

# TLC

Servo driver controller for single axis



## Features

Ready to use, simplified setup.

## Simple Operation

Use PC setup tool D-Step or digital operator TDO to access many useful functions.

## Functions

- Selectable function modes  
(64-position, external unit input instruction, 256-position, 512-position, Solenoid mode 1, and Solenoid mode 2)
- Step data count: Up to 512 (depending on function mode)
- Alarm history: Up to 50 (including power ON history)
- Switching between Auto/Manual, brake release switch
- Selectable control methods (positioning or pressing)

## Combined Control Device Model Configuration (TLC)

### ● Economy series

| Control device model | Capacity | Power supply voltage | Type                     | Encoder type | Actuator model                        | Lead                | Home position                          | Brake                                     | Stroke                                                               |
|----------------------|----------|----------------------|--------------------------|--------------|---------------------------------------|---------------------|----------------------------------------|-------------------------------------------|----------------------------------------------------------------------|
| TLC                  | 005      | 24DC                 | MOD                      | A            | ES6                                   | 12                  | D                                      | B                                         | 0050                                                                 |
| (1)                  | (2)      | (3)                  | (4)                      | (5)          | (6)                                   | (7)                 | (8)                                    | (9)                                       | (10)                                                                 |
| TLC                  | 005: 50W | 24DC: 24VDC          | MOD: Mode switching type | A: Absolute  | Direct coupling<br>ES5<br>ES6<br>EC4* | 06: 6mm<br>12: 12mm | D: Motor side<br>R: Reverse motor side | No symbol: Without brake<br>B: With brake | Enter the stroke of the actuator model (6)<br>Example)<br>0050: 50mm |
|                      |          |                      |                          |              | Motor wrap<br>ES5R<br>ES6R<br>EC4R    |                     |                                        |                                           |                                                                      |

\* Select "EC4" for EC4H.

### ● Compact series

| Control device model | Capacity | Power supply voltage | Type                     | Encoder type | Actuator model | Lead                | Home position                          | Brake                                     | Stroke                                                               |
|----------------------|----------|----------------------|--------------------------|--------------|----------------|---------------------|----------------------------------------|-------------------------------------------|----------------------------------------------------------------------|
| TLC                  | 005      | 24DC                 | MOD                      | A            | KRF4           | 06                  | D                                      | B                                         | 0050                                                                 |
| (1)                  | (2)      | (3)                  | (4)                      | (5)          | (6)            | (7)                 | (8)                                    | (9)                                       | (10)                                                                 |
| TLC                  | 005: 50W | 24DC: 24VDC          | MOD: Mode switching type | A: Absolute  | KRF4<br>KRF5   | 06: 6mm<br>10: 10mm | D: Motor side<br>R: Reverse motor side | No symbol: Without brake<br>B: With brake | Enter the stroke of the actuator model (6)<br>Example)<br>0050: 50mm |

### ● Universal series

| Control device model | Capacity | Power supply voltage | Type                     | Encoder type | Actuator model                                 | Lead                | Home position                          | Brake                                     | Stroke                                                                |
|----------------------|----------|----------------------|--------------------------|--------------|------------------------------------------------|---------------------|----------------------------------------|-------------------------------------------|-----------------------------------------------------------------------|
| TLC                  | 005      | 24DC                 | MOD                      | A            | US6T                                           | 12                  | D                                      | B                                         | 0100                                                                  |
| (1)                  | (2)      | (3)                  | (4)                      | (5)          | (6)                                            | (7)                 | (8)                                    | (9)                                       | (10)                                                                  |
| TLC                  | 005: 50W | 24DC: 24VDC          | MOD: Mode switching type | A: Absolute  | Direct coupling<br>US6T<br>Motor wrap<br>US6RT | 06: 6mm<br>12: 12mm | D: Motor side<br>R: Reverse motor side | No symbol: Without brake<br>B: With brake | Enter the stroke of the actuator model (6)<br>Example)<br>0100: 100mm |

