

# **TSL3000** series Robot Controller

## **I/O cables MANUAL**

### **Notice**

- Make sure that this instruction manual is delivered to the final user of Toshiba Machine's industrial robot.
- Before operating the industrial robot, read through and completely understand this manual.
- After reading through this manual, keep it nearby for future reference.

February, 2012

**TOSHIBA MACHINE CO., LTD.**  
TOKYO, JAPAN

Copyright 2001 by Toshiba Machine Co., Ltd.  
All rights reserved.

No part of this document may be reproduced in any form without obtaining prior written permission from Toshiba Machine Co., Ltd.

The information contained in this manual is subject to change without prior notice to effect improvements.

## **Preface**

This manual describes the I/O cables used for industrial robot controller TSL3000. These I/O cables are optional. For use of the cables, see the Interface Manual.



### **CAUTION**



This manual does not include detailed descriptions on connecting the robot, which are contained in the Installation & Transport Manual and Interface Manual.

**Cautions on Safety**

This manual contains the important information on the robot and controller to prevent injury to the operators and persons nearby, to prevent damage to assets and to assure correct use.

Make sure that the following details (indications and symbols) are well understood before reading this manual. Always observe the information that is noted.





[Explanation of indications]

Indication	Meaning of indication
 <b>DANGER</b>	This means that "incorrect handling will lead to fatalities or serious injuries."
 <b>CAUTION</b>	This means that "incorrect handling may lead to personal injuries *1) or physical damage *2).

\*1) Injuries refer to injuries, burns and electric shocks, etc., which do not require hospitalization or long-term medical treatment.

\*2) Physical damage refers to damages due to destruction of assets or resources.

[Explanation of symbols]


Symbol	Meaning of symbol
	This means that the action is prohibited (must not be done). Details of the actions actually prohibited are indicated with pictures or words in or near the symbol.
	This means that the action is mandatory (must be done). Details of the actions that must be done are indicated with pictures or words in or near the symbol.
	This means danger. Details of the actual danger are indicated with pictures or words in or near the symbol.
	This means caution. Details of the actual caution are indicated with pictures or words in or near the symbol.


**CAUTION**


To assure the safety work ranging from the robot installation to operation, read through the Safety Manual before starting the work.

[Maintenance and inspection]

To use the robot safely, strictly observe the following matters.

 <b>DANGER</b>	
Mandatory	<ul style="list-style-type: none"><li>• Before starting the maintenance and inspection, be sure to turn off the main power switch of the controller.</li></ul>

 <b>CAUTION</b>	
Disassembly prohibited	<ul style="list-style-type: none"><li>• The user must NEVER replace or modify parts other than those described in the instruction manual. Otherwise, the robot performance will deteriorate or faults will be caused.</li></ul>
Mandatory	<ul style="list-style-type: none"><li>• Always use the spare parts designated by Toshiba Machine when replacing the parts.</li><li>• Service and inspect the robot on a regular basis. Otherwise, the robot may malfunction or cause an accident as a result.</li></ul>

 <b>CAUTION</b>	
<p>To assure the safety work ranging from the robot installation to operation, read through the Safety Manual before starting the work.</p>	

## Table of Contents

	Page
1 Input Cable for TSL3000 Controller .....	8
1.1 Specifications .....	8
1.2 External View.....	9
1.3 Cable Connection Table .....	10
2 Output Cable for the TSL3000 Controller.....	12
2.1 Specifications .....	12
2.2 External View.....	13
2.3 Cable Connection Table .....	14
3 TR48DIOC(N) Input Cable.....	16
3.1 Specifications .....	16
3.2 External View.....	17
3.3 Cable Connection Table .....	18
4 TR48DIOC Output Cable .....	19
4.1 Specifications .....	19
4.2 External View.....	20
4.3 Cable Connection Table .....	21

## 1 Input Cable for TSL3000 Controller

### 1.1 Specifications

Type : 368M5400



Symbol in the table below.

