1.3.5 Function of the Enable Inputs

The modules of the U range incorporate enable circuits. The enable inputs can be used to interlock certain modules or switch individual modules off during operation of the programmable controller.

I/O modules whose order numbers end in ...-4U.12 offer the additional feature of changing the enable mode. The modules are therefore equipped with a jumper located next to the addressing switch. It can be accessed from the top (see Fig. below).

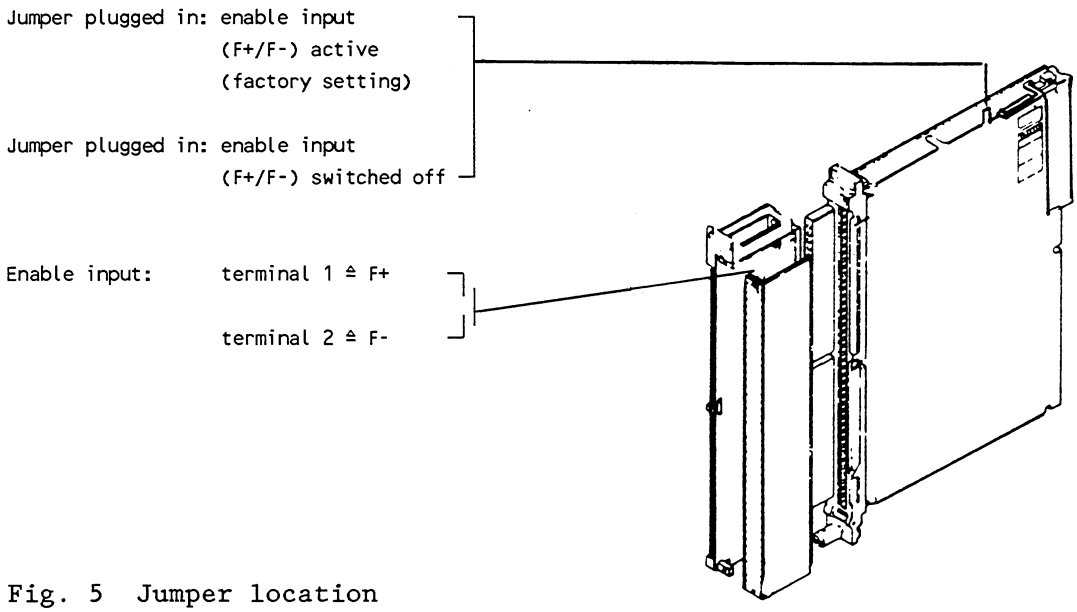


Fig. 5 Jumper location

1.3.5.1 With Active Enable Input (Factory Setting)

Modules with DC inputs or outputs are enabled by applying an external voltage to the inputs F+/F-.

Modules with AC inputs or outputs are enabled by means of a jumper in the front connector.

The power supply of the enable inputs is interrupted when the front connector is detached from the front panel of the module; the module is thus switched off and no longer issues acknowledgement signals, i.e. the CC recognizes an acknowledgement delay (timeout).

Examples of the function of enable inputs:

- Individual subprocesses can be switched off individually with very little control power, i.e. the outputs of the individual module can be connected to a common load power supply unit and activated separately.

- The load voltage of each individual module can be monitored without any additional effort. Reactions to load power failures can be programmed in the QVZ (timeout) organization block as required.

The following must be noted when configuring the system:

Power on: Max. 100 ms after switching on the PC, voltage must be present at the enable inputs of the I/O modules.

Power off: After switching off the PC, the supply voltage must be present at the enable inputs of the I/O modules as long as the internal 5 V voltage is present.

Please note the following for switching off the PC and the supply units for the enable inputs:

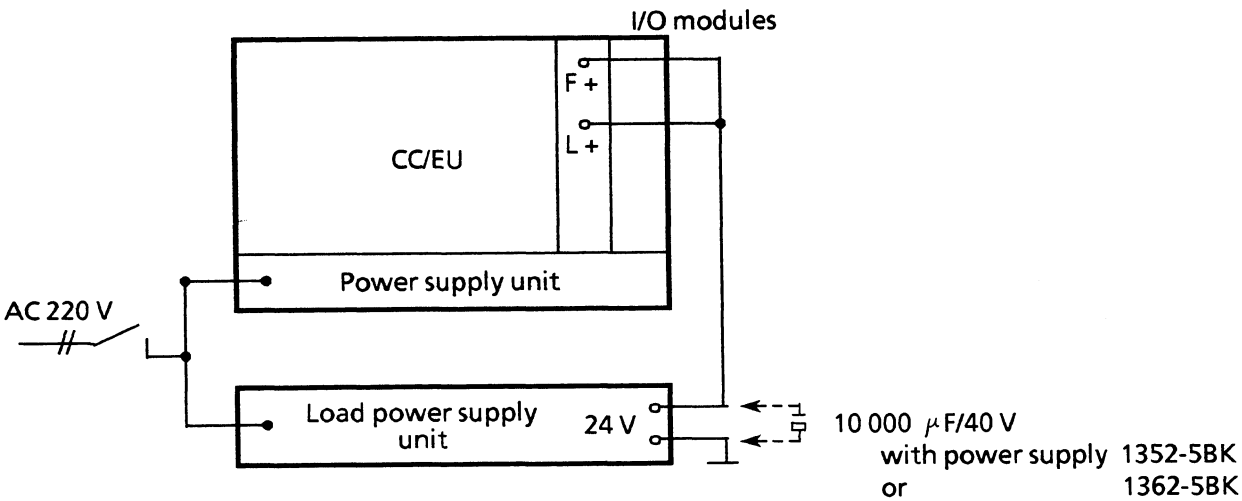
1. Switching off CCs/EUs and the load power supply simultaneously with 220-V power supply

Proper functioning of the module is ensured if the 24-V load power supply unit has at least a capacitance of 4700/uF connected at its output for every 10 A of load current.

Example: Load power supply 6EV1334-4AK (220 V/24 V, 10 A)

In units which do not fufil this condition, a capacitor of 10,000/uF/40 V can be connected in parallel.

Example: Load power supply unit 6EV1352-5BK (380 V/24 V, 20 A) and load power supply 6EV1362-5BK (380 V/24 V, 40 A).



1.3.5.2 With Switched-off Enable Input (applies only to ...-4U.12 modules with open plug-in jumper)

If you do **not wish to remove and plug in the modules during operation** the enable inputs (F+/F-) need not be wired. The jumper for switching the enable mode is then to be removed.

The module is now functionally compatible with the compact and rugged I/O modules.

When the module is used in the programmable controllers 115 U (with processors 941 and 942) 130 K, 130 W and 135 U (S processor) it is advisable to operate the module with switched-off enable input. Else, when the front connector is removed (i.e. it is disconnected from the enable power supply unit) the programmable controller enters the stop state and signals acknowledgment delay (timeout).

1.3.5.3 Removing and Inserting of I/O Modules

- **Active enable input:**
  Removing and inserting modules during operation is possible in the following programmable controllers:

  S5-115 U (processors 943 and 944),
  S5-135 U (R processor, S/R processor),
  S5-150 K/S/U and
  S5-155 U.

  Important

  If no enable signal is applied to the module or if the front connector or the module is removed, acknowledgment delay is signalled. All input data of this module is read as a "1" signal on the S5-150 S/U and the S5-135 with S and R processor and on all other programmable controllers and CPUs as a "0" signal.

- **Switched-off enable input:**
  I/O modules may be removed or plugged in only if the CPU is in the stop state.

  Important

  When the front connector is removed no further acknowledgment delay is signalled by the module and all input data is read as a "0" signal.
  When a module is removed all input data of this module is read as a "1" signal on the S5-150 S/U and the S5-135 with S and R processor and on all other programmable controllers and CPUs as a "0" signal.

  The user must program the QVZ organization block to make sure that neither in the case of a fault nor during replacement of the module a dangerous condition can occur in the process or in the plant.

5.10 Digital Output Module 6ES5451-4UA11 and 6ES5451-4UA12 (acc. to UL/CSA Requirements)

Rated input voltage	24 V DC
Number of outputs	32 current limited [1])
Type of outputs	Floating, 1 group of 32 outputs
Supply voltage range	20 to 30 V DC
Fusing	6.3 A, slow 1 fuse per 8 outputs
Output voltage	
"1" signal	min. L+ - 1.5 V
"0" signal	max. 3 V
Switching current (resistive, inductive load)	5 mA to 0.5 A
Leakage current at "0" signal	max. 0.5 mA
Lamp switching current	max. 0.22 A (5 W)
Switching frequency	
Resistive load	max. 100 Hz
Inductive load	max. 2 Hz at 0.3 A; max. 0.5 Hz at 0.5 A
Voltage induced on circuit interruption	Limited to L+ - 47 V
Total switching current	max. 4 A per 8 outputs
Diversity factor (number of outputs "On" simultaneously)	
with fan	100%
without fan	50%; 100% to 35 °C
Permissible length of cable	max. 400 m, unshielded;

