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SPEC FILE


**Product Number :** PT-**TW230**

**Product Name :** Short-Throw LCD Projector

Short-Throw LCD Projector

# PT-TW230

## Specifications

**Main unit**

| | | |
|---|---|---|
| Power supply | | 100–240 V AC, 50/60 Hz |
| Power consumption | | 310 W<br>(0.42 W when STANDBY MODE set to ECO,*1 9.5 W when STANDBY MODE set to NETWORK.) |
| LCD panel | Panel size | 15.0 mm (0.59 inches) diagonal (16:10 aspect ratio) |
| | Display method | Transparent LCD panel (× 3, R/G/B) |
| | Pixels | 1,024,000 (1,280 × 800) × 3, total of 3,072,000 pixels |
| | Pixel configuration | Stripe |
| Lens | | Fixed (0.5:1 throw ratio), manual focus, F 1.8, f 6.68 mm |
| Throw ratio | | 1.2–1.9:1 |
| Lamp | | 230 W UHM lamp × 1 |
| Screen size | | 1.52–2.79 m (60–110 inches) diagonally, 16:10 aspect ratio |
| Colors | | Full color (16,777,216 colors) |
| Brightness*2 | | 2,500 lumens (LAMP POWER: NORMAL) |
| Center-to-corner uniformity*2 | | 80% |
| Contrast*2 | | 500:1 (full on/off, LAMP POWER: NORMAL) |
| Resolution | | 1,280 × 800 pixels (Input signals that exceed this resolution will be converted to 1,280 × 800 pixels.) |
| Scanning frequency | HDMI | $f_H$: 25 kHz–80 kHz, $f_V$: 50 Hz–85 Hz,<br>dot clock: 162 MHz or lower |
| | RGB | $f_H$: 15 kHz–100 kHz, $f_V$: 50 Hz–100 Hz, dot clock: 140 MHz or lower<br>(Signals above 140 MHz are downsampled.) |
| | $Y P_B P_R$ ($Y C_B C_R$) | 525i (480i): $f_H$ 15.75 kHz; $f_V$ 60 Hz,<br>625i (576i): $f_H$ 15.63 kHz; $f_V$ 50 Hz,<br>525p (480p): $f_H$ 31.50 kHz; $f_V$ 60 Hz,<br>625p (576p): $f_H$ 31.25 kHz; $f_V$ 50 Hz,<br>750 (720)/60p: $f_H$ 45.00 kHz; $f_V$ 60 Hz,<br>750 (720)/50p: $f_H$ 37.50 kHz; $f_V$ 50 Hz,<br>1125 (1080)/60i: $f_H$ 33.75 kHz; $f_V$ 60 Hz,<br>1125 (1080)/50i: $f_H$ 28.13 kHz; $f_V$ 50 Hz |
| | Video/S-Video | $f_H$: 15.75 kHz, $f_V$: 60 Hz [NTSC/NTSC4.43/PAL-M/PAL60]<br>$f_H$: 15.63 kHz, $f_V$: 50 Hz [PAL/PAL-N/SECAM] |
| Optical axis shift | | 10:-1.44 (fixed) |
| Keystone correction range | | Vertical: ±20° |
| Installation | | Ceiling/desk, front/rear (menu selection) |
| Built-in speaker | Size | 3.7 cm (1-15/32 inches) (round) × 1 |
| | Output power | 10 W (monaural) |
| Terminals | HDMI IN | HDMI 19-pin × 1, HDCP compatible<br>525p (480p), 625p (576p), 750 (720)/60p, 750 (720)/50p,<br>1125 (1080)/60i, 1125 (1080)/50i, 1125 (1080)/60p, 1125 (1080)/50p<br>VGA (640 × 480)–WUXGA*3 (1,920 × 1,200), Audio signal: linear PCM (sampling frequencies: 48 kHz, 44.1 kHz, 32 kHz) |
| | COMPUTER (RGB) 1 IN | D-sub HD 15-pin (female) × 1 |
| | R, G, B | G: 0.7 Vp-p (1.0 Vp-p for sync on G), 75 ohms;<br>B, R: 0.7 Vp-p, 75 ohms;<br>HD/VD, SYNC: high impedance, TTL (positive/negative) |
| | Y, $P_B$ ($C_B$), $P_R$ ($C_R$) | Y: 1.0 Vp-p (including sync signal);<br>$P_B$ ($C_B$), $P_R$ ($C_R$): 0.7 Vp-p, 75 ohms |
| | COMPUTER (RGB) 2 IN / 1 OUT | |
| | R, G, B | D-sub HD 15-pin (female) × 1<br>(input/output selectable using on-screen menu)<br>G: 0.7 Vp-p (1.0 Vp-p for sync on G), 75 ohms;<br>B, R: 0.7 Vp-p, 75 ohms;<br>HD/VD, SYNC: high impedance, TTL (positive/negative) |
| | VIDEO IN | RCA pin × 1, 1.0 Vp-p, 75 ohms |
| | S-VIDEO IN | Mini DIN 4-pin × 1, Y: 1.0 Vp-p; C: 0.286 Vp-p, 75 ohms |