- ⊖ To designate the cable length (L), see the table below.

Symbol	L (m)	Symbol	L (m)
01	3	06	12
02	5	07	15
03	6		
04	8		
05	10		

- ⊖ For details and connection of the input signals, see the Interface Manual (STE 85364).

#### Cable specifications

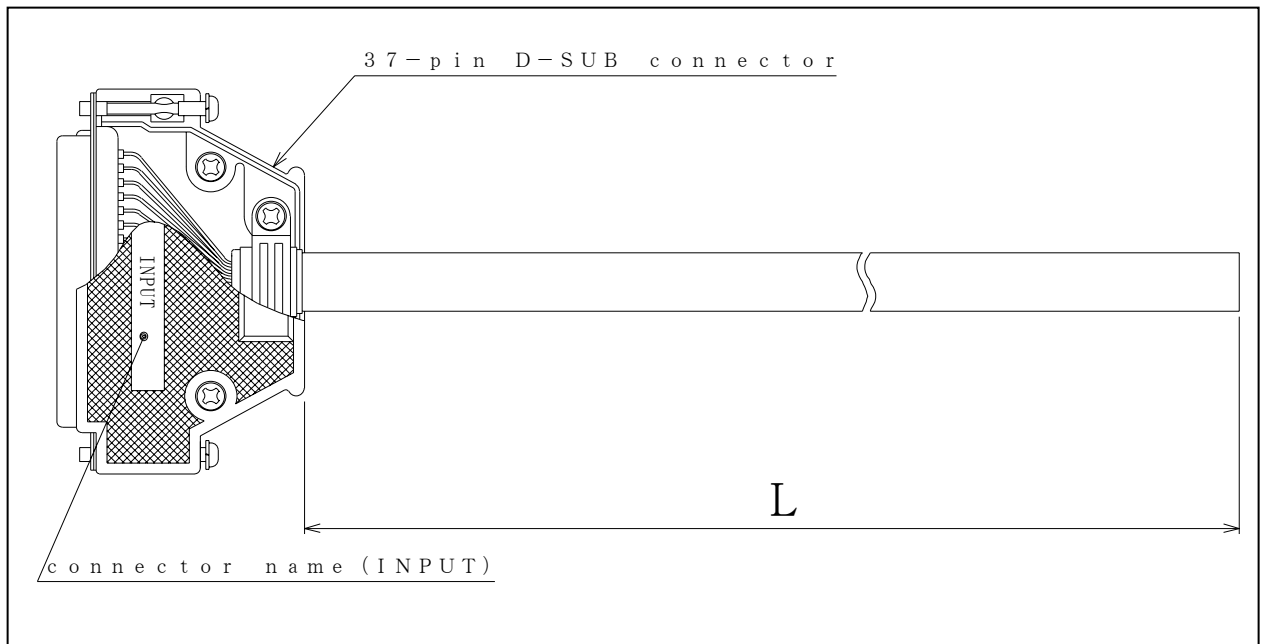
Items	Specifications
Nominal sectional area of conductor	0.2 mm <sup>2</sup>
Structure of conductor	7/0.18
No. of cable cores	40C
Insulator material	Heat-proof vinyl chloride
Shield material	Tin-plated annealed copper wire
Sheath material	Heat-proof vinyl chloride
Conductor resistance (20°C)	119 Ω/km or less
Operating temperature	-20°C ~ 75°C (See Note 1.)
Operating voltage	AC 50 V, DC 60 V

Note 1: Heat-proof grade: 90°C

Note 2: This cable cannot be used for the sliding part or moving part which will bend repeatedly.



