

Figure 6-5 Placing the BaseUnits for the AC I/O modules

6.5.3 Forming potential groups with fail-safe modules

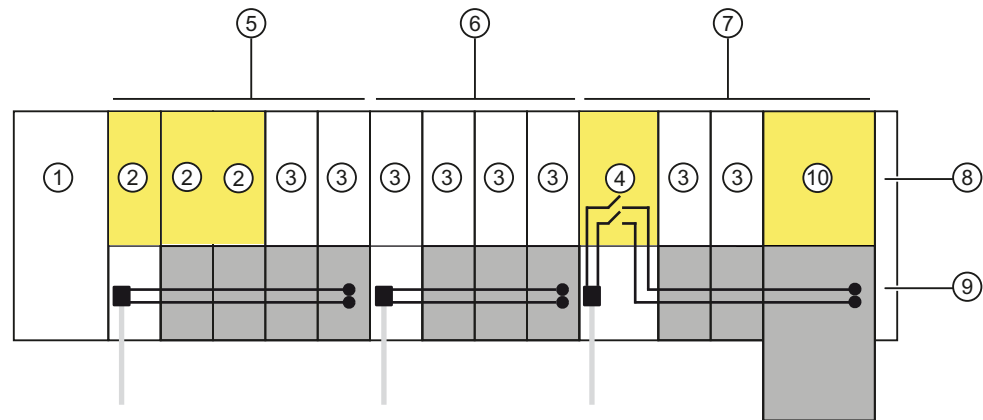
Introduction

ET 200SP distributed I/O systems can be configured using fail-safe and non-fail-safe modules. This chapter provides an example of a mixed configuration comprising fail-safe and non-fail-safe modules.

Example of an ET 200SP configuration with fail-safe and non-fail-safe modules

In principle, it is not necessary to operate fail-safe and non-fail-safe modules in separate potential groups. You can divide the modules into fail-safe and non-fail-safe potential groups and install them.

The figure below shows an example of a configuration with fail-safe and non-fail-safe modules within a single ET 200SP distributed I/O system.



- ① IM 155-6 PN HF interface module
- ② F-module
- ③ Non-fail-safe module
- ④ Power module F-PM-E 24VDC/8A PPM ST
- ⑤ Mixed fail-safe and non-fail-safe potential group with BaseUnits BU15..D and BU15..B. You achieve SIL3/Cat. 4/PLe for the fail-safe modules. No safety category can be achieved with the non-fail-safe motor starter.
- ⑥ Non-fail-safe potential group with BaseUnits BU15..D and BU15..B
- ⑦ Fail-safe potential group with BaseUnits BU20..D, BU15..B and BU30-MSx. Up to SIL2/Cat. 3/PLd is possible if you disconnect the self-assembling voltage bus and thus the non-failsafe modules.
- ⑧ Server module
- ⑨ Self-assembling voltage buses P1/P2
- ⑩ Fail-safe motor starter F-DS HF

Figure 6-6 ET 200SP - example of a configuration with fail-safe modules

6.5.4 Forming potential groups with Ex modules

Ex module group

When you form an Ex module group with Ex BaseUnits and Ex power module/Ex I/O modules, observe the information in the System Manual ET 200SP HA Distributed I/O system / ET 200SP Modules for devices used in an explosion hazardous environment (<https://support.industry.siemens.com/cs/ww/de/view/109795533/en>).

NOTE

Thermal decoupling required

For thermal decoupling of ET 200SP modules and Ex module groups, you must install the following in front of the first Ex power module:

- An empty slot with BU cover or
- Recommendation: Potential distributor (PotDis-TerminalBlock PotDis-TB-P1-R on a PotDis-BaseUnit PotDis-BU-P2/B-B). This allows for a distribution of the supply voltage for the downstream Ex power modules.