| | | |
|---|---|---|
| | COMPUTER AUDIO IN | M3 (L, R) × 1, 0.5 Vrms |
| | VIDEO/S-VIDEO AUDIO IN | RCA × 2 (L/R × 1), 0.5 Vrms |
| | AUDIO OUT | M3 (L, R) × 1 (monitor out: 0–2.0 Vrms, variable) |
| | SERIAL IN | D-sub 9-pin (male) × 1, for external control (RS-232C compliant) |
| | LAN | RJ-45 × 1, for network connection, 100Base-TX/10Base-T, compliant with PJLink™ |
| Power cord length | | 2.0 m (6 ft 7 in) |
| Cabinet materials | | Molded plastic (PC) |
| Dimensions (W × H × D) | | 350 mm × 143 mm*4 × 382 mm (13-25/32 × 5-5/8*4 × 15-1/32 inches) |
| Weight | | Approximately 4.7 kg (10.4 lbs) |
| Operation noise | | 36 dB (LAMP POWER: NORMAL), 29 dB (LAMP POWER: ECO) |
| Operating temperature | | 0–35 °C (32–95 °F) up to 1,200 m (3,937 ft) above sea level, 0–30 °C (32–86 °F) between 1,200 m and 2,700 m (3,937 ft and 8,858 ft) above sea level. |
| Operating humidity | | 20%–80% (no condensation) |

**Remote control unit**

| | |
|---|---|
| Power supply | 3 V DC (R03/LR03/AAA type battery × 2) |
| Operation range*5 | Approximately 7 m (23 ft) when operated from directly in front of the signal receptor |
| Dimensions (W × H × D) | 52 × 110 × 18 mm (2-1/16 × 4-11/32 × 23/32 inches) |
| Weight | Approx. 67 g (2.4 oz) (including batteries) |

**Supplied accessories**

Power cord with security lock (× 1) (× 2 for PT-TW231REA)
Wireless remote control unit (× 1)
Batteries for remote control (R03/LR03/AAA type × 2)
Computer cable (for VGA, 1.8 m / 5 ft 11 in) (× 1)
Software CD-ROM (Logo Transfer Software, Multi Projector Monitoring and Control Software) (× 1)

**Optional accessories**

| | |
|---|---|
| Ceiling mount bracket | ET-PKV100H (for high ceilings)<br>ET-PKV100S (for low ceilings) |
| Bracket assembly | ET-PKT100B |
| Replacement lamp unit | ET-LAT100 |
| Replacement filter unit | ET-RFT100 |

**Weights and dimensions shown are approximate. Specifications subject to change without notice.**

***1 When the standby mode is set to eco, network functions such as power on over the LAN network will not operate. Also, only certain commands can be received for external control using the serial terminal.**

***2 Measurement, measuring conditions, and method of notation all comply with ISO 21118 international standards.**

***3 WUXGA resolution is supported only when the signals are compliant with VESA CVT-RB (Coordinated Video Timing-Reduced Blanking).**