### ● Press series

| Control device model | Capacity | Power supply voltage | Type                     | Encoder type | Actuator model                                   | Lead | Home position                          | Brake                                     | Stroke                                                  |
|----------------------|----------|----------------------|--------------------------|--------------|--------------------------------------------------|------|----------------------------------------|-------------------------------------------|---------------------------------------------------------|
| TLC                  | 005      | 24DC                 | MOD                      | A            | PCT20                                            | 06N  | D                                      | B                                         | 0050                                                    |
| (1)                  | (2)      | (3)                  | (4)                      | (5)          | (6)                                              | (7)  | (8)                                    | (9)                                       | (10)                                                    |
| TLC                  | 005: 50W | 24DC: 24VDC          | MOD: Mode switching type | A: Absolute  | Direct coupling<br>PCT20<br>Motor wrap<br>PCT20R | 06N  | D: Motor side<br>R: Reverse motor side | No symbol: Without brake<br>B: With brake | 0050: 50mm<br>0100: 100mm<br>0150: 150mm<br>0200: 200mm |

ES/EC

KRF

US/USW

PCT/PC

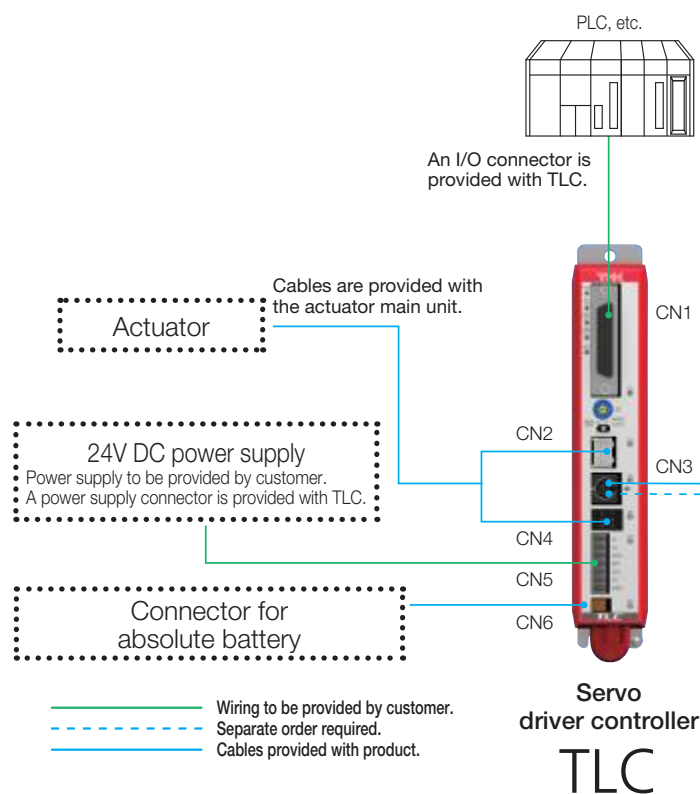
Controller

## TLC Specifications

|                        |                                |               |                                                                                                                                                  |                     |              |              |                 |                 |
|------------------------|--------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|--------------|-----------------|-----------------|
| Type of machine        | Model                          |               | TLC                                                                                                                                              |                     |              |              |                 |                 |
|                        | Capacity                       |               | 50W                                                                                                                                              |                     |              |              |                 |                 |
| Input power supply     | Main circuit                   |               | 24VDC±10%                                                                                                                                        |                     |              |              |                 |                 |
|                        | Control circuit                |               |                                                                                                                                                  |                     |              |              |                 |                 |
|                        | Power supply [A]               |               | Rated 6A (Max 16A)                                                                                                                               |                     |              |              |                 |                 |
| Control                | Control axis                   |               | Single axis                                                                                                                                      |                     |              |              |                 |                 |
|                        | Motor                          |               | AC servo motor                                                                                                                                   |                     |              |              |                 |                 |
|                        | Control                        |               | Feedback control (Semi-closed loop)                                                                                                              |                     |              |              |                 |                 |
|                        | Position detection             |               | Absolute                                                                                                                                         |                     |              |              |                 |                 |
|                        | Acceleration/deceleration      |               | Trapezoid acceleration, S-shape acceleration                                                                                                     |                     |              |              |                 |                 |