Power supply

Digital section from system bus	5 V, typ. 120 mA
Current consumption from L+/L-	24 V, typ. 150 mA

Enable input (F+/F-)

Rated input voltage	24 V DC
Input voltage	
"1" signal	13 to 33 V
"0" signal	- 33 V to 5 V
Rated input current	5 mA
Permissible length of cable	max. 200 m

Short-circuit monitoring

Indication for signal output (H+)	Red LED for groups of 8 outputs
Output voltage referred to L- (supply of 1 L+)	
"1" signal	min. 1L+ - 5 V
"0" signal	max. 3 V
Switching current	max. 10 mA, limited

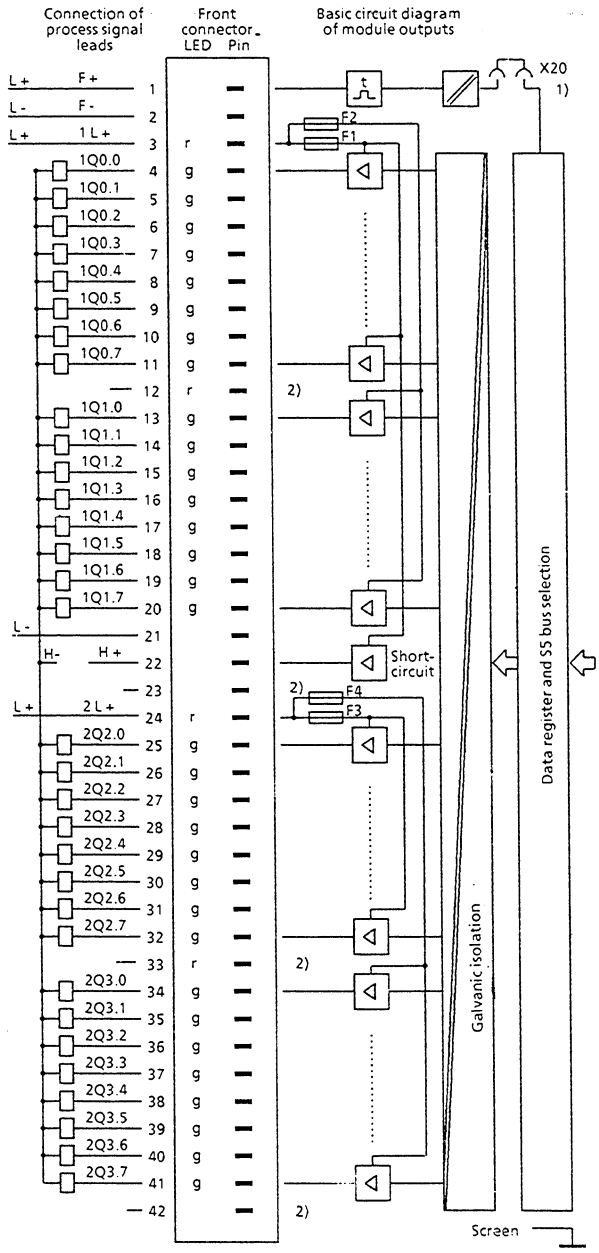
[1]) Short-circuit protection responds at line resistance ≤ 15 ohms.

Safety test

Voltage test to VDE 0160	Group to group: 1250 V AC; Group to casing: 1250 V AC
Impulse voltage test to IEC 255-4	Output to L-: U_s = 1 kV; 1.2/50/us waveform
RIV (radio interference voltage) test to IEC 255-4	Output to L-: U_s = 1 kV; 1 MHz

Physical data

Dimensions (WxHxD)	20 mm x 255 mm x 195 mm (0.8 in x 10 in 7.7 in)
Approx. weight	0.45 kg (1.1 lbs)



Example for the labelling of an input:

(1)Q 1.6

- Output 6 (6th bit); Possible: 0 to 7
- Address of output bytes (1st byte); Possible: 0 to 255
- Q = Output
- 1st terminal L+ (not specified in the address)

g = Green LED (status display)
r = Red LED (short-circuit indication)
F+ = Enabling input

1) Enable mode switch (only applies to ...-4UA12), jumper inserted: enable input is active (factory setting)

2) The connection is not established internally. Creepage and ventilation paths of 0.8mm have been retained.
Warning: when connecting voltages in the input voltage area or above, these distances are, according to UL and CSA, not adequate. (But according to German standards (VDE) permissible).