**1.2 External View**



### 1.3 Cable Connection Table

I/O type: Type-N

Signal name	Connector pin	Cable color
DI_1	1	Black
DI_2	20	White
DI_3	2	Red
DI_4	21	Green
DI_5	3	Yellow
DI_6	22	Brown
DI_7	4	Blue
DI_8	23	Gray
P24G	5	Orange
P24V	24	Purple
INCOM	6	Pink
STROBE	25	Light green
PRG_RST	7	Light blue
STEP_RST	26	Black/White
CYC_RST	8	Red/White
DO_RST	27	Green/White
ALM_RST	9	Yellow/White
RUN	28	Brown/White
EX_SVON	10	Blue/White
P24G	29	Gray/White
P24V	11	Orange/White
INCOM	30	Purple/White
STOP	12	Pink/White
CYCLE	31	Light green/White
LOW_SPD	13	Light blue/White
BREAK	32	White/Black
SVOFF	14	Red/Black
	33	Green/Black
	15	Yellow/Black
	34	Brown/Black
P24G	16	Blue/Black
P24V	35	Gray/Black
INCOM	17	Orange/Black
EMS2B	36	Purple/Black
EMS1B	18	Pink/Black
EMS2C	37	Light green/Black
EMS1C	19	Light blue/Black
FG	Case	Shield

**Type N**

For details, see the Interface Manual.

I/O type:Type-P

Signal name	Connector pin	Cable color
DI_1	1	Black
DI_2	20	White
DI_3	2	Red
DI_4	21	Green
DI_5	3	Yellow
DI_6	22	Brown
DI_7	4	Blue
DI_8	23	Gray
P24V	5	Orange
P24G	24	Purple
INCOM	6	Pink
STROBE	25	Light green
PRG_RST	7	Light blue
STEP_RST	26	Black/White
CYC_RST	8	Red/White
DO_RST	27	Green/White
ALM_RST	9	Yellow/White
RUN	28	Brown/White
EX_SVON	10	Blue/White
P24V	29	Gray/White
P24G	11	Orange/White
INCOM	30	Purple/White
STOP	12	Pink/White
CYCLE	31	Light green/White
LOW_SPD	13	Light blue/White
BREAK	32	White/Black
SVOFF	14	Red/Black
	33	Green/Black
	15	Yellow/Black
	34	Brown/Black
P24V	16	Blue/Black
P24G	35	Gray/Black
INCOM	17	Orange/Black
EMS2B	36	Purple/Black
EMS1B	18	Pink/Black
EMS2C	37	Light green/Black
EMS1C	19	Light blue/Black
FG	Case	Shield

**Type P**

For details, see the Interface Manual.

## 2 Output Cable for the TSL3000 Controller

### 2.1 Specifications

Type : 368M5500  
          ↑

Symbol in the table below.

- ⊕ To designate the cable length (L), see the table below.

Symbol	L (m)	Symbol	L (m)
01	3	06	12
02	5	07	15
03	6		
04	8		
05	10		

- ⊕ For details and connection of the output signals, see the Interface Manual (STE 85364).