| Program                | Function mode                  |               | 64-position                                                                                                                                      | External unit input | 256-position | 512-position | Solenoid mode 1 | Solenoid mode 2 |
|                        | Step data count                |               | 64 points                                                                                                                                        | 64 points           | 256 points   | 512 points   | 7 points        | 3 points        |
|                        | Data input/output              |               | PC setup tool D-STEP or Digital operator TDO                                                                                                     |                     |              |              |                 |                 |
| Input/output           | Dedicated input/output         | Input points  | 16 points (Start, Return to home position, Pause, Reset, Servo ON, Specify step number, etc.) *                                                  |                     |              |              |                 |                 |
|                        |                                | Output points | 16 points (Return to home position completed, In position, Servo ready, Alarm, Emergency stop status, etc.) *                                    |                     |              |              |                 |                 |
|                        | Input/output power supply      |               | 24VDC ±10% (This should be prepared by yourself.)                                                                                                |                     |              |              |                 |                 |
| Communication          | Serial communication           | Device        | Digital operator or PC software                                                                                                                  |                     |              |              |                 |                 |
|                        |                                | Method        | RS-485                                                                                                                                           |                     |              |              |                 |                 |
|                        |                                | Ports         | Mini DIN × 1                                                                                                                                     |                     |              |              |                 |                 |
| Usage conditions       | Operating/storage temperature  |               | 0 to 40°C (No freezing) / -20 to 85°C (No freezing)                                                                                              |                     |              |              |                 |                 |
|                        | Operating/storage humidity     |               | 90% RH or below (No condensation)                                                                                                                |                     |              |              |                 |                 |
|                        | Ambient condition              |               | An indoor place (not exposed to direct sunlight) free from corrosive gas, flammable gas, oil mist, and dust, free from water, oil, and chemicals |                     |              |              |                 |                 |
| General specifications | Protective function            |               | Overload, overvoltage, excessive position deviation, software limit over error, etc.                                                             |                     |              |              |                 |                 |
|                        | Accessories                    |               | Power supply connector × 1<br>I/O connector × 1                                                                                                  |                     |              |              |                 |                 |
|                        | Options (sold separately)      |               | Digital operator TDO (Cable length 5m)<br>I/O cable 3m, 5m, 7m, and 10m<br>Communication cable (Mini DIN↔USB)                                    |                     |              |              |                 |                 |
|                        | External dimensions [mm]       |               | 36.4mm (W)×199.2mm (H)×112.6mm (D)                                                                                                               |                     |              |              |                 |                 |
|                        | Weight (not including battery) |               | 0.4kg or less                                                                                                                                    |                     |              |              |                 |                 |

\* This count varies depending on function mode.

## System Configuration



TLC needs either **TDO** or **D-STEP** for setting.



(Available in Japanese and English)