6.5.5 Forming potential groups with motor starters

Overview of the functions of the BaseUnits

	24 V infeed	24 V continuation from left module	24 V transmission	500 V infeed	500 V continuation from left module	500 V transmission	F-DI infeed	F-DI continuation from left module	F-DI routing
3RK1908-0AP00-0AP0	✓	--	✓	✓	--	✓	--	--	--
3RK1908-0AP00-0CP0	--	✓	✓	✓	--	✓	--	--	--
3RK1908-0AP00-0BP0	✓	--	✓	--	✓	✓	--	--	--
3RK1908-0AP00-0DP0	--	✓	✓	--	✓	✓	--	--	--
3RK1908-0AP00-0EP0	--	✓	✓	✓	--	✓	✓	--	--
3RK1908-0AP00-0FP0	--	✓	✓	--	✓	✓	✓	--	--
3RK1908-0AP00-0GP0	--	✓	✓	✓	--	✓	✓	--	✓
3RK1908-0AP00-0HP0	--	✓	✓	✓	--	✓	--	✓	✓
3RK1908-0AP00-0JP0	--	✓	✓	--	✓	✓	--	✓	✓
3RK1908-0AP00-0KP0	--	✓	✓	--	✓	✓	✓	--	✓

✓ Function available

-- Function not available

Properties of the 500 V AC infeed bus

The infeed bus has the following properties:

- The infeed bus is assembled by lining up the motor starter BaseUnits "BU30-MSx".
- The infeed bus distributes the energy to the SIMATIC ET 200SP motor starter within one load group.
- You can open load groups by plugging in a 500 V infeed BaseUnit (BU30-MS1, BU30-MS2, BU30-MS5, BU30-MS7 or BU30-MS8). With BaseUnits BU30-MS3, BU30-MS4, BU30-MS6, BU30-MS9 or BU30-MS10, you can continue the infeed bus from the left BaseUnit.
- Via the infeed bus, you have the option of supplying three-phase load groups via L1, L2 and L3 or with single-phase load groups via L and N.
- The permissible voltage range is between 48 and 500 V AC.
- The maximum current carrying capacity is up to 32 A (3-phase) at 50 °C and 500 V. Pay attention to the derating values depending on the configuration.

Properties of the self-assembling voltage bus (L+)

Self-assembling voltage buses have the following properties:

- Maximum current: 7 A
- Rated voltage: 24 V

Pay attention to the derating values depending on the configuration.

The AUX1 bus is not supported in the BaseUnits of the SIMATIC ET 200SP motor starters. The AUX1 bus is used in ET 200SP motor starters for routing the F-DI signal in BU30-MS7 to BU30-MS10.

WARNING

Electric shock when operating the infeed bus without touch protection cover

There is a risk of electric shock when touching the infeed bus if you have not fitted a touch protection cover on the infeed bus on the right.

Always fit a touch protection cover on the infeed bus on the right (article number: 3RK1908-1DA00-2BP0).

WARNING

Electric shock when operating a BaseUnit without an inserted motor starter

If you fit a BaseUnit for motor starters without cover (e.g. option handling), there is a risk of an electric shock when touching the BaseUnit.

Always fit a cover on the BaseUnit (article number: 3RK1908-1CA00-0BP0).

Requirements

Use the following devices to form potential groups with motor starters:

- BaseUnits BU30-MSx
- 3RK1308-0xx00-0CP0 motor starters

Operating principle

Feed in the supply voltage L+ via the BaseUnit BU30-MS1 and BU30-MS3 at the 24V DC and M terminals.

You can operate the motor starter on a single-phase (L1, N, PE) or a three-phase (L1, L2, L3, PE) AC voltage system. You connect the required AC voltage directly to the BaseUnits BU30-MSx (terminals L1, L2(N), L3, PE). You plug the motor starter onto the BaseUnits.