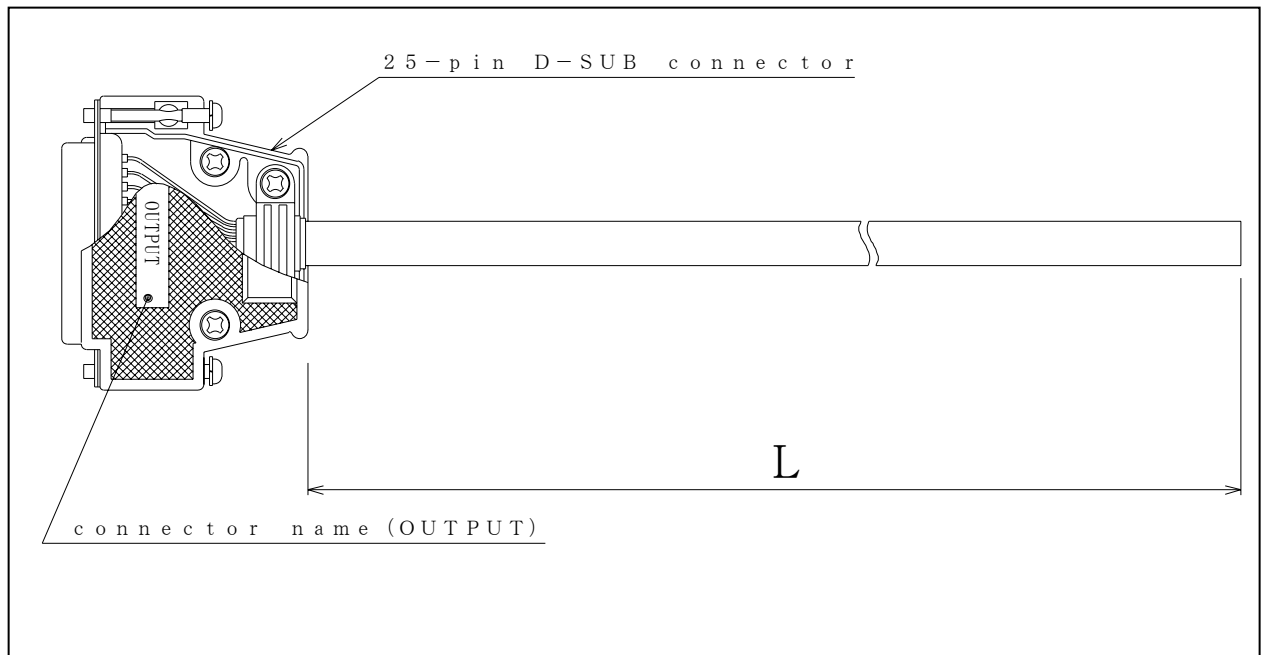
#### Cable specifications

Items	Specifications
Nominal sectional area of conductor	0.2 mm <sup>2</sup>
Structure of conductor	7/0.18
No. of cable cores	25C
Insulator material	Heat-proof vinyl chloride
Shield material	Tin-plated annealed copper wire
Sheath material	Heat-proof vinyl chloride
Conductor resistance (20°C)	119 Ω/km or less
Operating temperature	-20°C ~ 75°C (See Note 4.)
Operating voltage	AC 50 V, DC 60 V

Note 4: Heat-proof grade: 90°C

Note 5: This cable cannot be used for the sliding part or moving part which will bend repeatedly.

**2.2 External View**



### 2.3 Cable Connection Table

I/O type:Type-N

Signal name	Connector pin	Cable color
DO_1	1	Black
DO_2	14	White
DO_3	2	Red
DO_4	15	Green
DO_5	3	Yellow
DO_6	16	Brown
DO_7	4	Blue
DO_8	17	Gray
P24V	5	Orange
P24V	18	Purple
ACK	6	Pink
SV_RDY	19	Light green
EXTSIG	7	Light blue
SYS_RDY	20	Black/White
AUTORUN	8	Red/White
CYC_END	21	Green/White
LOW_ST	9	Yellow/White
BT_ALM	22	Brown/White
P24V	10	Blue/White
P24V	23	Gray/White
ALARM	11	Orange/White
SVST_A	24	Purple/White
SVST_B	12	Pink/White
EMSST_A	25	Light green/White
EMSST_B	13	Light blue/White
FG	Case	Shield

**T y p e N**

For details, see the Interface Manual.

I/O type: Type-P

Signal name	Connector pin	Cable color
DO_1	1	Black
DO_2	14	White
DO_3	2	Red
DO_4	15	Green
DO_5	3	Yellow
DO_6	16	Brown
DO_7	4	Blue
DO_8	17	Gray
P24G	5	Orange
P24G	18	Purple
ACK	6	Pink
SV_RDY	19	Light green
EXTSIG	7	Light blue
SYS_RDY	20	Black/White
AUTORUN	8	Red/White
CYC_END	21	Green/White
LOW_ST	9	Yellow/White
BT_ALM	22	Brown/White
P24G	10	Blue/White
P24G	23	Gray/White
ALARM	11	Orange/White
SVST_A	24	Purple/White
SVST_B	12	Pink/White
EMSST_A	25	Light green/White
EMSST_B	13	Light blue/White
FG	Case	Shield

**Type P**

For details, see the Interface Manual.