Digital operator  
**TDO**

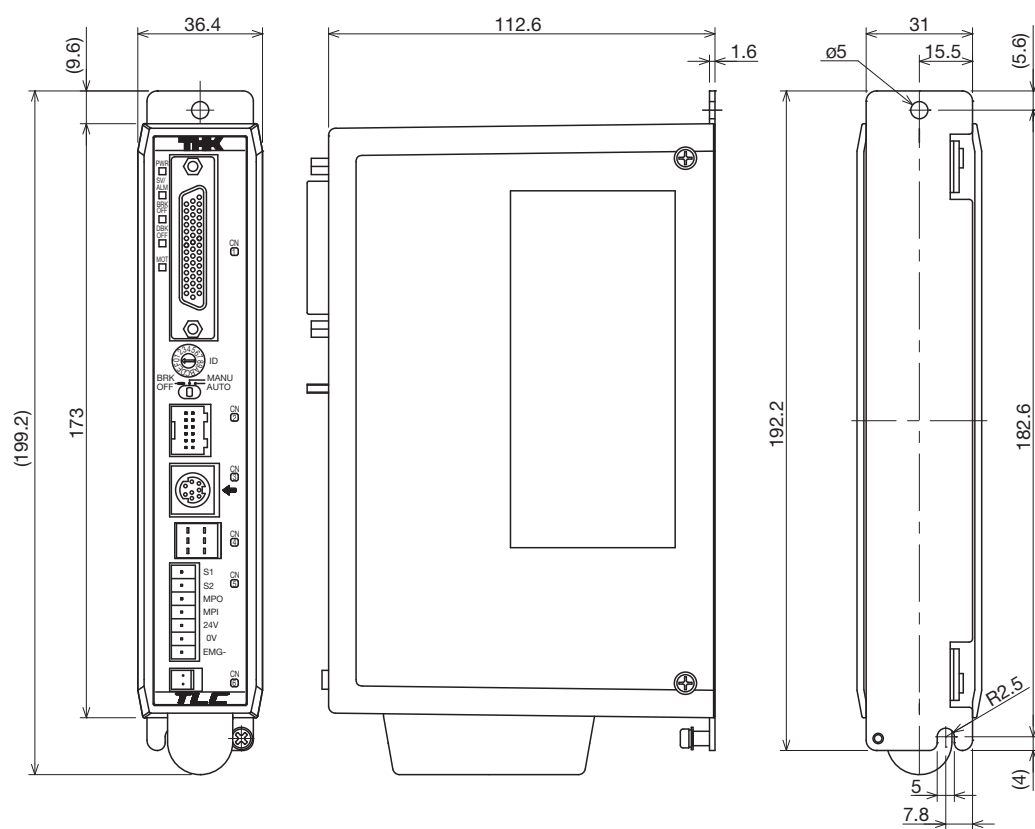


PC setup tool  
**D-STEP**

The PC setup tool can be freely downloaded after logging in to the technical support website.  
(Available in Japanese, English, and Simplified Chinese)  
<https://tech.thk.com/>

## Controller

TLC (50W)



