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Chapter 4
SIMATIC TI315 Models

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4.1 SIMATIC TI315 Quick Start

The purpose of this section is to get the experienced user started in the shortest time possible.

⚠CAUTION

Do not connect the 220 VAC neutral terminal when powering the unit with 110 VAC. The unit is damaged when 110 VAC operation is attempted with this terminal connected.

⚠WARNING

To minimize risk of potential shock hazard, be sure the unit is properly installed in the enclosure to minimize access of electrically live terminals. Only persons experienced in using high voltage safely should perform this task.

1. Unpack the equipment.
2. Connect unit to the AC power source. (See Figure 4-1.)
3. Place the keyswitch in program mode.
4. Turn unit power on. The PWR LED illuminates. (See Figure 4-1.)
5. Connect the TI305 Programmer to the front of the unit. The programmer display reads **0.0.0.0.** and the ADR LED illuminates. (See Figure 4-2.)
6. Clear program memory by pressing the following keys on the portable programmer:

   CLR SHFT 3 4 8 DEL NXT

7. Place the mode select key switch on the programmer in the RUN position (run mode). The RUN LED illuminates. (See Figure 4-2.)
8. Test an output. Enter the following instruction from the programmer to force an output on. For this test, use output 20.

   SET SHFT 2 0 ENT

   Output 20 LED on the TI315 unit illuminates.
9. Press the following keys to turn output 20 off.

   RST SHFT 2 0 ENT

10. Turn unit power off.

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11. To test an output and an input using a field device, connect an input device, such as a switch, to terminal 0 on the TI315 unit. (See Figure 4-1.)

12. Place the TI305 programmer mode select switch in the PRG position (program mode). (See Figure 4-2.)

13. Turn unit power on.

14. Press [STR] [SHFT] [0] [ENT]

15. Press [OUT] [SHFT] [2] [0] [ENT]

16. Place the TI305 programmer mode select switch in the RUN position (run mode). (See Figure 4-2.)

17. Close the switch hard-wired to terminal 0. Output 20 LED on the TI315 unit illuminates. (See Figure 4-2.)

18. If you encounter problems with this procedure, repeat steps 4. through 17. If the problem persists, refer to Chapter 1 for information regarding technical assistance.

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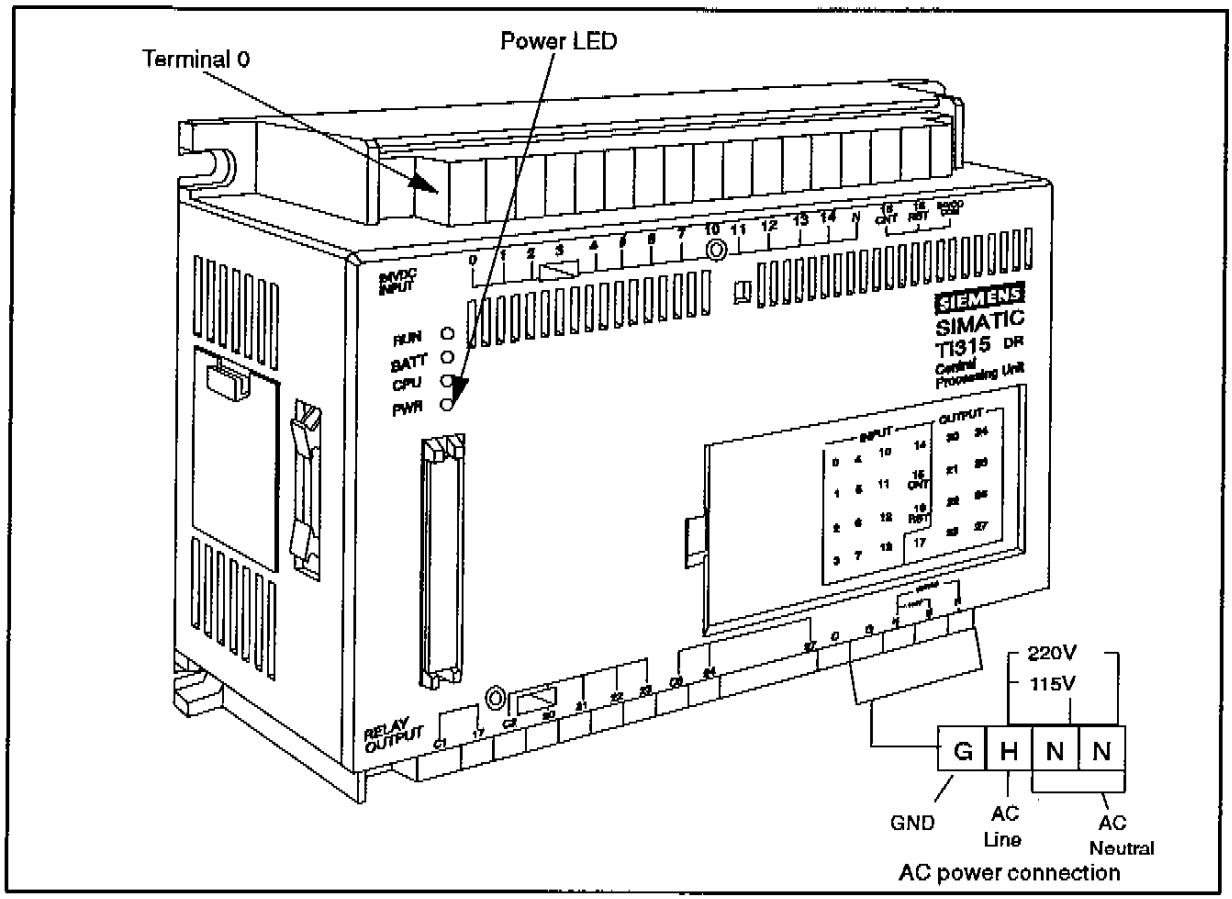


Figure 4-1 SIMATIC TI315 Controller

⚠CAUTION

Do not connect the 220 VAC neutral terminal when powering the unit with 110 VAC. The unit is damaged when 110 VAC operation is attempted with this terminal connected.

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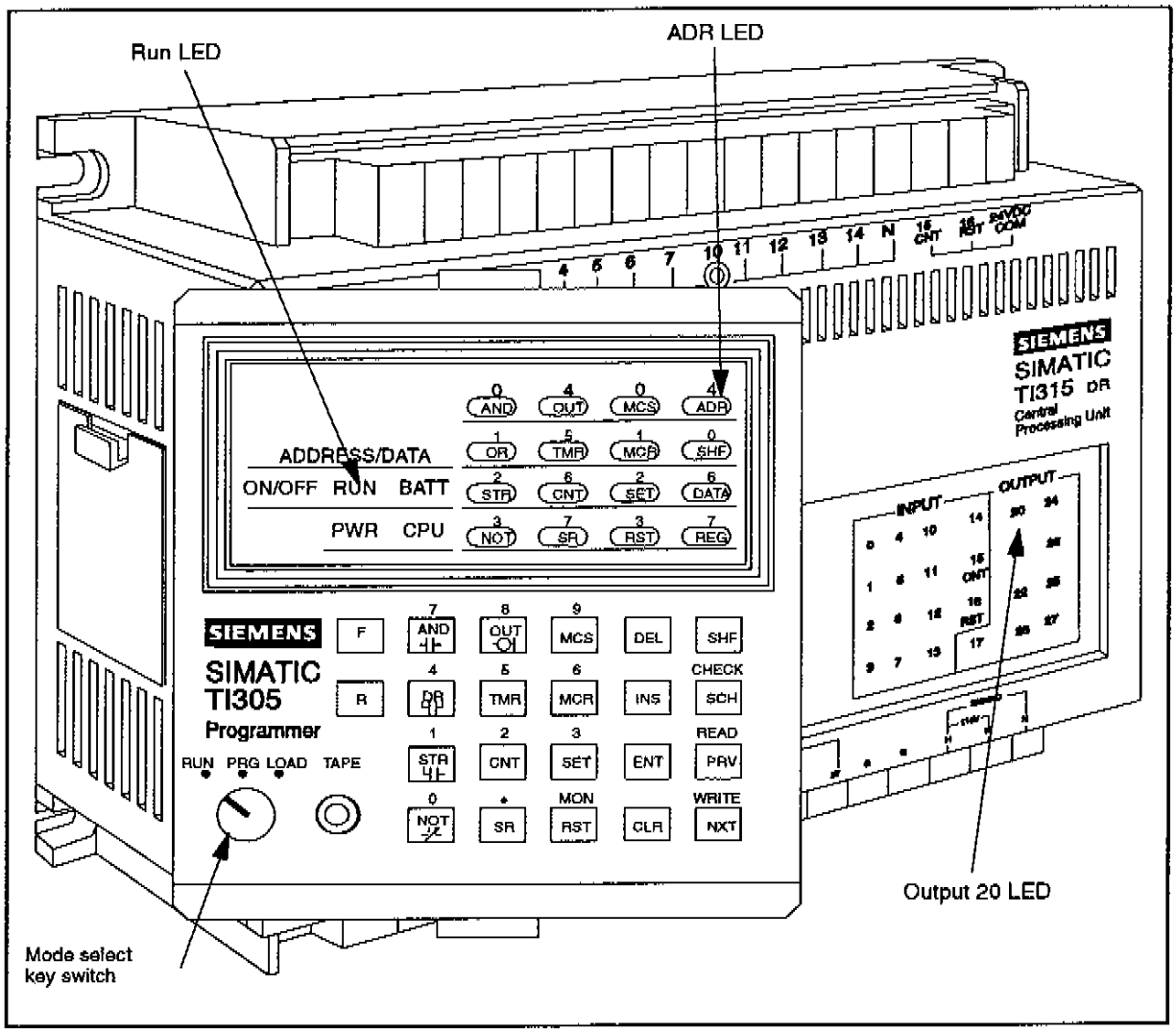


Figure 4-2 SIMATIC TI305 Programmer

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4.3 Characteristic Specifications

Table 4-1 contains information about the program capacity, program memory, number of input and output terminals, shift registers, internal relays, program monitoring features, and diagnostic features for the TI315 model.