***4 With legs at shortest position.**

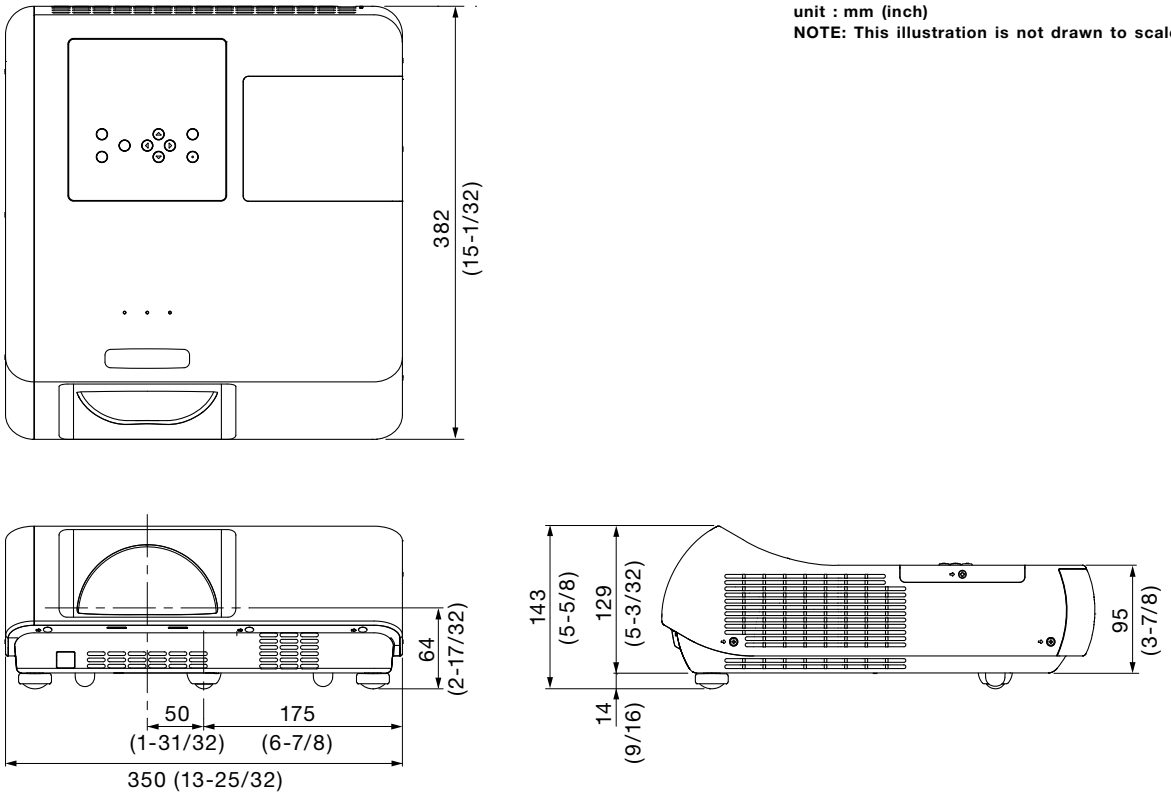
***5 Operation range differs depending on environments.**

Short-Throw LCD Projector

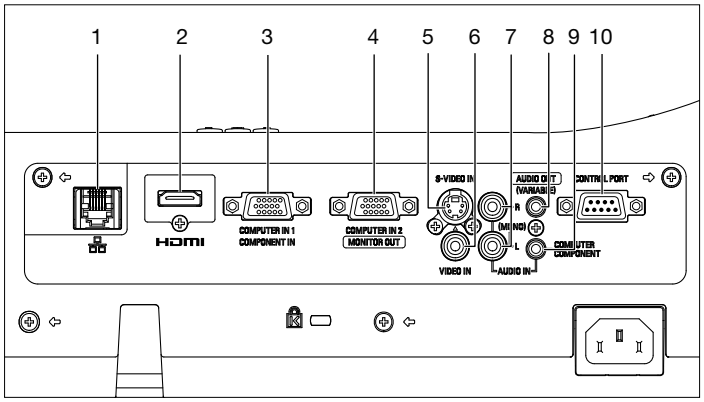
# PT-**TW230**

## Dimensions

unit : mm (inch)
NOTE: This illustration is not drawn to scale.