### 3 TR48DIOC(N) Input Cable

#### 3.1 Specifications

Type : 368M5400  
↑

Symbol in the table below.

- ⊖ To designate the cable length (L), see the table below.

Symbol	L (m)	Symbol	L (m)
01	3	06	12
02	5	07	15
03	6		
04	8		
05	10		

- ⊖ The TR48DIOC(N) input cable is the same as the input cable for the TSL3000 controller.
- ⊖ For details and connection of the input signals, see the Interface Manual (STE 85364).

#### Cable specifications

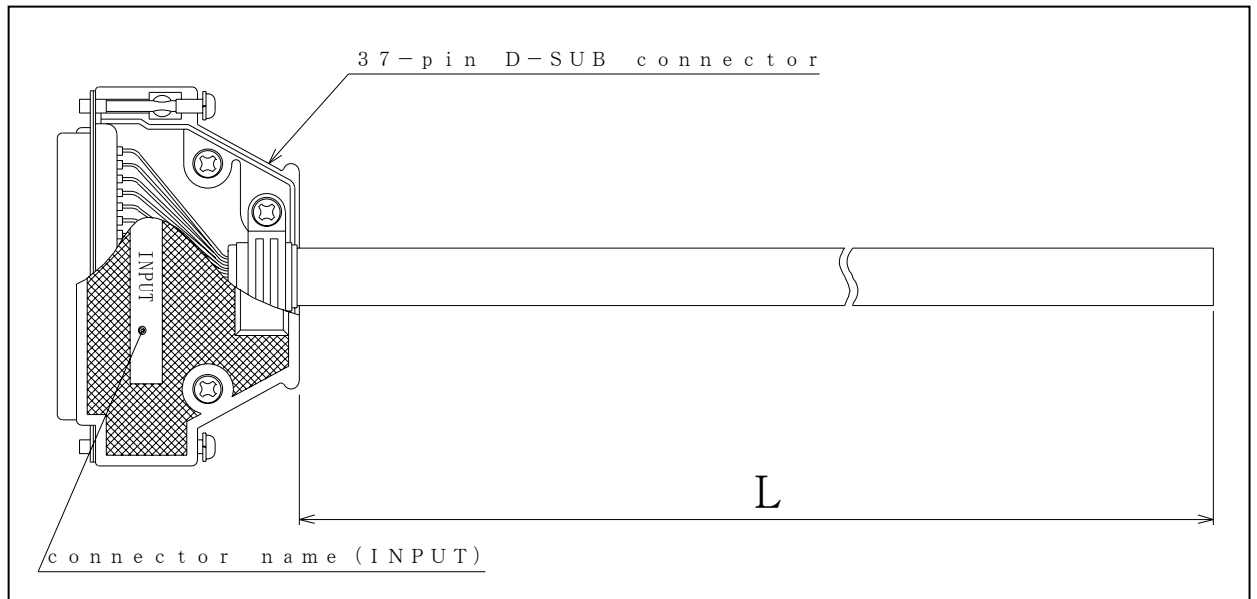
Items	Specifications
Nominal sectional area of conductor	0.2 mm <sup>2</sup>
Structure of conductor	7/0.18
No. of cable cores	40C
Insulator material	Heat-proof vinyl chloride
Shield material	Tin-plated annealed copper wire
Sheath material	Heat-proof vinyl chloride
Conductor resistance (20°C)	119 Ω/km or less
Operating temperature	-20°C ~ 75°C (See Note 9.)
Operating voltage	AC 50 V, DC 60 V

Note 9: Heat-proof grade: 90°C

Note 10: This cable cannot be used for the sliding part or moving part which will bend repeatedly.



**3.2 External View**



### 3.3 Cable Connection Table

The TR48DIOC(N) input cable is the same as the input cable.