ES/EC

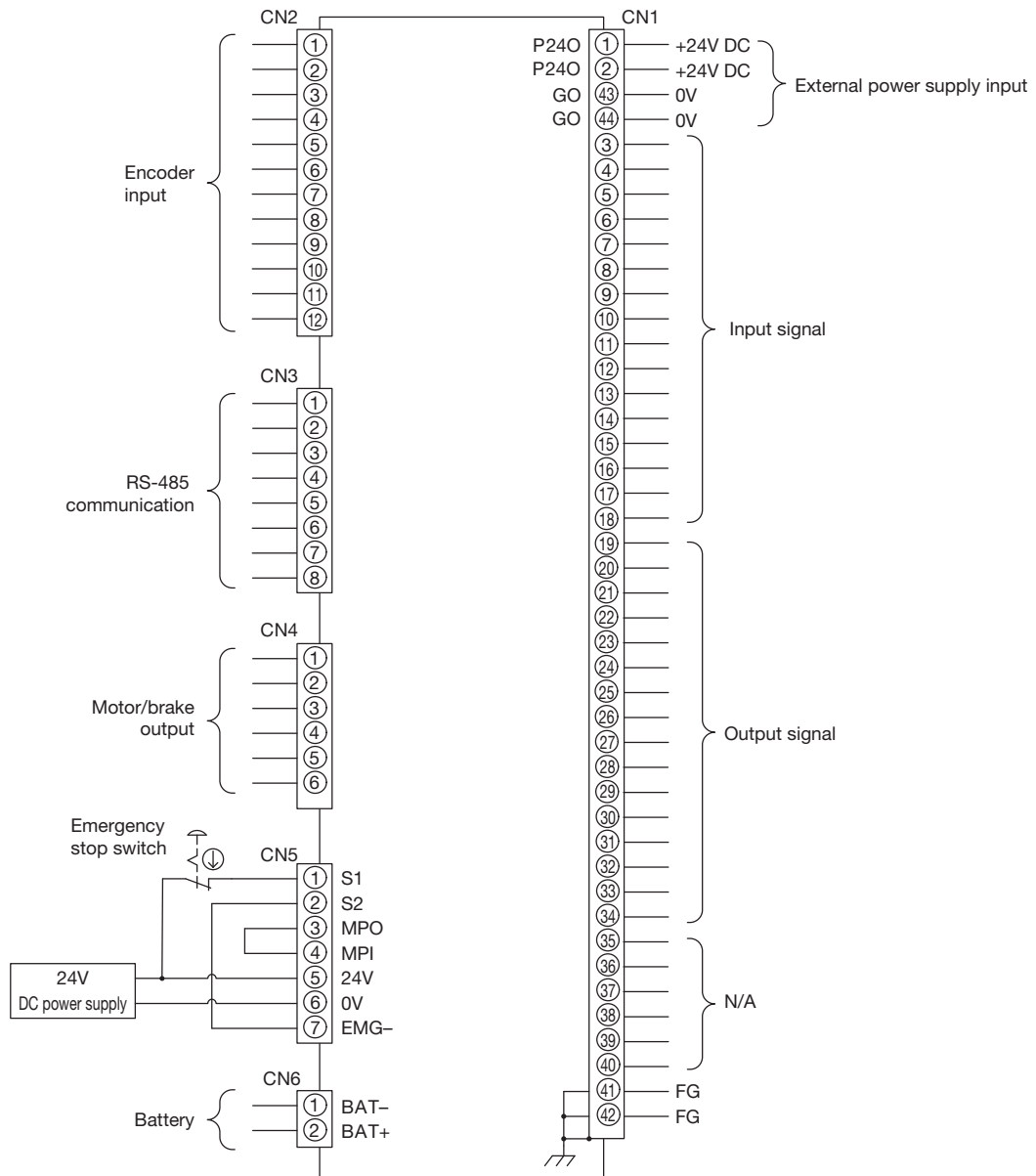
KRF

US/USW

PCT/PC

Controller

## TLC Pin Configuration

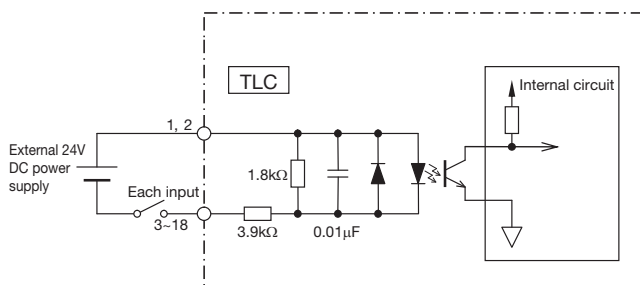


For attached I/O connector pin numbers, see P.5-009.

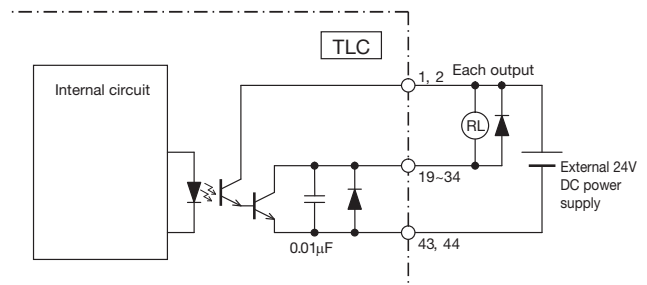
Customer provides 24V DC power supply for input/output circuitry.

## Input/Output Circuitry for TLC (CN1)

Input circuit



Output circuit



## TLC Function Modes

TLC provides six modes to support various requirements and purposes.

| Function mode           |                                    | Overview                                                                                                                                               | Step data count | Pressing operation |
|-------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------|
| Multi-point positioning | 0: 64-position                     | Multi-point positioning operation with 64 points<br>With area output, with P area output                                                               | 64              | ○                  |
|                         | 1: External unit input instruction | Multi-point positioning operation with 64 points<br>I/O-based external unit instruction mode<br>Without area output, with P area output                | 64              | –                  |
|                         | 2: 256-position                    | Multi-point positioning operation with 256 points<br>Without area output, with P area output                                                           | 256             | ○                  |
|                         | 3: 512-position                    | Multi-point positioning operation with 512 points<br>Without area output, without P area output                                                        | 512             | ○                  |
| Electromagnetic valve   | 4: Solenoid mode 1                 | Multi-point positioning operation with 7 points<br>Direct move command input<br>With area output, with P area output                                   | 7               | ○                  |
|                         | 5: Solenoid mode 2                 | Multi-point positioning operation with 3 points<br>Direct move command input<br>With position sensor auto-switch output, area output and P area output | 3               | –                  |