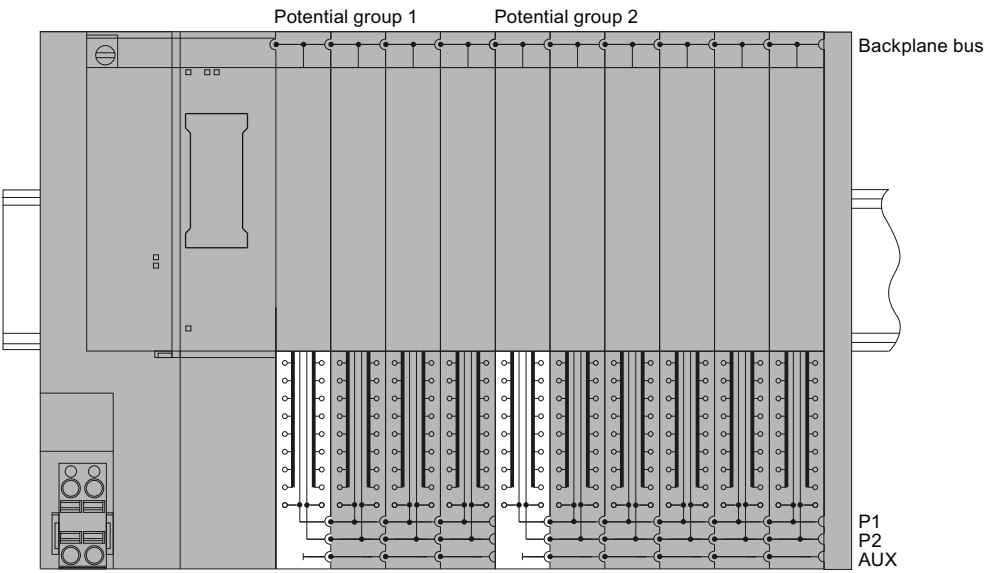
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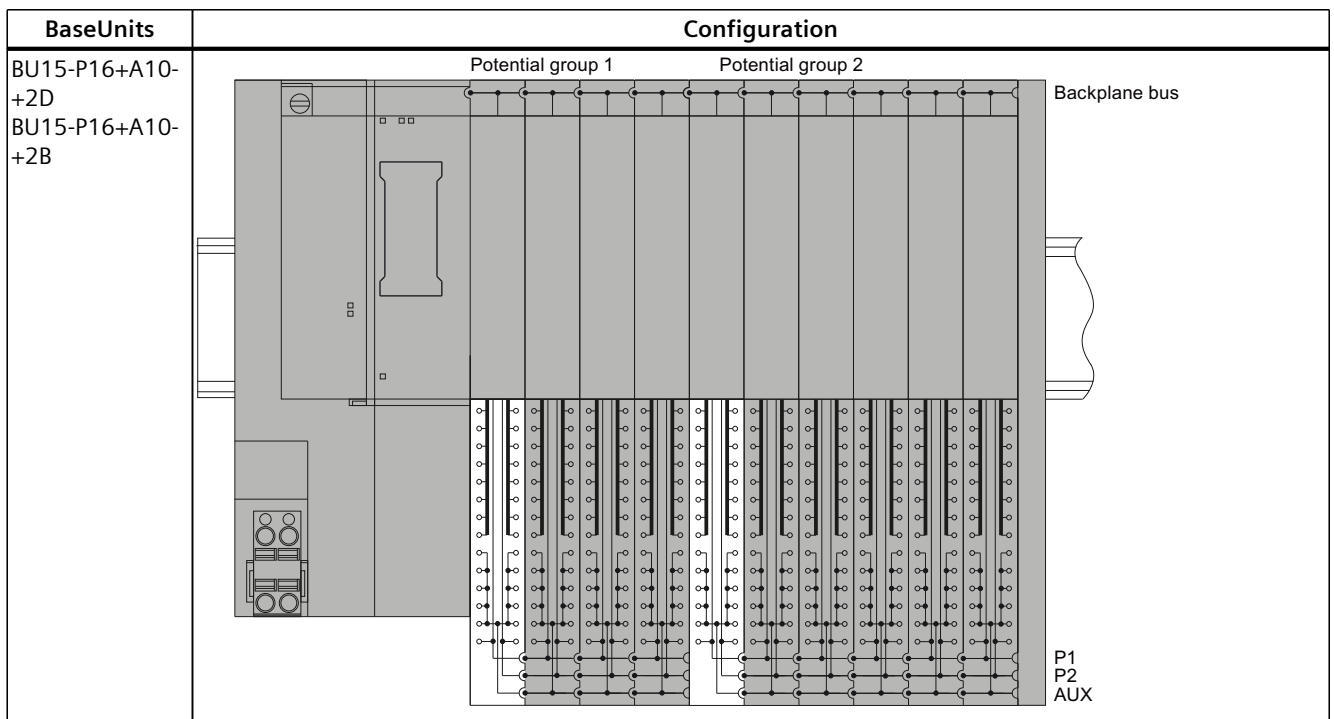
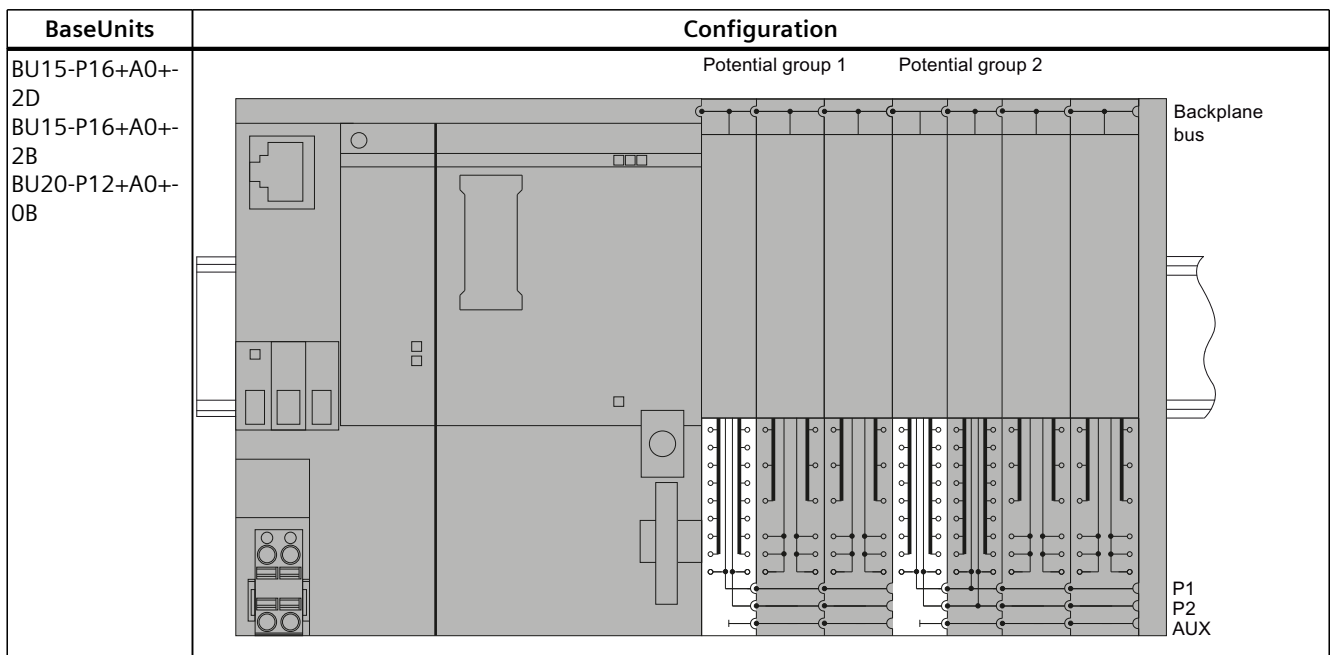
The motor starters' AC power supply is not connected to the AC power supply for the AC I/O modules (see Chapter "Forming potential groups with BaseUnit type B1 (Page 99)").