## Terminals




1 LAN connector
2 HDMI input
3 Computer 1 input
4 Computer 2 input / computer 1 output
5 S-Video input
6 Video input
7 Audio input for video/S-Video
8 Audio output
9 Audio input for computer
10 Serial input


Panasonic

Short-Throw LCD Projector

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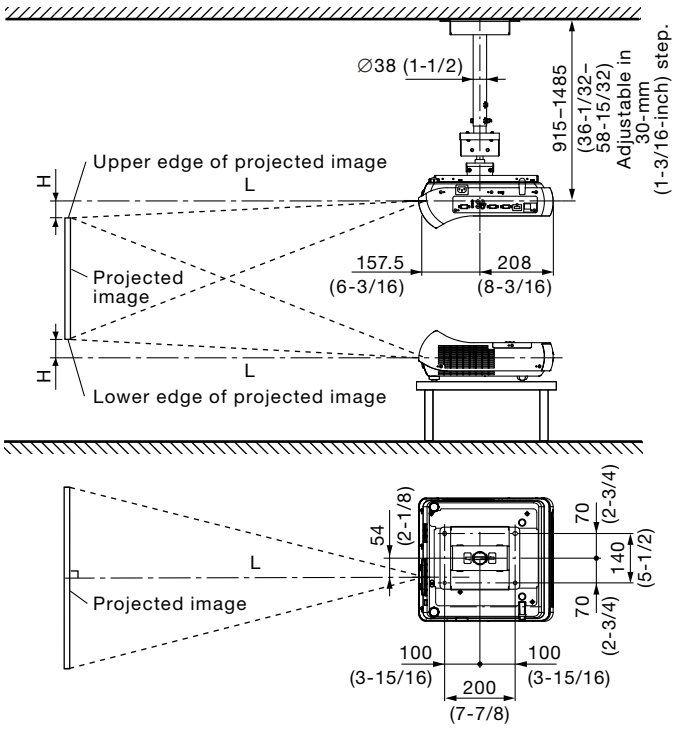
## Standard setting-up position




**NOTE:**

**Illustrations show the projector installed using optional ceiling mount bracket ET-PKV100H and bracket assembly ET-PKT100B.**

**This illustration is not drawn to scale.**

**L: Distance to screen**
**H: Height from the edge of screen to center of lensstep.**

**unit : mm (inch)**

## Projection distance for 16:10 aspect ratio screen

Unit: meters

| Screen size (inch, diagonal) | Distance to screen (L) | Height from the edge of screen to center of lens (H) |
|---|---|---|
| 60 | 0.64 | -0.14 |
| 70 | 0.75 | -0.16 |
| 80 | 0.86 | -0.18 |
| 90 | 0.97 | -0.20 |
| 100 | 1.09 | -0.23 |
| 110 | 1.20 | -0.25 |

Unit: feet

| Screen size (inch, diagonal) | Distance to screen (L) | Height from the edge of screen to center of lens (H) |
|---|---|---|
| 60 | 2.1 | -0.5 |
| 70 | 2.5 | -0.5 |
| 80 | 2.8 | -0.6 |
| 90 | 3.2 | -0.7 |
| 100 | 3.6 | -0.8 |
| 110 | 3.9 | -0.8 |

## Projection distance for 16:9 aspect ratio screen

Unit: meters

| Screen size (inch, diagonal) | Distance to screen (L) | Height from the edge of screen to center of lens (H) |
|---|---|---|
| 60 | 0.65 | -0.17 |
| 70 | 0.77 | -0.20 |
| 80 | 0.89 | -0.22 |
| 90 | 1.00 | -0.25 |
| 100 | 1.12 | -0.28 |
| 105 | 1.17 | -0.29 |

Unit: feet

| Screen size (inch, diagonal) | Distance to screen (L) | Height from the edge of screen to center of lens (H) |
|---|---|---|
| 60 | 2.1 | -0.6 |
| 70 | 2.5 | -0.7 |
| 80 | 2.9 | -0.7 |
| 90 | 3.3 | -0.8 |
| 100 | 3.7 | -0.9 |
| 105 | 3.8 | -1.0 |

**Calculation of the projection distance**

For a screen size different from the above, use the equation below to calculate the projection distance.