## Pin Configuration by Function Mode

| I/O    | CN1 pin number | Signal name     |                     |                 |                 |                 |                 |
|--------|----------------|-----------------|---------------------|-----------------|-----------------|-----------------|-----------------|
|        |                | Function mode 0 | Function mode 1     | Function mode 2 | Function mode 3 | Function mode 4 | Function mode 5 |
|        |                | 64-position     | External unit input | 256-position    | 512-position    | Solenoid mode 1 | Solenoid mode 2 |
| Input  | 3              | PI 0            | PI 0                | PI 0            | PI 0            | ST 0            | ST 0            |
|        | 4              | PI 1            | PI 1                | PI 1            | PI 1            | ST 1            | ST 1            |
|        | 5              | PI 2            | PI 2                | PI 2            | PI 2            | ST 2            | ST 2            |
|        | 6              | PI 3            | PI 3                | PI 3            | PI 3            | ST 3            | –               |
|        | 7              | PI 4            | PI 4                | PI 4            | PI 4            | ST 4            | –               |
|        | 8              | PI 5            | PI 5                | PI 5            | PI 5            | ST 5            | –               |
|        | 9              | –               | MODE                | PI 6            | PI 6            | ST 6            | –               |
|        | 10             | –               | JOG/INCHING         | PI 7            | PI 7            | –               | –               |
|        | 11             | –               | JOG P               | –               | PI 8            | –               | –               |
|        | 12             | BKRL            | JOG N               | BKRL            | BKRL            | BKRL            | BKRL            |
|        | 13             | STRT            | STRT/PWRT           | STRT            | STRT            | –               | –               |
|        | 14             | MANU            | MANU                | MANU            | MANU            | MANU            | MANU            |
|        | 15             | HOME            | HOME                | HOME            | HOME            | HOME            | HOME            |
|        | 16             | PAUSE           | PAUSE               | PAUSE           | PAUSE           | PAUSE           | PAUSE           |
|        | 17             | REST            | REST                | REST            | REST            | REST            | REST            |
|        | 18             | SV-ON           | SV-ON               | SV-ON           | SV-ON           | SV-ON           | SV-ON           |
| Output | 19             | PO 0            | PO 0                | PO 0            | PO 0            | PE 0            | LS 0            |
|        | 20             | PO 1            | PO 1                | PO 1            | PO 1            | PE 1            | LS 1            |
|        | 21             | PO 2            | PO 2                | PO 2            | PO 2            | PE 2            | LS 2            |
|        | 22             | PO 3            | PO 3                | PO 3            | PO 3            | PE 3            | –               |
|        | 23             | PO 4            | PO 4                | PO 4            | PO 4            | PE 4            | –               |
|        | 24             | PO 5            | PO 5                | PO 5            | PO 5            | PE 5            | –               |
|        | 25             | MOVE            | MOVE                | PO 6            | PO 6            | PE 6            | –               |
|        | 26             | AREA            | MODES               | PO 7            | PO 7            | AREA            | AREA            |
|        | 27             | P AREA          | P AREA              | P AREA          | PO 8            | P AREA          | P AREA          |
|        | 28             | MANU S          | MANU S              | MANU S          | MANU S          | MANU S          | MANU S          |
|        | 29             | HEND            | HEND                | HEND            | HEND            | HEND            | HEND            |
|        | 30             | INPS            | INPS                | INPS            | INPS            | INPS            | –               |
|        | 31             | LOAD/TRQS       | WEND                | LOAD/TRQS       | LOAD/TRQS       | LOAD/TRQS       | –               |
|        | 32             | SVRDY           | SVRDY               | SVRDY           | SVRDY           | SVRDY           | SVRDY           |
|        | 33             | BALM            | BALM                | BALM            | BALM            | BALM            | BALM            |
|        | 34             | ALM             | ALM                 | ALM             | ALM             | ALM             | ALM             |