Table 4-1 TI315 Specifications

Item	Description
Programming	Relay ladder logic (RLL)*
Average scan rate	20 ms, 500 words
Program capacity	700 words
Program memory	CMOS-RAM (lithium battery backup, life/5 years). Option: EPROM PPX:305-ROM or HN2732A-4
Number of I/O points	15 inputs (2 inputs can be used for high-speed counter); 9 outputs
Internal relays	155 (59 selectable for memory retention)
Shift registers	Uses internal relays
Timers and counters	20 timer/counters; timers: 0.1 – 999.9 or 1 – 9999 sec; counter: 1 – 9999 (4 timer/counters available for external setting)
High-speed counter	1, response: 2 k Hz; number of step settings: 20
Special internal relays	5 internal relays: relay for power failure retention, 0.1 second clock relay, battery failure relay, pause relay, initial reset relay
Diagnostic features	CPU/memory/battery/grammatical
Cassette interface	830 baud
Weight	2 kg (4.4 pounds), including programmer
Power required: AC models DC models	 115/230 VAC 47–63 Hz 25 W 24 VDC

* Stage upgrade kits are available for Stage programming.

Table 4-2 Status Displays

LEDs	Description or Value
I/O	24 points
CPU error	1 indicator
Battery low	1 indicator
Multipoint operation monitoring	16 points
On/off status	1 indicator
Timer/counter accumulated value	1 4-digit display

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4.4 Self-diagnostics

This section describes the TI315 self-diagnostics.

CPU Failure

If a CPU failure occurs, the RUN output turns off, program execution stops, and all outputs are off. All status LEDs turn off except for the power supply and the CPU alarm indicators.

Parity Error

CPU memory is parity-checked when you apply power or select run mode. If an error is found in the program, **E21** is displayed on the programmer and the run mode does not engage.

I/O Circuit

LEDs indicate input/output conditions. You can check all of the inputs and outputs by viewing the indicators or by using the multipoint monitor feature available in the programmer. This feature allows you to monitor input signals to the CPU.

I/O Circuit Wiring

The input LED lights when an input is received, regardless of whether a program is present.

Program Errors

An error code is displayed on the programmer when the program contains an error.

NOTE: Error codes are defined in Appendix A.

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TI315 models feature 24 I/O (15 inputs and 9 outputs) and are expandable to 96 I/O.

Table 4-3 Unit Configurations

Model Number	Unit Configuration
PPX:315-AA	AC input and output (TRIAC)
PPX:315-DA	DC sink in/AC out
PPX:315-DD	DC sink in/DC out
PPX:315-DR	DC sink in/relay out
PPX:315-DSR	DC source in/relay out
PPX:315DC-DR	24 VDC system DC sink in/relay out
PPX:315DC-DD	24 VDC system DC sink in/out

NOTE: The PPX:305-PROG is compatible with all of the above units.

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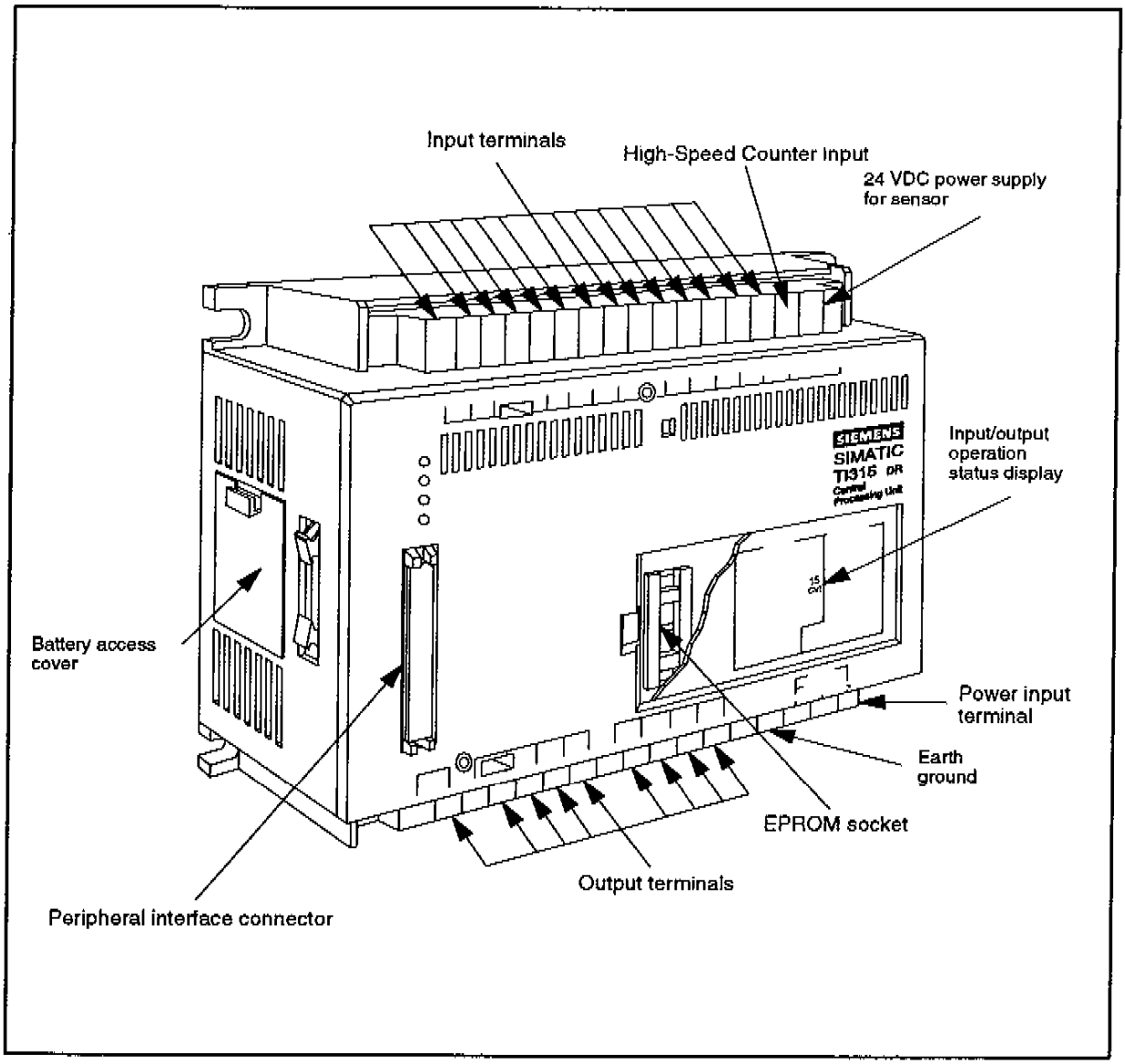


Figure 4-3 SIMATIC TI315 Major Component Identification

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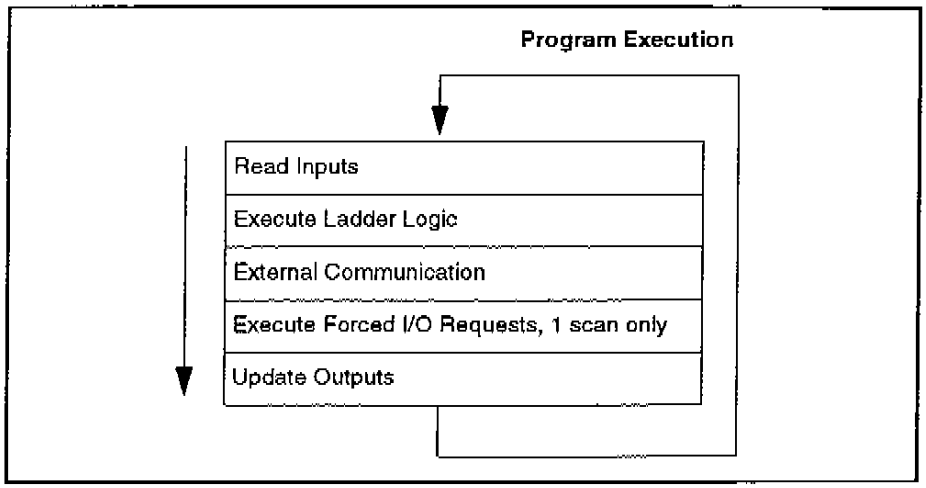


Figure 4-4 CPU Processing

NOTE: The I/O references in the Series 305 are numbered in octal, which is also known as base 8. In octal, the digits 8 and 9 are not used. I/O points are counted as usual from 0 up to 7. Since 8 and 9 are not used, the next point after 7 is 10. When your count reaches 17, the next point is 20. The point following 77 is 100, and so on.

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The following tables contain the times (in micro-seconds) required for the TI315 models to execute their instructions.

Table 4-4 Boolean Logic Commands

Instruction	Contact Pt #0–377	Tmr/Ctr Contact Pt	Drum Sequence Counter Number 600–623	
			Pwr Flow	No Pwr Flow
AND	33.0	41.7	63.2	38.0
AND NOT	36.5	45.2	65.0	38.0
OR	39.0	47.7	71.7	38.0
OR NOT	42.5	51.2	73.5	38.0
STR	42.0	50.7	73.0	73.0
STR NOT	45.5	54.2	74.7	74.7

Table 4-5 Output Commands

Instruction	Power Flow	No Power Flow
OUT	40.2	40.2
SET OUT	46.2	46.2
SET	39.0	34.5
RST	41.5	34.5
TMR	99.2	58.5
CNT	126.7	83.0
*SR	71.2 + 17.5 x N	59.0

* The processing time of SR command changes by the number of internal relays specified.
N = number of internal relays specified in the shift register.

Table 4-6 Master Control and Ladder Logic Rung Connection

Instruction	Power Flow	No Power Flow
MCS	40.2	40.2
MCR	40.2	40.2
AND STR	40.2	40.2
OR STR	40.2	40.2

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4.9 SIMATIC TI315 Controller Memory

You can use two types of memory to store the ladder logic program, RAM or EPROM. The TI315 controller has a standard 700 words of memory, which you can store in either RAM or the optional EPROM.

RAM

User memory resides in the RAM area if an EPROM is not installed. The 3 V lithium battery retains the ladder logic program in RAM when power to the TI315 is turned off. Refer to Section 8.3 for more information on battery backup.