Aspect ratio 16:10

L (m) = (diagonal screen size in inches) × 0.0112 – 0.0367

Aspect ratio 16:9

L (m) = (diagonal screen size in inches) × 0.0115 – 0.0378

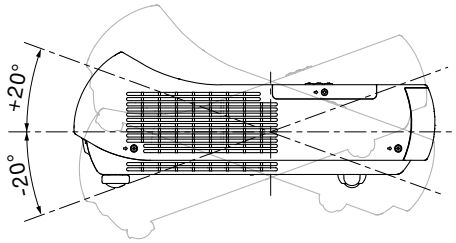
**NOTE:**
**Distances calculated with the above equations will include a slight error.**

**Installable angle**

Install the projector at an angle within the range shown below.

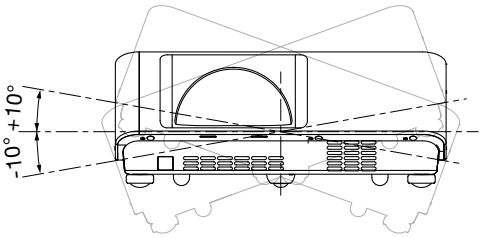
**• Vertical direction**

The projector may be installed at a vertical angle of ±20°.




**• Horizontal direction**

The projector may be installed at a horizontal angle of ±10°.



## List of compatible signals

The signals that can be input to this projector are shown in the table below. Horizontal scanning frequencies of 25 kHz to 80 kHz (15 kHz to 100 kHz for RGB signals), vertical scanning frequencies of 50 Hz to 120 Hz (50 Hz to 100 Hz for RGB signals), and a dot clock of 162 MHz maximum (140 MHz maximum for RGB signals) can be input.

**NOTE: The native resolution of this projector is 1,280 × 800 pixels. If the display resolution of the input signal is different from the native resolution, image compression or expansion will be used to convert the input signal to a level within the native resolution.**

| Display mode | Display resolution (dots)[1] | Scanning frequency H (kHz) | Scanning frequency V (kHz) | Dot clock frequency (MHz) | Format |
|---|---|---|---|---|---|
| NTSC/NTSC4.43/PAL-M/PAL60 | 720 × 480i | 15.7 | 59.9 | – | VIDEO/S-VIDEO |
| PAL/PAL-N/SECAM | 720 × 576i | 15.6 | 50.0 | – | |
| 525i (480i) | 640 × 480i | 15.7 | 59.9 | 12.3 | $YP_BP_R$/RGB |
| 625i (576i) | 768 × 576i | 15.6 | 50.0 | 14.8 | |
| 525p (480p) | 640 × 480 | 31.5 | 59.9 | 25.2 | HDMI/$YP_BP_R$/RGB |
| 625p (576p) | 768 × 575 | 31.3 | 50.0 | 29.5 | |
| 720p | 1280 × 720 | 45.0 | 60.0 | 74.3 | |
| | | 37.5 | 50.0 | 74.3 | |
| 1035i | 1920 × 1035i | 33.8 | 60.0 | 74.3 | |
| 1080i | 1920 × 1080i | 33.8 | 60.0 | 74.3 | |
| | | 28.1 | 50.0 | 74.3 | |
| 1080p | 1920 × 1080 | 56.3 | 50.0 | 148.5 | HDMI |
| | | 67.5 | 60.0 | 148.5 | |
| VGA | 640 × 400 | 31.5 | 70.1 | 25.2 | RGB |
| | 640 × 480 | 31.5 | 59.9 | 25.2 | HDMI/RGB |
| | | 37.5 | 75.0 | 31.5 | RGB |
| | | 37.9 | 72.8 | 31.5 | |
| | | 37.9 | 74.4 | 31.5 | |
| | | 43.3 | 85.0 | 36.0 | |
| | 720 × 400 | 31.5 | 70.1 | 28.3 | |
| MAC LC13 | 640 × 480 | 35.0 | 66.6 | 31.3 | |
| MAC13 | | 35.0 | 66.7 | 30.2 | |
| SVGA | 800 × 600 | 32.7 | 51.1 | 32.7 | |
| | | 34.5 | 55.4 | 36.4 | |
| | | 35.2 | 56.3 | 36.0 | |
| | | 37.9 | 60.3 | 40.0 | HDMI/RGB |
| | | 37.9 | 61.0 | 40.0 | RGB |
| | | 38.0 | 60.5 | 40.1 | |
| | | 38.6 | 60.3 | 38.6 | |
| | | 46.9 | 75.0 | 49.5 | |
| | | 48.1 | 72.2 | 50.0 | |
| | | 53.7 | 85.1 | 56.3 | |
| MAC16 | 832 × 624 | 49.7 | 74.6 | 57.3 | |
| XGA | 1024 × 768 | 44.0 | 54.6 | 59.1 | |
| | | 46.9 | 58.2 | 63.0 | |
| | | 47.0 | 58.3 | 61.7 | |
| | | 48.4 | 60.0 | 65.0 | HDMI/RGB |
| | | 48.5 | 60.0 | 65.2 | RGB |
| | | 58.0 | 72.0 | 74.7 | |
| | | 60.0 | 75.0 | 78.8 | |
| | | 60.3 | 74.9 | 79.3 | |
| | | 61.0 | 75.7 | 81.0 | |
| | | 62.0 | 77.1 | 84.3 | |
| | | 63.5 | 79.4 | 83.4 | |
| | | 56.5 | 70.1 | 75.0 | |
| | | 68.7 | 85.0 | 94.5 | |
| | 1024 × 768i | 36.0 | 87.2 | 47.3 | |
| | | 35.5 | 87.0 | 44.9 | |
| MAC19 | 1024 × 768 | 60.2 | 75.1 | 80.0 | |