ES/EC

KRF

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PCT/PC

Controller

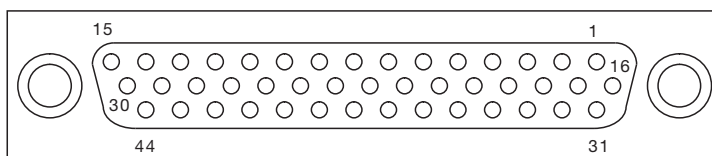
## Input Signal Functions

| Input       |                                                              |                                                                                                                                                                                                                                                     |
|-------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Signal name | Description                                                  | Remarks                                                                                                                                                                                                                                             |
| MANU        | Operation mode                                               | Switches AUTO/MANUAL from I/O. MANUAL when signal is on, and AUTO when it is off.                                                                                                                                                                   |
| STRT        | Start                                                        | Start signal of program step. Program starts when signal is on.                                                                                                                                                                                     |
| PI0 - PI8   | Instruction position number                                  | Input for specifying position numbers. Specifies programs at each signal level. Selects a program step and starts a program with "STRT" signal.                                                                                                     |
| PAUSE       | Pause                                                        | Temporarily interrupts the operation. PAUSE input status when signal is off. (N.C. connection specification)                                                                                                                                        |
| HOME        | Return to home position                                      | Starts the return to home position operation. Returning to home position is started when signal is on. It stops when it is off.                                                                                                                     |
| SV-ON       | Servo on                                                     | Turns the servo ON and OFF. Servo ON when signal is on, and servo OFF when signal is off.                                                                                                                                                           |
| REST        | Alarm reset                                                  | Resets alarm. Resets remaining travel distance during pause. Resets when it is on.                                                                                                                                                                  |
| BKRL        | Brake release                                                | Forcibly releases brake. Releases brake when it is on.                                                                                                                                                                                              |
| MODE        | External unit input instruction mode                         | Enters the instruction mode when signal is on. Instruction mode when signal is on.                                                                                                                                                                  |
| PWRT        | Current position write with external unit input instruction  | During the instruction mode, the position is written when this signal is greater than 20ms with the position for writing specified.                                                                                                                 |
| JOG/INCHING | Manual operation switch with external unit input instruction | Switching of manual operation during the instruction mode. Selects inching operation when it is on, and jog operation when it is off.                                                                                                               |
| JOG P       | Moving direction + with external unit input instruction      | Operating direction and operation start signal during the instruction mode. Moves in + direction to the soft limit when signal is on. Decelerates and stops when it is off while moving.                                                            |
| JOG N       | Moving direction - with external unit input instruction      | Operating direction and operation start signal during the instruction mode. Moves in - direction to the soft limit when signal is on. Decelerates and stops when it is off while moving.                                                            |
| ST0 - 6     | Cylinder type START                                          | Program start signal for position numbers from ST0 to ST6. Can select either Level or Edge for signal using parameter 13 "move" command. Note that when more than two positions are on at the same time, the lowest-number signal takes precedence. |

## Output Signal Functions

| Output      |                                         |                                                                                                                                                  |
|-------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Signal name | Description                             | Remarks                                                                                                                                          |
| MANU S      | Operation mode status                   | Operation mode status outputs (AUTO/MANUAL). MANUAL when signal is on, AUTO when off.                                                            |
| PO1 - PO8   | End position number                     | Outputs the position number arrived after positioning is completed (binary outputs).                                                             |
| MOVE        | Moving                                  | Outputs signal during motor operation.                                                                                                           |
| INPS        | Positioning completed                   | Outputs when motor comes within the positioning completed width.                                                                                 |
| SVRDY       | Operation preparations completed        | Outputs signal when servo is on.                                                                                                                 |
| ALM         | Alarm                                   | Alarm output signal.                                                                                                                             |
| MODES       | Operation mode status                   | Output signal for judging instruction mode or regular operation mode. Instruction mode when signal is on. Regular operation mode when it is off. |
| WEND        | Writing completed                       | Signal is off after switching to the regular mode, and it is on for 30ms when writing of the PWRT signal is completed.                           |
| HEND        | Return to home position completed       | Outputs signal when returning to home position is completed.                                                                                     |
| AREA        | Upper/lower area limit                  | On when the current position of actuator is within a range specified by the parameter.                                                           |
| P AREA      | Position area                           | On when the current position of actuator is within a range specified by the program step.                                                        |
| EMGS        | Emergency stop status                   | Outputs judgment for input of emergency stop. On during normal operation, and off when emergency stop circuit is shut off.                       |
| LOAD        | Load output judgment status             | On when a directive torque exceeds the threshold over a certain period within a judgment range.                                                  |
| TRQS        | Torque level status                     | On when the load threshold is reached while moving. Off while the load remains under the threshold.                                              |
| PE0 - PE6   | Cylinder type arrival completed output  | Signal generated after operation for position number is completed.                                                                               |
| LS0 - LS2   | Cylinder type position detection output | Outputs when the current position comes within the positioning width for each of the three points.                                               |