I/O type: Type-N, Type-P

Signal name	Connector pin	Cable color
DI_101/DI_133	1	Black
DI_102/DI_134	20	White
DI_103/DI_135	2	Red
DI_104/DI_136	21	Green
DI_105/DI_137	3	Yellow
DI_106/DI_138	22	Brown
DI_107/DI_139	4	Blue
DI_108/DI_140	23	Gray
P24V	5	Orange
P24G	24	Purple
INCOM1	6	Pink
DI_109/DI_141	25	Light green
DI_110/DI_142	7	Light blue
DI_111/DI_143	26	Black/White
DI_112/DI_144	8	Red/White
DI_113/DI_145	27	Green/White
DI_114/DI_146	9	Yellow/White
DI_115/DI_147	28	Brown/White
DI_116/DI_148	10	Blue/White
P24V	29	Gray/White
P24G	11	Orange/White
INCOM2	30	Purple/White
DI_117/DI_149	12	Pink/White
DI_118/DI_150	31	Light green/White
DI_119/DI_151	13	Light blue/White
DI_120/DI_152	32	White/Black
DI_121/DI_153	14	Red/Black
DI_122/DI_154	33	Green/Black
DI_123/DI_155	15	Yellow/Black
DI_124/DI_156	34	Brown/Black
P24V	16	Blue/Black
P24G	35	Gray/Black
INCOM3	17	Orange/Black
DI_125/DI_157	36	Purple/Black
DI_126/DI_158	18	Pink/Black
DI_127/DI_159	37	Light green/Black
DI_128/DI_160	19	Light blue/Black
FG	Case	Shield

**Type N**

**Type P**

- η As up to two (2) extension I/O units (TR48DIOC(N)) can be connected with the TSL3000 controller, the cable signal names are station 0 and station 1. For details, see the Interface Manual (STE 85364).

## 4 TR48DIOC Output Cable

### 4.1 Specifications

Type : 368M5500  
 ↑

Symbol in the table below.

- ⊖ To designate the cable length (L), see the table below.

Symbol	L (m)	Symbol	L (m)
01	3	06	12
02	5	07	15
03	6		
04	8		
05	10		

- ⊖ The TR48DIOC(N) output cable is the same as the output cable for the TSL3000 controller.
- ⊖ For details and connection of the output signals, see the Interface Manual (STE 85371).