6.6 Configuration examples for potential groups

6.6.1 Configuration examples with BaseUnits

Table 6-6 Configuration examples with BaseUnits

BaseUnits	Configuration
BU15-P16+A0+-2D BU15-P16+A0+-2B	



6.6.2 Configuration examples with potential distributor modules

3-wire connection

The potential distributor modules allow for a space-saving design. For a 3-wire connection, you can, for example, replace two digital input modules with 8 channels on a 141 mm long BaseUnit with a digital input module with 16 channels and a potential distributor module, each of which is only 117 mm long.

NOTE

You must not place a BaseUnit for I/O modules in a PotDis potential group formed with a light-colored PotDis-BaseUnit.

The figure below shows a configuration example with a DI 16×24VDC ST digital input module on a BU15-P16+A0+2B BaseUnit and a PotDis-TerminalBlock PotDis-TB-P1-R on a PotDis-BaseUnit PotDis-BU-P2/B-B.

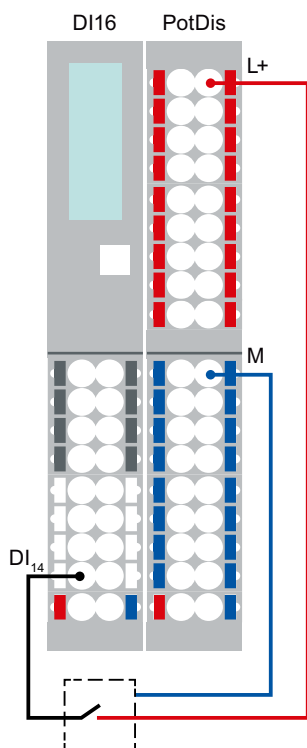


Figure 6-7 Example: 3-wire connection

Supply of external components

Another application of the potential distributor modules is the supply of potentials for external components. Potential distributor modules enable simple, compact, integrated and clear design.

Observe the current carrying capacity of each terminal: max. 10 A.

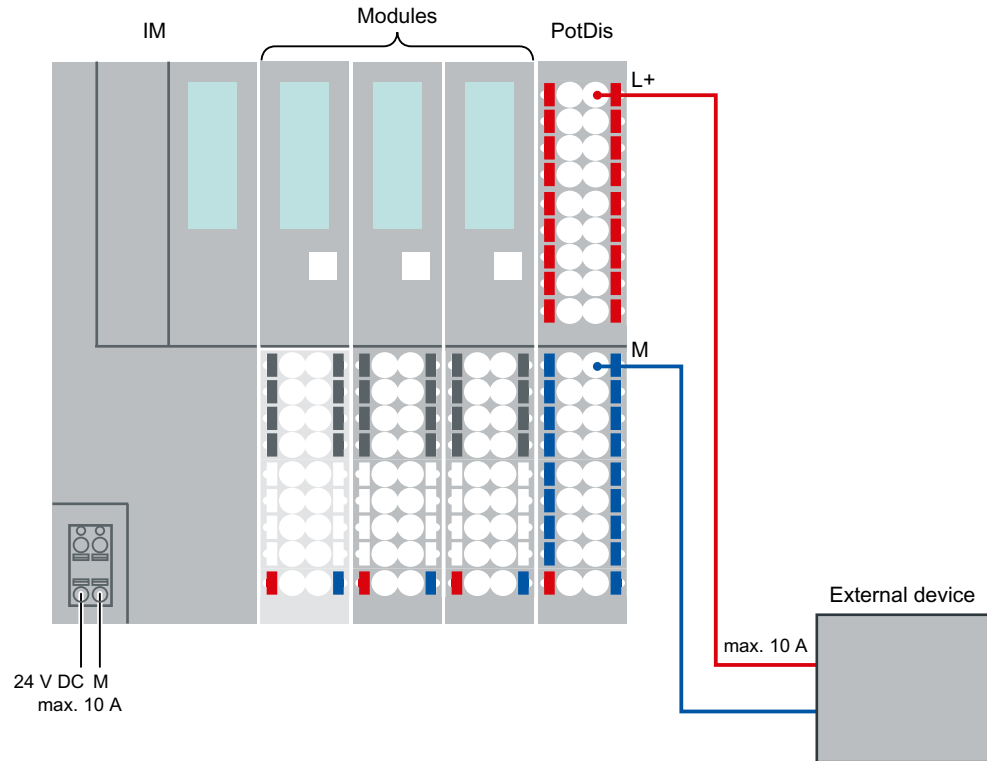


Figure 6-8 Example: Supply of external components

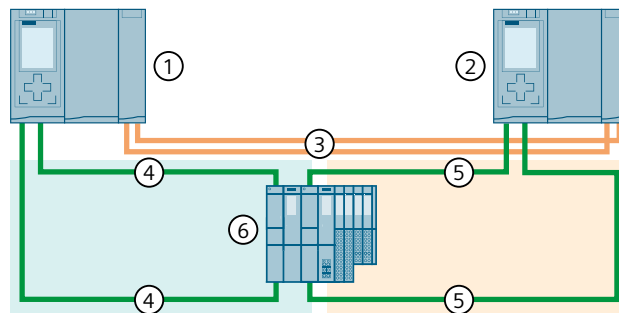
6.7 System redundancy R1

6.7.1 General notes on operating an ET 200SP R1 system

6.7.1.1 Example configuration of a system with ET 200SP R1

You need at least the following components for configuration of an ET 200SP R1 station:

- SIMATIC system rail (1 unit)
- BaseUnit BU type M0 (1 unit)
- Interface module IM 155-6 PN R1 (2 units)
- SIMATIC BusAdapter (2 units, e.g. BA 2×M12)
- BaseUnits and electronic modules (see section Configuration examples for potential groups (Page 104))
- Server module (1 unit)
- To operate a station with R1 system redundancy, you also need a set of R1-compatible S7-1500 CPUs (e.g. CPU 1517H-3 PN or CPU 1518HF-4 PN, 2 units).



- ① CPU 1
- ② CPU 2
- ③ Two fiber-optic cables (redundancy connections)
- ④ PROFINET cable (PROFINET ring 1)
- ⑤ PROFINET cable (PROFINET ring 2)
- ⑥ ET 200SP I/O device (with system redundancy R1)

Figure 6-9 Configuration of S7-1500H with R1 devices in the PROFINET ring

You can find additional configuration examples in the SIMATIC S7-1500 S7-1500R/H Redundant System (<https://support.industry.siemens.com/cs/ww/de/view/109754833>) System Manual.

6.7.1.2 Commissioning an R1 station

After you configure an ET 200SP R1 station, you perform a commissioning maintenance cycle before the deployment in productive operation. This ensures that both redundant interface modules have been correctly contacted and can operate the electronic modules. The following is checked at the same time:

- Test for hardware integrity. Especially for hardware units that are not used while the device is passive and has no access to the SP bus. To ensure that the hardware is fully intact, perform at least a temporary takeover of the SP bus.
- After the maintenance cycle, the redundancy group must return to its pre-maintenance state.

To perform a commissioning maintenance cycle, proceed as follows:

The initial state is: The S7-1500H redundant system is in the RUN-Redundant system state. The ACT LED of one of the two interface modules (IM 1: regardless whether slot 0 or slot 1) is continuously lit.

1. Test step: Disconnect the interface module with the continuously lit ACT LED (IM 1) from the operating voltage by removing the connector from the 24 V connection. The station must assume the following state:
 - The LEDs of interface module 1 all go out.
 - The ACT LED of interface module 2 starts to flash.
 - In the CPU user program, an OB 70 (loss of redundancy) is reported on the station.
 - In the CPU user program, no OB 86 (station failure) is reported on the station.
2. Test step: Check the inputs and outputs via interface module 2. Use the engineering or configuration tool (e.g. user program or tag table).
3. Test step: Restore the operating voltage of interface module 1. The station must assume the following state after restart of interface module 1:
 - The ACT LED of interface module 2 lights up continuously.
 - In the CPU user program, an OB 70 (redundancy return) is reported.
 - The S7-1500H redundant system is again in the RUN-Redundant system state.
4. Test step: Disconnect the interface module with the permanently lit LED ACT (IM 2) from the operating voltage by pulling the plug out of the 24 V connection. The station must assume the following state:
 - The LEDs of interface module 2 all go out.
 - The ACT LED of the interface module 1 starts to flash.
 - In the CPU user program, an OB 70 (loss of redundancy) is reported on the station.
 - In the CPU user program, no OB 86 (station failure) is reported on the station.
5. Test step: Check the inputs and outputs via interface module 1. Use the engineering or configuration tool (e.g. user program or tag table).
6. Test step: Restore the operating voltage of interface module 2. The station must assume the following state after restart from interface module 2:
 - The ACT of interface module 1 is lit continuously.
 - In the CPU user program, an OB 70 (redundancy return) is reported.
 - The S7-1500H redundant system is again in the RUN-Redundant system state.
 - The system is again in the same state as before test step 1. The commissioning maintenance cycle has been successfully completed.