Table 4-7 RAM Specifications

Program Capacity	700 words (steps), CMOS-RAM contained
Memory Address	0 – 699, decimal
Program Protection	Lithium battery (replaceable)
Estimated Protection Life	5 years

EPROM

The TI315 controllers offer the option of saving the ladder logic in a non-volatile form. Through the use of an erasable programmable read-only memory (EPROM) integrated circuit, the program can be protected in case of power loss without a battery. The EPROM only protects the program. If the battery is not installed, the count values for all counters and the retentive relays (if selected) are lost during a power outage.

The EPROM mounting socket is located behind the plastic window of the input/output display on the front of the unit. When the EPROM is installed, the unit is automatically set for EPROM operation and disregards programs already in RAM.

Table 4-8 EPROM Specifications

Vendor number	PPX:305-ROM or HN482732AG (Hitachi)
Program capacity	700 words (steps)

Writing programs into EPROM requires a separate EPROM writer unit. For more information, refer to Chapter 7, "Peripheral Devices".

NOTE: When an EPROM is installed, the CPU powers up in run mode.

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Table 4-9 I/O Numbers

Inputs (15 Points)		Outputs (9 Points)	
000	010	—	020
001	011	—	021
002	012	—	022
003	013	—	023
004	014	—	024
005	015	—	025
006	016	—	026
007	—	017	027

Table 4-10 Timer/Counter Numbers

600	610	620	Note: 620–623 are Timer/Counter only with the PPX:305-10D T/C Setpoint Unit
601	611	621	
602	612	622	
603	613	623	
604	614	624	Note: 624 is the Counter reference for the high-speed counter
605	615	625	
606	616		
607	617		

NOTE: Counter current values are retentive during system power cycles.

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Table 4-11 Control Relay Numbers

140	150	160	170	200	210	220	230	240	250	260	270
141	151	161	171	201	211	221	231	241	251	261	271
142	152	162	172	202	212	222	232	242	252	262	272
143	153	163	173	203	213	223	233	243	253	263	273
144	154	164	174	204	214	224	234	244	254	264	274
145	155	165	175	205	215	225	235	245	255	265	275
146	156	166	176	206	216	226	236	246	256	266	276
147	157	167	177	207	217	227	237	247	257	267	277
300	310	320	330	340	350	360	370				
301	311	321	331	341	351	361	371				
302	312	322	332	342	352	362	372				
303	313	323	333	343	353	363	373				
304	314	324	334	344	354	364	374				
305	315	325	335	345	355	365	375				
306	316	326	336	346	356	366	376				
307	317	327	337	347	357	367	377				

NOTE: TI315 relays from 300 to 372 can be used as retentive relays. Control relays are used when programming shift registers. Table 4-12 describes special function relays 373, 374, 375, 376, and 377.

Table 4-12 Special Function Relays

Relay	Function
373	When energized, control relay references 300–372 are retentive upon power failure.
374	Energizes for one scan following power-up or program-to-run transition.
375	A 0.1 second clock pulse that can be used in ladder logic.
376	When energized, all outputs are disabled except those entered with the SET OUT command.
377	Energized when backup battery voltage is low.

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4.11 SIMATIC TI315 I/O Wiring

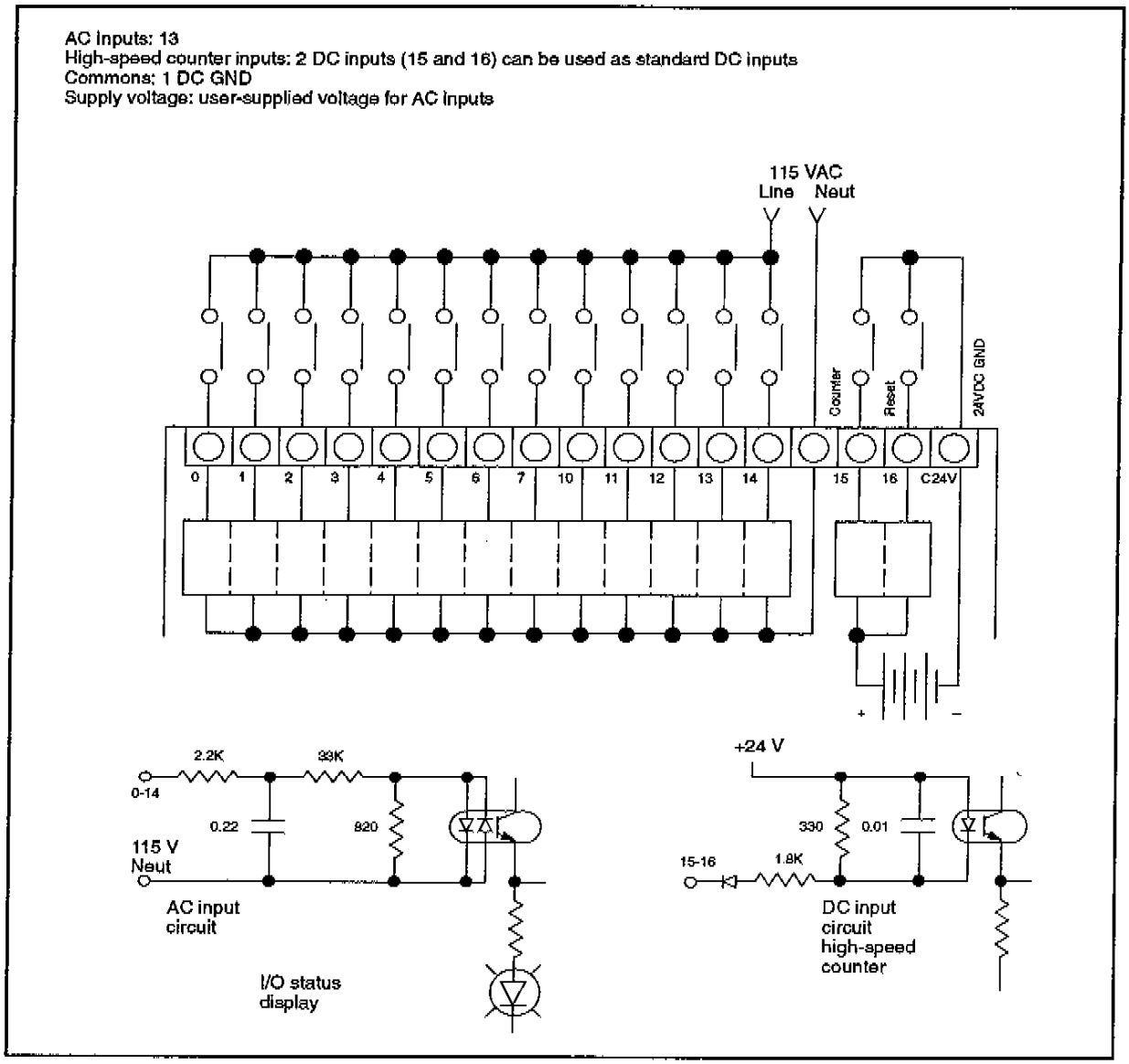


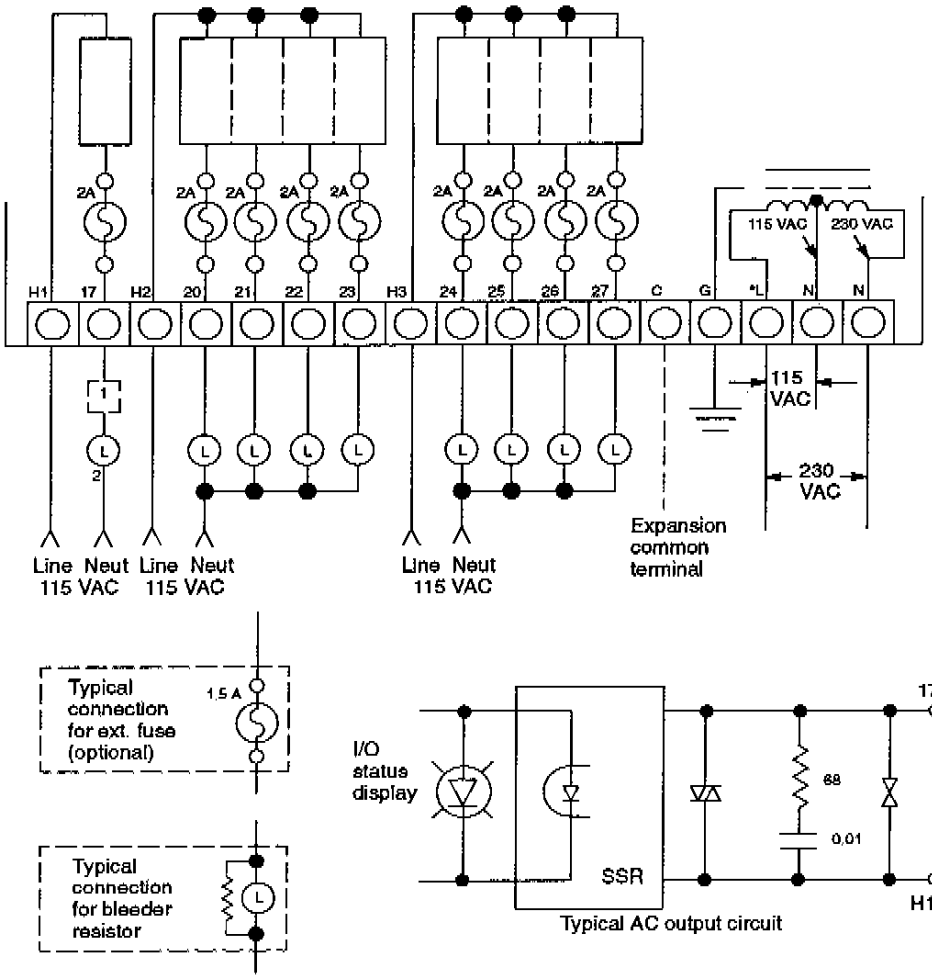
Figure 4-5 PPX:315-AA AC Input Wiring Diagram

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SIMATIC TI315 I/O Wiring (continued)

Outputs: 9 TRIAC outputs
Commons: 3 AC lines and 1 expansion GND
H1 for output #17
H2 for outputs #20-23
H3 for outputs #24-27
C for expansion GND

