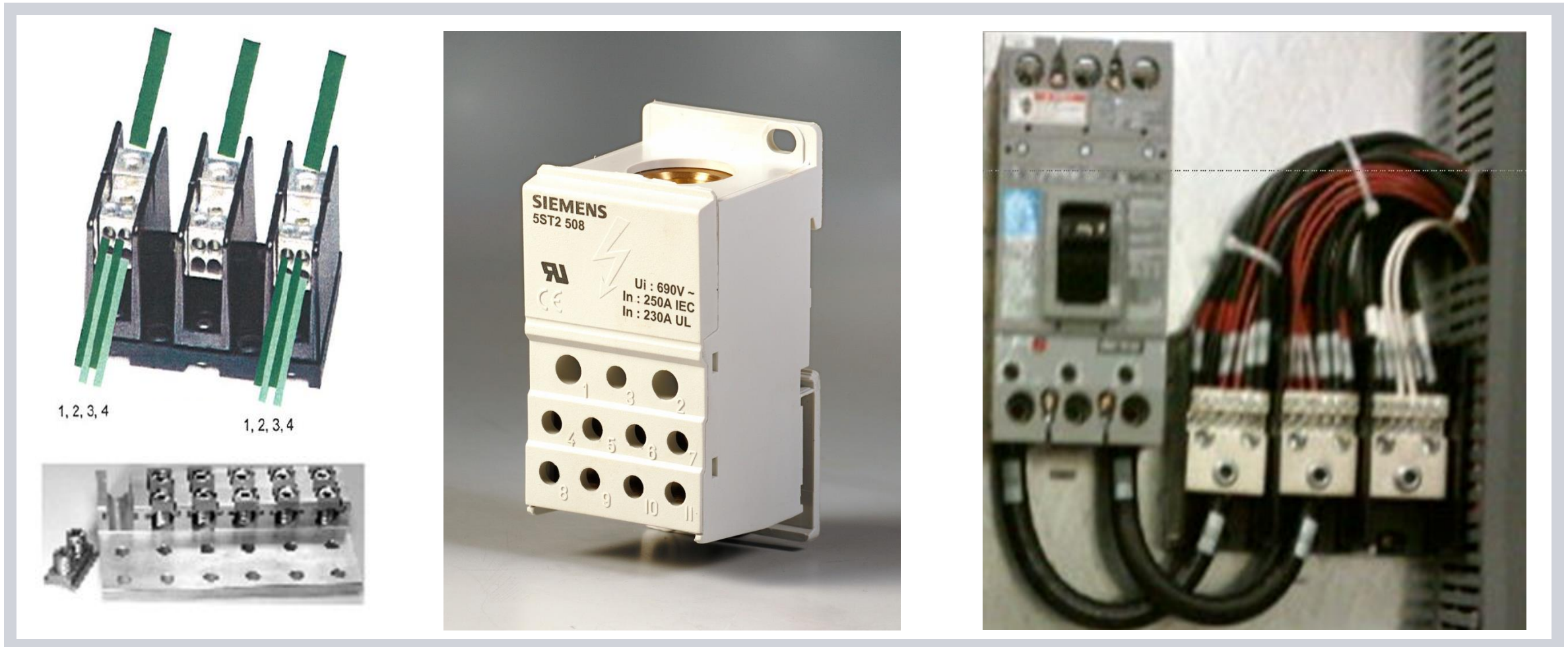


3-phase feeder terminal
3RV19 35-5E (S2)

3RV29 25-5EB (S00/S0)



Power Distribution Blocks



Tap conductor without short circuit protection acc. NFPA79

Case 1: Overcurrent protection at the supply shall not be required *if all of the following conditions are met:*

- The current-carrying capacity of each of the conductors is at least ***equal to that required for their respective load***
- Each connecting conductor to the overcurrent protective devices is ***no longer than 3 m (10 ft)***.
- The conductor is ***suitably protected from physical damage*** (e.g. conduit)
- The conductor ***does not extend beyond the control panel enclosure.***
- The conductor ***terminates*** in a single ***branch circuit rated protective device.***

Note: Applicable within the control panel enclosure only!



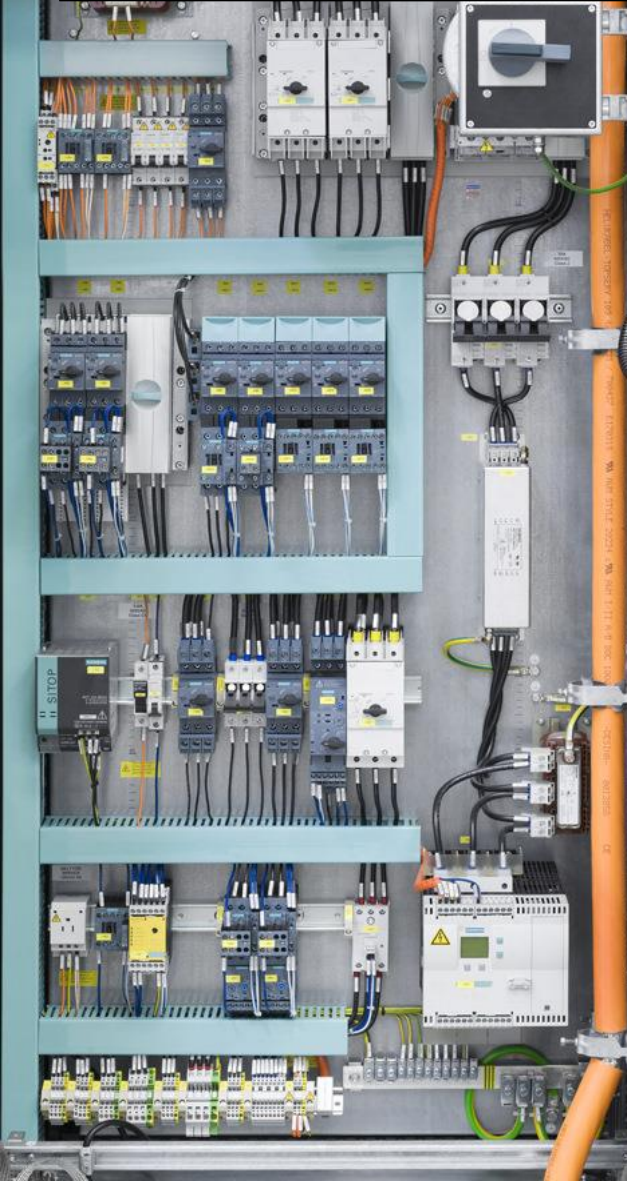
Tap conductor without short circuit protection acc. NFPA79

Case 2: Overcurrent protection at the supply shall not be required *if all of the following conditions are met:*

- The conductor has an ampacity of *at least one-third that of the conductor from which it is supplied.*
- The conductor is *suitably protected from physical damage.* (e.g. conduit or duct)
- The conductor is *not over 7.5 m (25 ft) long*, and the conductor terminates in a single branch circuit-rated protective device

Note: Applicable also *beyond* the control panel enclosure!

Questions?



Note / Disclaimer

The circuit examples and interpretations of the standard are non-binding and do not claim completeness concerning configuration, equipping and contingencies. They do not represent customized solutions but merely provide support for typical tasks.

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