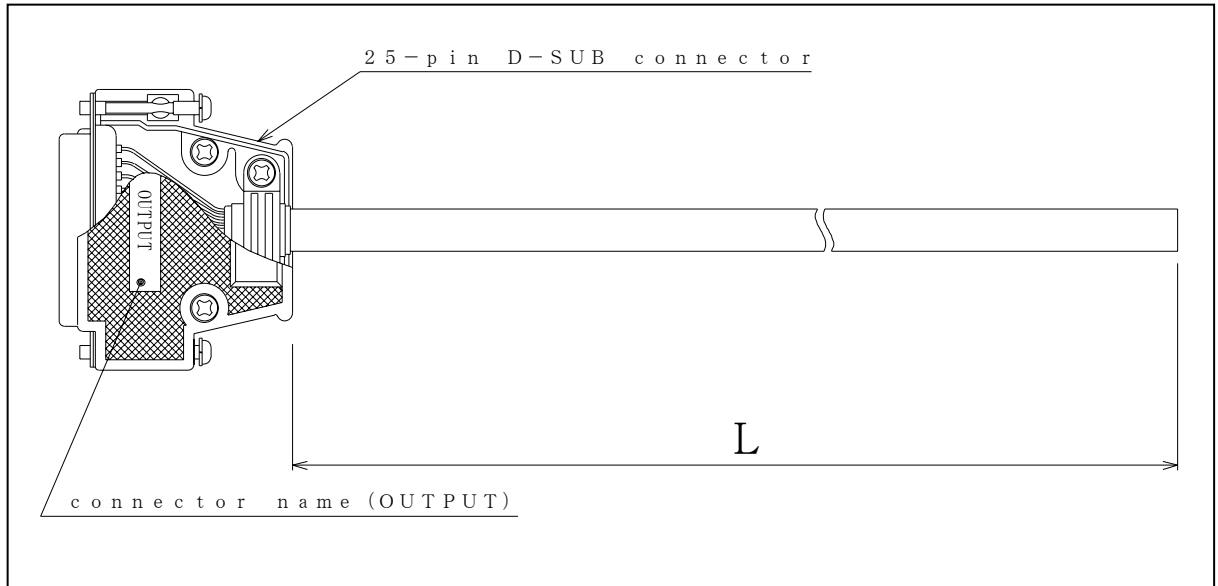
#### Cable specifications

Items	Specifications
Nominal sectional area of conductor	0.2 mm <sup>2</sup>
Structure of conductor	7/0.18
No. of cable cores	25C
Insulator material	Heat-proof vinyl chloride
Shield material	Tin-plated annealed copper wire
Sheath material	Heat-proof vinyl chloride
Conductor resistance (20°C)	119 Ω/km or less
Operating temperature	-20°C ~ 75°C (See Note 11.)
Operating voltage	AC 50 V, DC 60 V

Note 11: Heat-proof grade: 90°C

Note 12: This cable cannot be used for the sliding part or moving part which will bend repeatedly.

**4.2 External View**



### 4.3 Cable Connection Table

I/O type: Type-N

Signal name	Connector pin	Cable color
DO_101/DO_133	1	Black
DO_102/DO_134	14	White
DO_103/DO_135	2	Red
DO_104/DO_136	15	Green
DO_105/DO_137	3	Yellow
DO_106/DO_138	16	Brown
DO_107/DO_139	4	Blue
DO_108/DO_140	17	Gray
P24V	5	Orange
P24V	18	Purple
DO_109/DO_141	6	Pink
DO_110/DO_142	19	Light green
DO_111/DO_143	7	Light blue
DO_112/DO_144	20	Black/White
DO_113/DO_145	8	Red/White
DO_114/DO_146	21	Green/White
DO_115/DO_147	9	Yellow/White
DO_116/DO_148	22	Brown/White
P24V	10	Blue/White
P24V	23	Gray/White
DO_117/DO_149	11	Orange/White
DO_118/DO_150	24	Purple/White
DO_119/DO_151	12	Pink/White
DO_120/DO_152	25	Light green/White
DO_121/DO_153	13	Light blue/White
FG	Case	Shield

**Type N**

- η As up to two (2) extension I/O units (TR48DIOCN) can be connected with the TSL3000 controller, the cable signal names are station 0 and station 1. For details, see the Interface Manual (STE 85364).

I/O type:Type-P

Signal name	Connector pin	Cable color
DO_101/DO_133	1	Black
DO_102/DO_134	14	White
DO_103/DO_135	2	Red
DO_104/DO_136	15	Green
DO_105/DO_137	3	Yellow
DO_106/DO_138	16	Brown
DO_107/DO_139	4	Blue
DO_108/DO_140	17	Gray
P24G	5	Orange
P24G	18	Purple
DO_109/DO_141	6	Pink
DO_110/DO_142	19	Light green
DO_111/DO_143	7	Light blue
DO_112/DO_144	20	Black/White
DO_113/DO_145	8	Red/White
DO_114/DO_146	21	Green/White
DO_115/DO_147	9	Yellow/White
DO_116/DO_148	22	Brown/White
P24G	10	Blue/White
P24G	23	Gray/White
DO_117/DO_149	11	Orange/White
DO_118/DO_150	24	Purple/White
DO_119/DO_151	12	Pink/White
DO_120/DO_152	25	Light green/White
DO_121/DO_153	13	Light blue/White
FG	Case	Shield

**Type P**

- η As up to two (2) extension I/O units (TR48DIOC) can be connected with the TSL3000 controller, the cable signal names are station 0 and station 1. For details, see the Interface Manual (STE 85364).