Fuses: 2 amp 250 V non-replaceable fuse per output

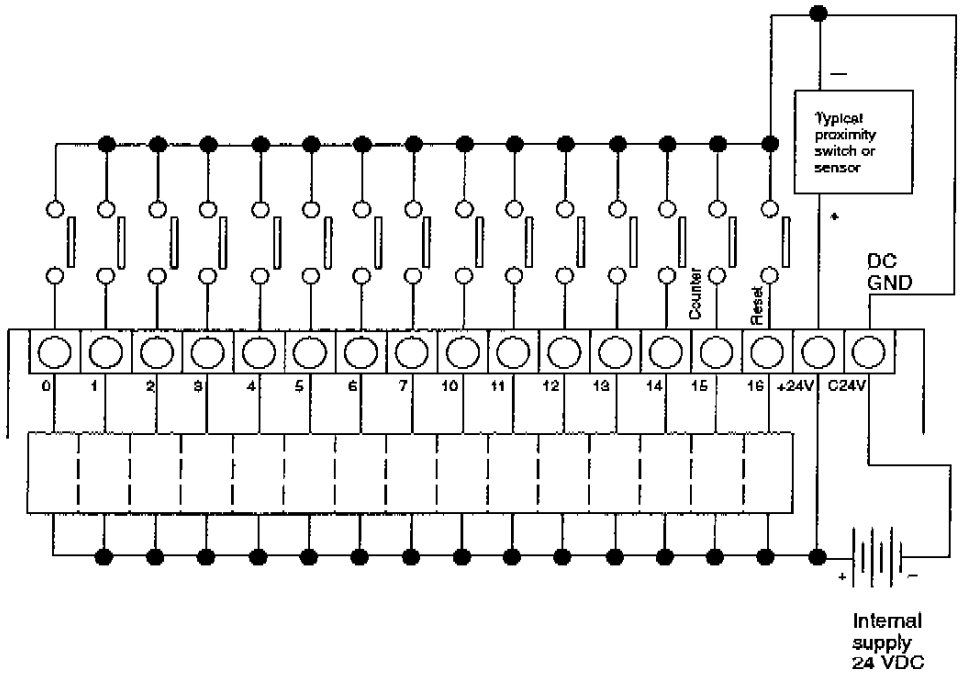


Note: AC power source wiring – Older TI315 controllers are labeled H where L is printed on the diagram for the AC line voltage connection to the controller.

Figure 4-6 PPX:315-AA AC Output Wiring Diagram

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Inputs: 15 DC inputs, 2 inputs (15 & 16) can be used for high-speed counter inputs
Commons: 1 DC GND
Supply voltage: unit supplies 24 VDC for inputs



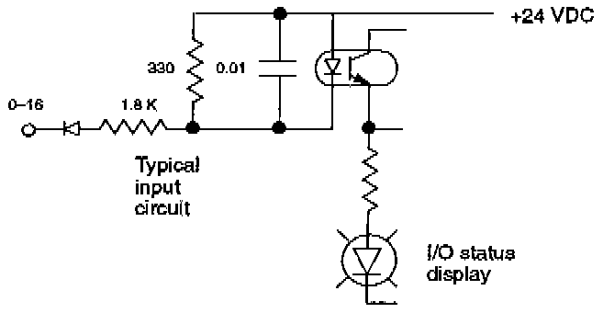


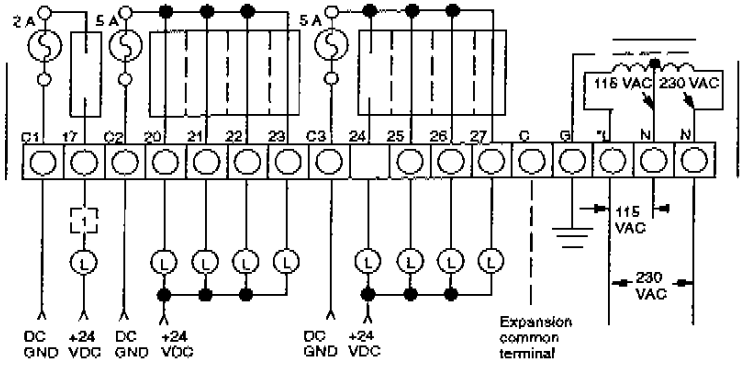
Figure 4-7 PPX:315-DD DC Sink Input Wiring Diagram

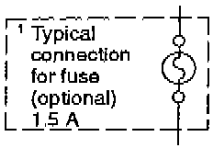
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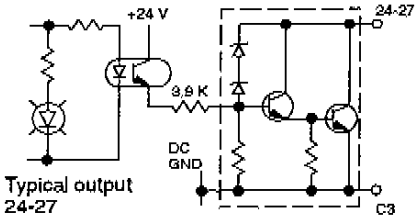
SIMATIC TI315 I/O Wiring (continued)

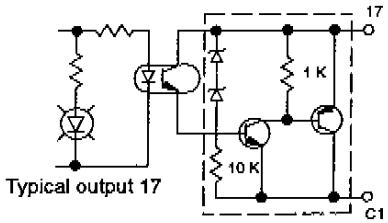
Outputs: 9 transistor outputs
Commons: 3 DC GNDs and 1 expansion GND
C1 for output #17
C2 for outputs #20-23
C3 for outputs #24-27
C for expansion GND

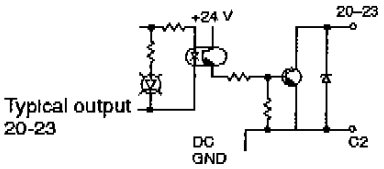
Fuses: C1 is 2 amp 250 V fast blow replaceable fuse, Littlefuse #235002 or Bussman #GMA–2
C2 and C3 are 5 amp 250 V fast blow replaceable fuses, Littlefuse #216005











Note: AC power source wiring — Older TI315 controllers are labeled H where L is printed on the diagram for the AC line voltage connection to the controller.

Figure 4-8 PPX:315-DD DC Sink Output Wiring Diagram

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Inputs: 15 DC inputs, 2 inputs (15 & 16) can be used for high-speed counter inputs
Commons: 1 DC GND
Supply voltage: unit supplies 24 VDC for inputs

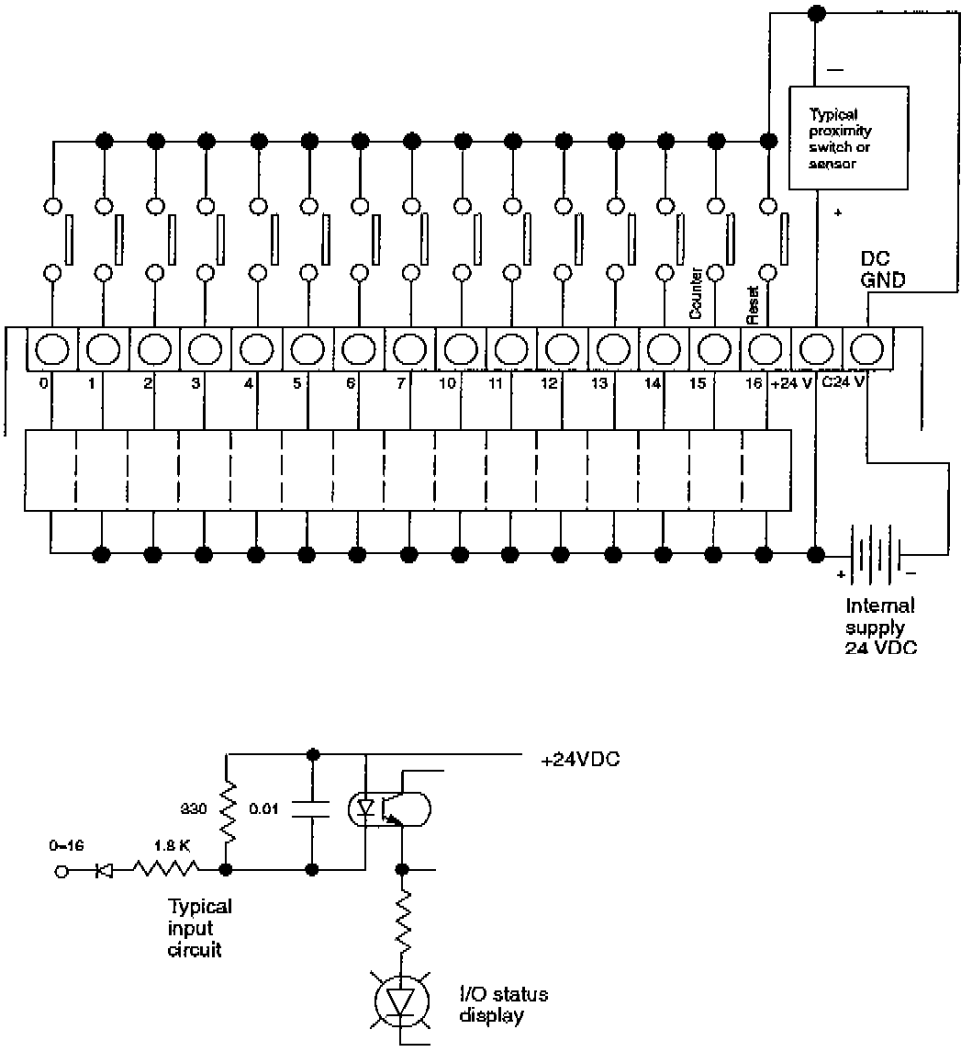


Figure 4-9 PPX:315-DA Input Wiring

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SIMATIC TI315 I/O Wiring (continued)

Inputs: 15 DC inputs, 2 inputs (15 & 16) can be used for high-speed counter inputs
Commons: 1 DC GND
Supply voltage: unit supplies 24 VDC for inputs