## I/O Connector Pin Numbers



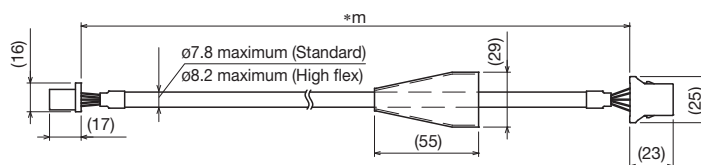
Controller connector port view

## Actuator Cable

Motor brake cable for TLC: CBL-TLC-ACP-\*\*F (Standard)

CBL-TLC-ACP-\*\*R (High flex)

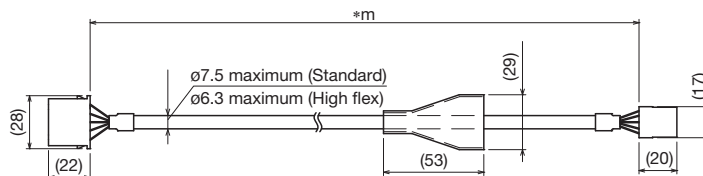
\*\* indicates cable length: 03 (3m), 05 (5m), or 10 (10m).



Encoder cable for TLC: CBL-TLC-ACS-\*\*F (Standard)

CBL-TLC-ACS-\*\*R (High flex)

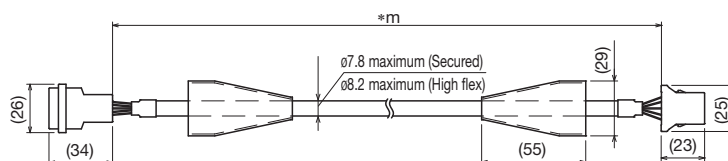
\*\* indicates cable length: 03 (3m), 05 (5m), or 10 (10m).



Motor brake extension cable for TLC/THC: CBL-ACP-EXT01-\*\*F (Secured)

CBL-ACP-EXT01-\*\*R (High flex)

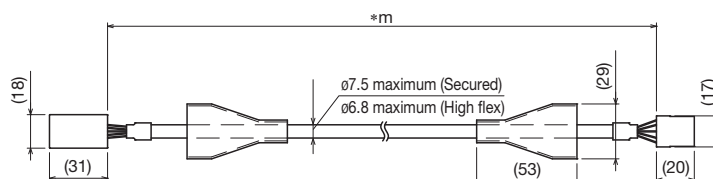
\*\* indicates cable length: 01 (1m), 03 (3m), or 05 (5m).



Extension encoder cable for TLC: CBL-ACS-EXT01-\*\*F (Secured)

CBL-ACS-EXT01-\*\*R (High flex)

\*\* indicates cable length: 01 (1m), 03 (3m), or 05 (5m).



Note 1) For use involving moving elements, select high flex type. The recommended bending radius at the core of cable is R95 or greater.  
(For use involving other than moving elements, R50 or greater is recommended.)

Note 2) When using the TLC servo driver controller, motor brake cable and encoder cable should be no longer than 11m.  
Up to two extension cables can be connected.

ES/EC

KRF

US/USW

PCT/PC

Controller

## Option

## Lithium ion battery (for maintenance)

ER6V C4 (Toshiba Home Appliances Corporation)

- This is required for the absolute system.
- When replacing the battery, order the above.

ES/EC

KRF

US/USW

PCT/PC

Controller