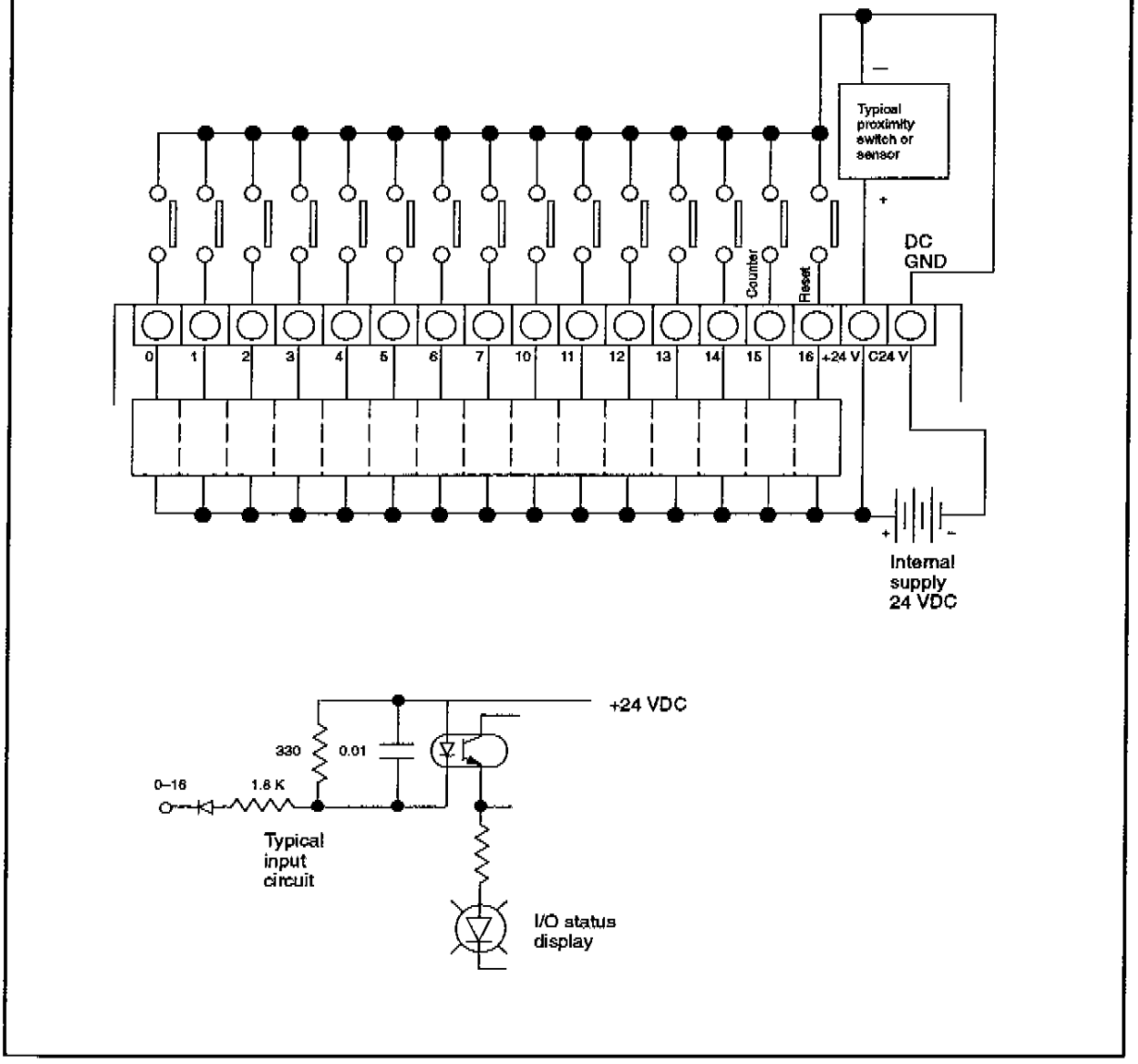


Figure 4-10 PPX:315-DA Input Wiring

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Inputs: 15 DC inputs, 2 inputs (15 & 16) can be used for high speed counter inputs
Commons: 1 DC GND
Supply voltage: unit supplies 24 VDC for inputs

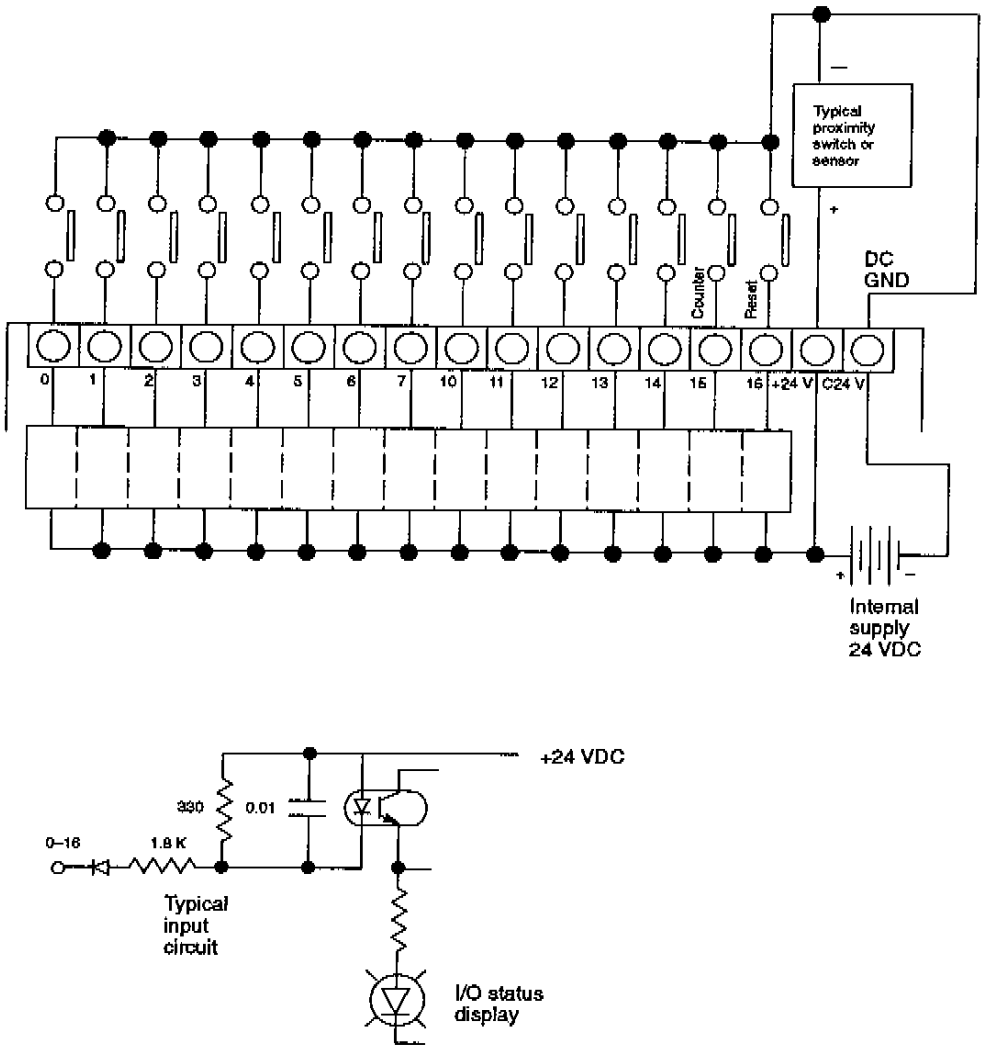


Figure 4-11 PPX:315DC-DD 24VDC System – DC Sink Input Wiring Diagram

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SIMATIC TI315 I/O Wiring (continued)

Outputs: 9 transistor outputs
Commons: 3 DC GNDs and 1 expansion GND
C1 for output #17
C2 for outputs #20-23
C3 for outputs #24-27
C for expansion GND
Fuses. C1 Is 2 amp 250 V fast blow replaceable fuse, Littlefuse #235002 or Bussman #GMA–2
C2 and C3 are 5 amp 250 V fast blow replaceable fuses, Littlefuse #216005

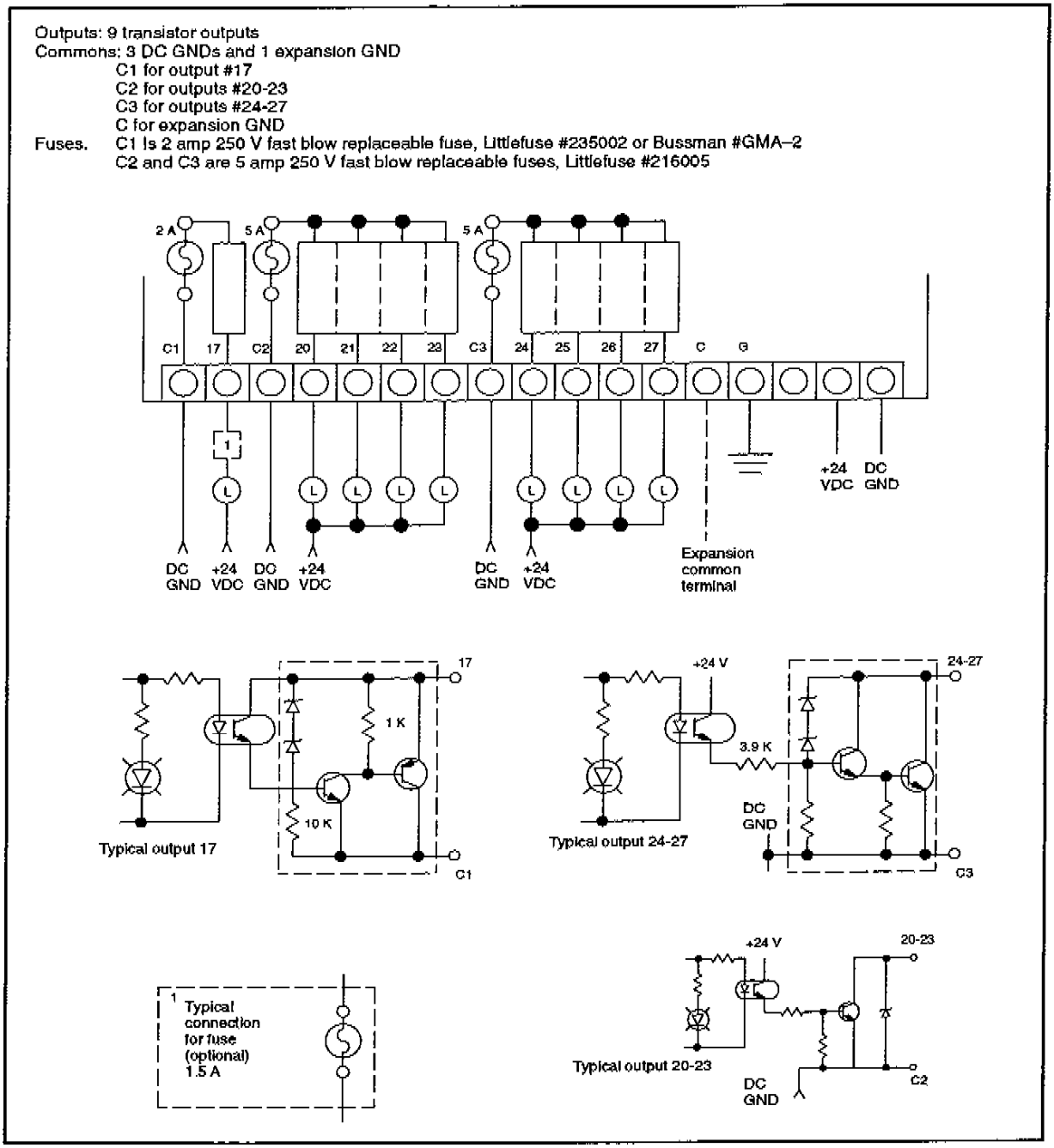
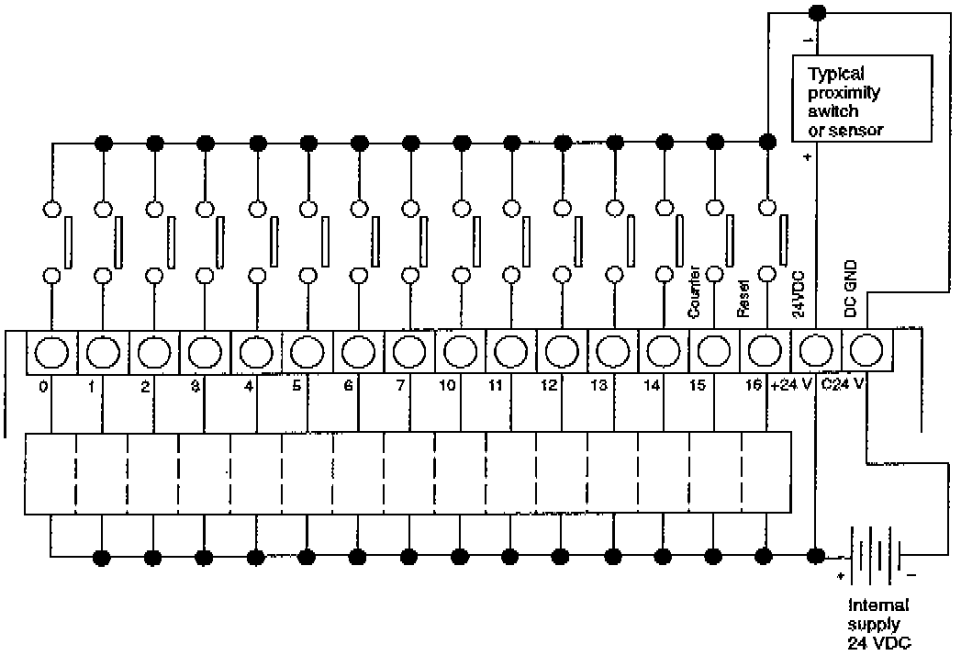


Figure 4-12 PPX:315DC-DD 24VDC System – DC Sink Output Wiring Diagram

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Inputs: 15 DC inputs, 2 inputs (15 & 16) can be used for high speed counter inputs
Commons: 1 DC GND
Supply voltage: unit supplies 24 VDC for inputs



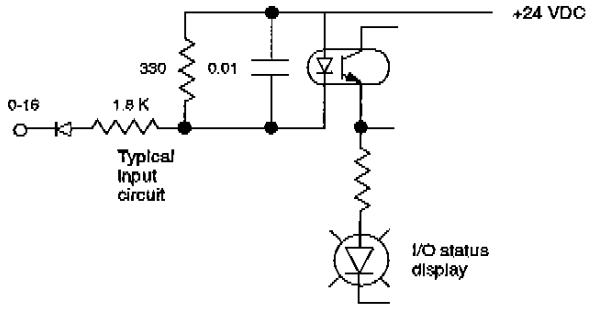


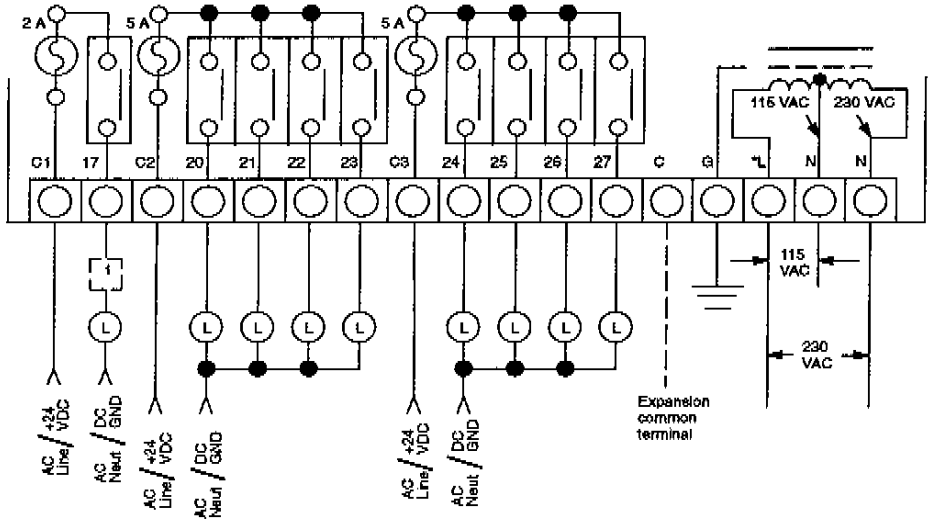
Figure 4-13 PPX:315-DR DC Sink Input Wiring Diagram

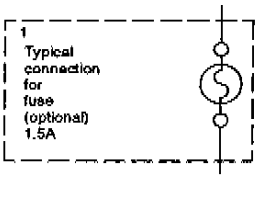
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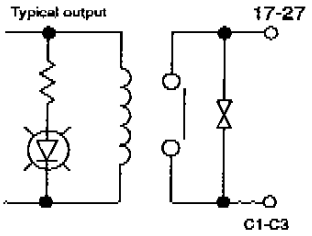
SIMATIC TI315 I/O Wiring (continued)

Outputs: 9 relay outputs
Commons: 3 AC lines/+24 VDCs and 1 expansion GND
C1 for output #17
C2 for outputs #20-23
C3 for outputs #24-27
C for expansion GND

Fuses: C1 is 2 amp 250 V fast blow replaceable fuse, Littlefuse #235002 or Busaman #GMA–2
C2 and C3 are 5 amp 250 V fast blow replaceable fuses, Littlefuse #216005







The above DC power source is wired for sourcing configuration. For sinking configuration, reverse the polarity of the power supply. If the AC power source for the outputs is not wired as shown above, there could be a voltage potential on the output terminals even though power to the controller has been turned off.

Note: AC power source wiring – Older TI315 controllers are labeled H where L is printed on the diagram for the AC line voltage connection to the controller.

Figure 4-14 PPX:315-DR Relay Output Wiring Diagram

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Inputs: 15 DC inputs, 2 inputs (15 & 16) can be used for high speed counter inputs
Commons: 1 DC GND
Supply voltage: unit supplies 24 VDC for inputs

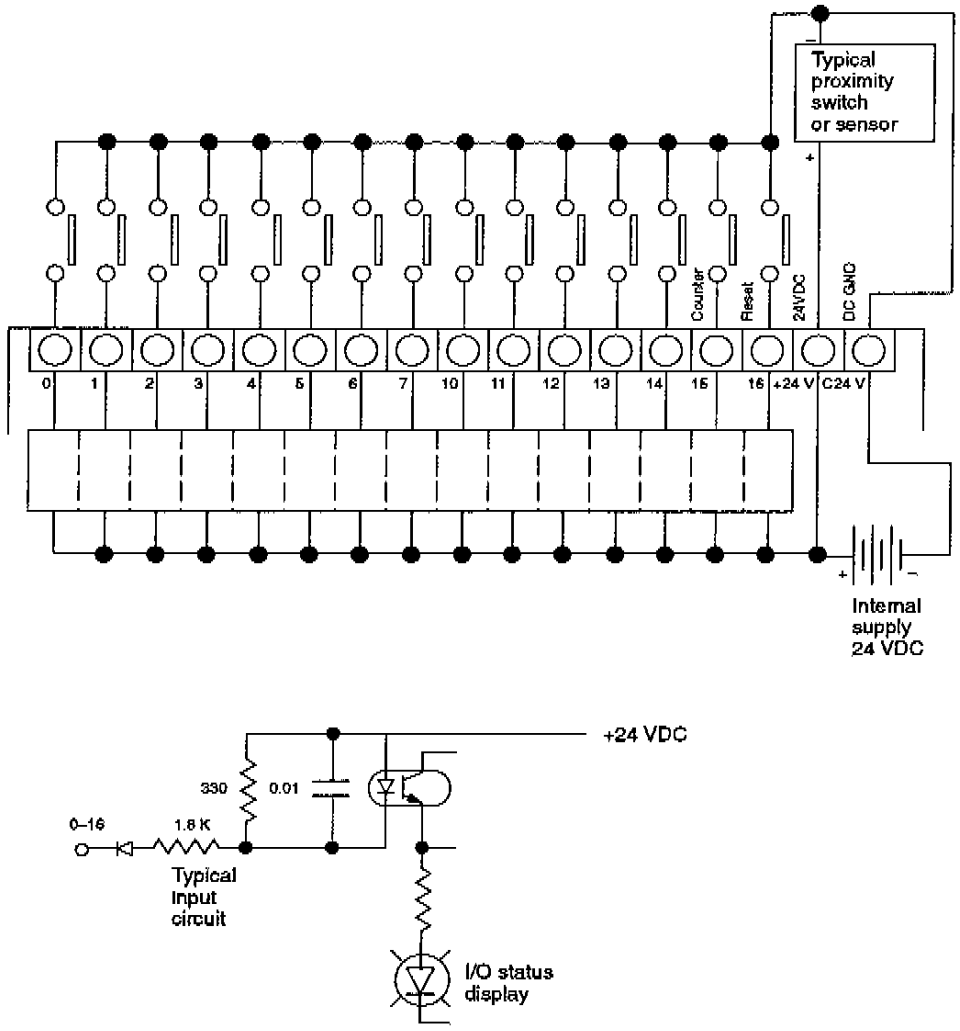


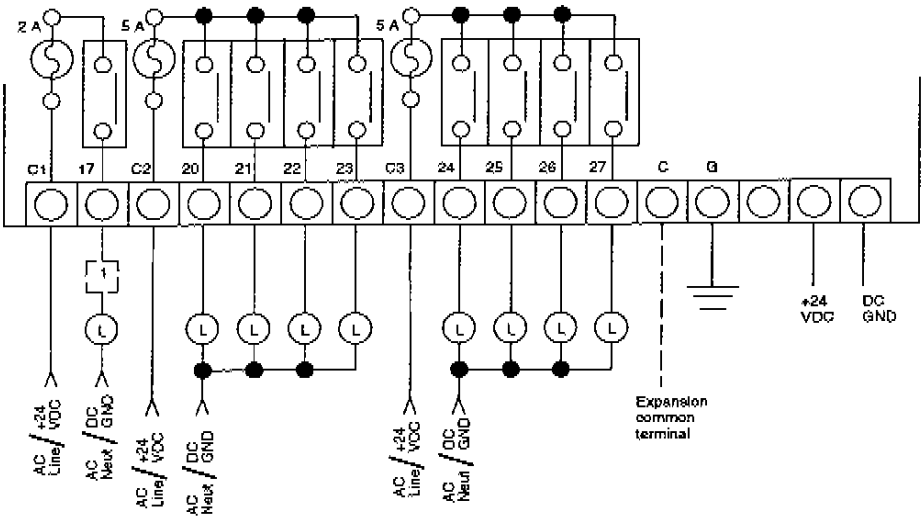
Figure 4-15 PPX:315DC-DR 24VDC System – DC Sink Input Wiring Diagram

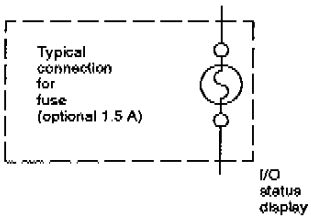
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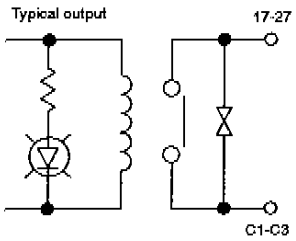
SIMATIC TI315 I/O Wiring (continued)

Outputs: 9 relay outputs
Commons: 3 AC lines/+24 VDCs and 1 expansion GND
C1 for output #17
C2 for outputs #20-23
C3 for outputs #24-27
C for expansion GND

Fuses: C1 is 2 amp 250 V fast blow replaceable fuse, Littlefuse #235002 or Bussman #GMA-2
C2 and C3 are 5 amp 250 V fast blow replaceable fuses, Littlefuse #216005







The above DC power source for the outputs is wired for sourcing configuration. For sinking configuration, reverse the polarity of the power supply. If the AC power source for the outputs is not wired as shown above, there could be a voltage potential on the output terminals even though power to the controller has been turned off

Figure 4-16 PPX:315DC-DR 24VDC System Relay Output Wiring Diagram

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Inputs: 15 DC inputs, 2 inputs (15 & 16) can be used for high speed counter inputs
Commons: 1 DC GND
Supply voltage: unit supplies 24 VDC for inputs

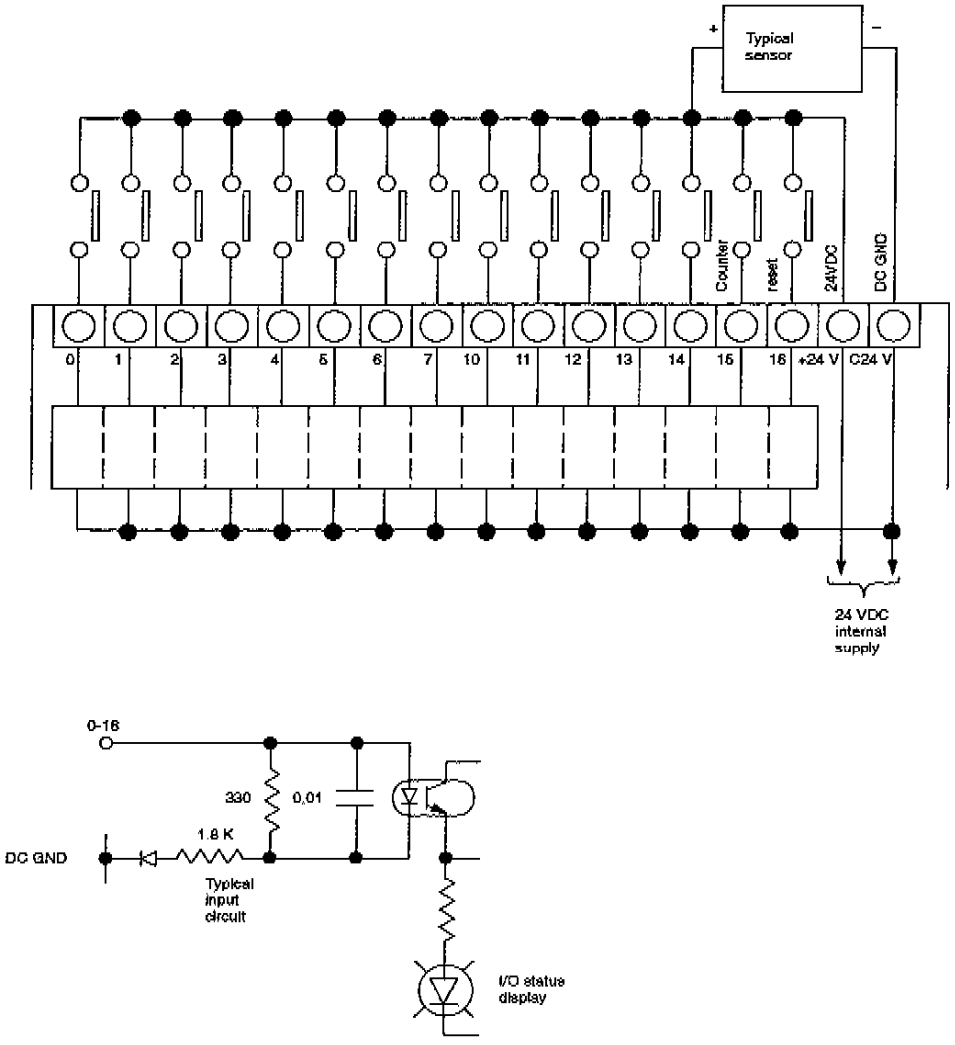


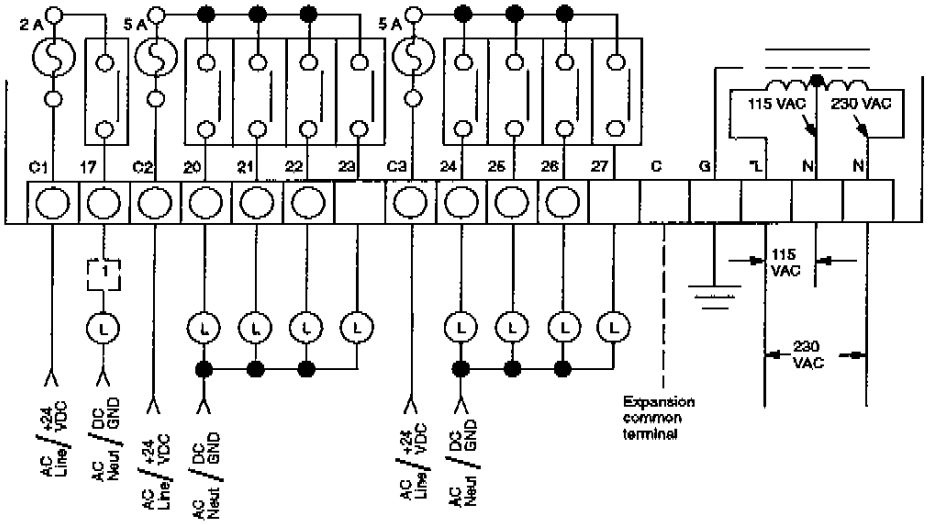
Figure 4-17 PPX:315-DSR DC Sourcing Input Wiring Diagram

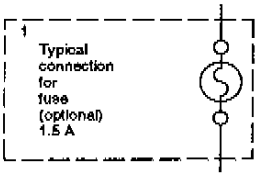
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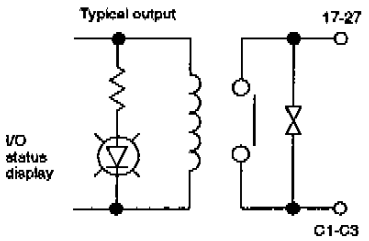
SIMATIC TI315 I/O Wiring (continued)

Outputs: 9 relay outputs
Commons: 3 AC lines/+24 VDCs and 1 expansion GND
C1 for output #17
C2 for outputs #20-23
C3 for outputs #24-27
C for expansion GND

Fuses: C1 is 2 amp 250V fast blow replaceable fuse, Littlefuse #235002 or Bussman #GMA-2
C2 and C3 are 5 amp 250V fast blow replaceable fuses, Littlefuse #216005







The above DC power source is wired for sourcing configuration. For sinking configuration, reverse the polarity of the power supply. If the AC power source for the outputs is not wired as shown above, there could be a voltage potential on the output terminals even though power to the controller has been turned off.

Note: AC power source wiring – Older TI315 controllers are labeled H where L is printed on the diagram for the AC line voltage connection to the controller.

Figure 4-18 PPX:315-DSR Relay Output Wiring Diagram

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4.12 SIMATIC TI315 I/O Specifications

General

All TI315 controllers have logic-side LEDs for inputs and logic-side LEDs for outputs.

Inputs

All field devices to be used with TI315 DC input models must comply with the following:

The device must be a nonvoltage contact or an open collector device; it must be rated for more than 30 V and have a switching capacity of more than 15 mA of current.

NOTE: All TI315 units have two inputs used for the high-speed counter, which is built into the unit. The two inputs (15 and 16) have an off-to-on-to-off response time of 0.1 ms. For input 15, use an open collector field device.

Outputs

A small current load, such as a neon lamp, can energize due to leakage current. If this becomes a problem, add a 10 k 2 W resistor in parallel with the load.

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Table 4-13 Specifications — PPX:315-AA AC In/AC Out

Inputs	15*
Sink/Source	N/A
Input voltage	97-132 VAC
Input current	12 mA (115 VAC, 60 Hz)
Input impedance	12 kΩ (60 Hz)
On current	7.0 mA
Off current	3.0 mA
On voltage	80 VAC Min.
Off voltage	20 VAC Max.
Off to on time	10-30 ms**
On to off time	10-30 ms**
LEDs, Logic/Field	Yes, Logic
Commons	1
Weight	1.8 kg (4 pounds)

Outputs	9
Sink/Source	N/A
Output voltage	97-265 VAC
Output current	1 A
Surge current	10 A / 16 ms
On-state voltage drop	1.6 V / 1 amp
Off-state leakage current	1.8 mA / 110 V, 60 Hz 3.6 mA / 220 V, 60 Hz
Off to on time	1 ms Max.
On to off time	8–33 ms Max.
LEDs, Logic/Field	Yes, Logic
Commons	3
Isolated/Connected	Isolated
Fuse	2 A 250 V (fast-blow type) per output
24 VDC for field device	100 mA

* Two of the 15 inputs are used for the high speed counter.
** High speed counter inputs (15 and 16 response time is 0.1 ms)

NOTE: When a high speed counter is not used, you can use #15 and #16 input references for DC inputs.

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Table 4-14 Specifications – PPX:315-DA DC In/AC Out

Inputs	**15**
Sink/Source	Sink
Input voltage	24 VDC
Input current	12 mA/Point
Input impedance	1.8 kΩ
On current	6 mA Min.
Off current	3 mA Max.
On voltage	7 V Max.
Off voltage	18 V Min.
Off to on time*	5-10 ms
On to off time*	5-10 ms
LEDs, Logic/Field	Yes, Logic
Commons	1 Isolated/Connected
Weight	1.8 kg (4 pounds)
24 VDC power source	100 mA

Outputs	**9**
Sink/Source	N/A
Output voltage	97-265 VAC
Output current	1 A
Surge current	10 A / 8 ms; 5A / 40 ms
On-state voltage drop	1.6 V / 1 amp
Off-state leakage current	3.5 mA / 110 V, 60 Hz 7.0 mA / 220 V, 60 Hz
Off to on time	1 ms Max.
On to off time	8-10 ms (1/2 cycle)
LEDs, Logic/Field	Yes, Logic
Commons	3, Isolated
Fuse	2 A 250 V (fast-blow type) per output
24VDC for field device	100 mA

* Two of the 15 inputs are used for the high speed counter.
** High speed counter inputs (15 & 16) response time is 0.1 mS.

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Table 4-15 Specifications – PPX:315DC-DD & PPX:315-DD Sink In/DC Out

Inputs	**15**
Sink/Source	Sink
Input voltage	24 VDC
Input current	12 mA/Point
Input impedance	1.8 kΩ
On current	6 mA Min.
Off current	3 mA Max.
On voltage	7 V Max.
Off voltage	18 V Min.
Off to on time*	5-10 ms
On to off time*	5-10 ms
LEDs, Logic/Field	Yes, Logic
Commons	1 Isolated/Connected
Weight	1.8 kg (4 pounds)
24 VDC power source	100 mA

Outputs	**9**
Sink/Source	Sink
Output voltage	24 VDC
Output current	1 A Max. – #17-23 0.5 Max. – #24-27
Surge current	4 A / 10 ms – #17-23 1 A / 100 ms – #24-27
On-state voltage drop	0.9 VDC / 1 amp #17-23 1.5 VDC / 0.5 amp #24-29
Off-state leakage current	.1 mA
Off to on time	.1 ms
On to off time	.1 ms
LEDs, Logic/Field	Yes, Logic
Commons Isolated/Connected	3 1 isolated, 2 connected
Fuse, Fast blow	C1-2 A 250 V C2 & C3-5 A 250 V

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Table 4-16 Specifications – PPX:315DC-DR & PPX:315-DR DC Sink In/Relay Out

Inputs	15*
Sink/Source	Sink
Input voltage	24 VDC
Input current	12 mA/Point
Input impedance	1.8 kΩ
On current	6 mA Min.
Off current	3 mA Max.
On voltage	7 V Max.
Off voltage	18 V Min.
Off to on time	5-10 ms**
On to off time	5-10 ms**
LEDs Logic/Field	Yes, Logic
Commons	1 Isolated/Connected
Weight	1.8 kg (4 pounds)
24 VDC power source	100 mA

Outputs	9
Sink/Source	N/A
Output voltage	24 VDC, 110 VAC, 220 VAC
Output current	2 A Max. (5 A Max/Common)
Surge current	3 A
On-state voltage drop	N/A
Off-state leakage current	.1 mA Max. (220 V, 60 Hz)
Off to on time	5 ms Max.
On to off time	5 ms Max.
LEDs, Logic/Field	Yes, Logic
Commons Isolated/Connected	3 Isolated
Fuse, Normal replaceable	C1-2 A 250 V C2, C3-5 A 250 V

* Two of the 15 inputs are used for the high speed counter
** High speed counter inputs (15 & 16) response time is 0.1 mS.

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Table 4-17 Relay Life PPX:315-DR, PPX:315-DSR

Voltage	Resistive	Lamp	Solenoid	~Closures
220VAC	2A	0.3A	0.3A	200k
220VAC		0.05A	0.05A	800k
110VAC		0.3A	0.3A	250k
110VAC		0.1A	0.1A	500k
24VDC	2A	0.3A	0.3A	200k

Table 4-18 Specifications – PPX:315-DSR DC Source In/Relay Out

Inputs	**15**
Sink/Source	Source
Input voltage	24 VDC
Input current	18 mA/Point
Input impedance	1.8 kΩ
On current	6 mA Min.
Off current	3 mA Max.
On voltage	18 V Min.
Off voltage	7 V Max.
Off to on time	5-10 ms
On to off time	5-10 ms
LEDs, Logic/Field	Yes, Logic
Commons	1 Isolated/Connected
Weight	1.8 kg (4 pounds)
24 VDC power source for field devices	24 VDC, 100 mA

Outputs	**9**
Sink/Source	N/A
Output voltage	24 VDC, 100 VAC, 220 VAC
Output current	2 A Max.; 5A max/common
Surge current	3 A
On-state voltage drop	N/A
Off-state leakage current	.1 mA Max. (220 V, 60 Hz)
Off to on time	5 ms Max.
On to off time	5 ms Max.
LEDs, Logic/Field	Yes, Logic
Commons Isolated/Connected	3 Isolated
Fuse, Normal type	C1-2 A 250 V C2, C3-5 A 250 V

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4.13 SIMATIC TI315 High-speed Counter

The TI315 has a built-in high-speed counter used to count high-speed pulses up to 2 kHZ. The high-speed counter inputs are input memory references 15 and 16. (Input 15 is the count pulse, and input 16 is the external count reset.)

Timer counter reference 624 is the dedicated high-speed counter. For the external pulses to be recorded, the counter count contact must be on, and the reset contact must be off. The counter can be reset by the ladder logic contact or by the external reset (input reference 16). The input references 15 and 16 are executed internally in the TI315 controller and are not programmed in the ladder logic program. You can use the TI305 programmer to monitor the counter accumulated value.

The following paragraph explains the high-speed counter processing, and gives a programming example.

1. The high-speed counter counts independent of CPU scan until the counter current value reaches the preset value.
2. Each time reference 624 is used as a contact, a preset must be entered immediately following it. This preset is compared against the high-speed count to control the on/off state of the contact.
3. When the counter current value reaches the preset value, the CPU is given an interrupt.
4. The CPU stops the current task and goes to address 0 in the ladder logic program.
5. The CPU executes ladder logic until the CNT 624 instruction is executed, then the CPU returns to the task prior to the interrupt and continues normally.

NOTE: The logic associated with the high-speed counter should be programmed in ladder logic prior to the CNT 624 instruction.

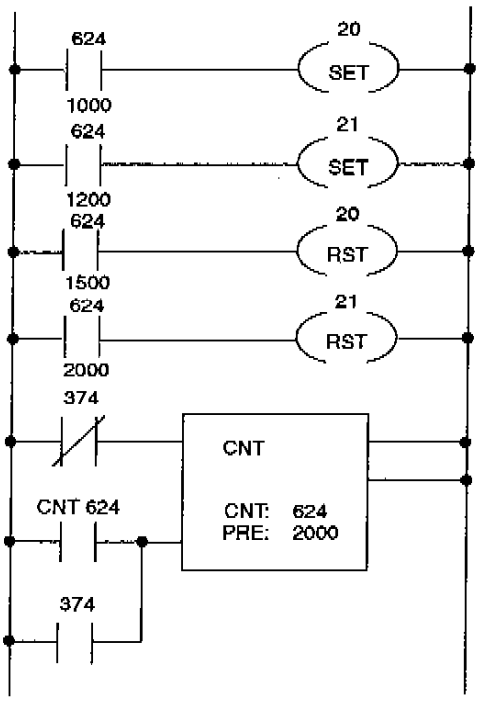
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High-speed Counter Response

The response time from input on to output on when the count value of the high-speed counter matches the set value in the program follows.

Input/Output throughput time	=	Input from field less than 0.1 ms	+	Internal processing time	+	Output to field (Time depends on controller type)

In this example, output coil 20 turns on when the current count reaches 1000 and turns off when the count reaches 1500. Output coil 21 turns on when the current count reaches 1200, and turns off when the count reaches 2000.



Command	Command Processing Time µs	
	Execution	Nonexecution
Interrupt response time		180
STR 624 1000	—	73
SET 20	—	34.5
STR 624 1200	—	73
SET 21	—	34.5
STR 624 1500	—	73
RST 20	—	34.5
STR 624 2000	73	—
RST 21	41.5	—
Output transfer time		100

Total Command Processing Time = 717 µs

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