***1 The "i" appearing after the resolution indicates an interlaced signal.**

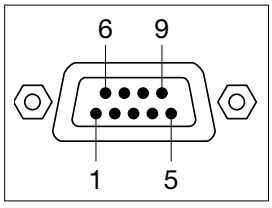
| Display mode | Display resolution (dots)[1] | Scanning frequency H (kHz) | Scanning frequency V (kHz) | Dot clock frequency (MHz) | Format |
|---|---|---|---|---|---|
| WXGA | 1280 × 768 | 47.8 | 59.9 | 79.5 | HDMI/RGB |
| | | 56.0 | 70.0 | 95.0 | RGB |
| | | 57.7 | 72.0 | 97.8 | |
| | 1280 × 800 | 60.3 | 74.9 | 102.3 | HDMI/RGB |
| | | 68.6 | 84.8 | 117.5 | |
| | | 41.2 | 50.0 | 68.6 | |
| | | 49.6 | 60.1 | 79.4 | |
| | | 49.7 | 59.8 | 83.5 | |
| | | 58.2 | 70.0 | 98.9 | RGB |
| | | 60.0 | 72.0 | 102.8 | |
| | | 62.8 | 74.9 | 106.5 | |
| | | 63.9 | 60.0 | 108.0 | HDMI/RGB |
| | | 71.5 | 84.8 | 122.5 | RGB |
| | 1360 × 768 | 47.7 | 60.0 | 86.7 | |
| | | 56.2 | 72.0 | 100.1 | |
| | 1366 × 768 | 48.4 | 60.0 | 86.7 | |
| | 1376 × 768 | 48.4 | 60.0 | 86.7 | |
| MAC21 | 1152 × 870 | 68.7 | 75.1 | 100.0 | |
| SXGA | 1152 × 900 | 61.2 | 65.2 | 92.0 | |
| | | 71.4 | 75.6 | 105.1 | |
| | | 61.9 | 66.0 | 94.5 | |
| | 1280 × 960 | 60.0 | 60.0 | 108.0 | |
| | 1280 × 1024 | 31.7 | 29.8 | 53.5 | HDMI/RGB |
| | | 60.3 | 58.1 | 93.1 | |
| | | 62.5 | 58.6 | 108.0 | RGB |
| | | 63.3 | 60.0 | 108.2 | |
| | | 63.7 | 60.0 | 109.5 | |
| | | 63.9 | 60.0 | 107.4 | |
| | | 71.7 | 67.2 | 117.0 | |
| | | 81.1 | 76.1 | 135.0 | |
| | | 64.0 | 60.0 | 108.0 | HDMI/RGB |
| | | 80.0 | 75.0 | 135.0 | RGB |
| | | 63.4 | 60.0 | 111.5 | |
| | | 77.0 | 72.0 | 130.1 | |
| | | 63.8 | 60.2 | 108.2 | |
| | | 91.1 | 85.0 | 157.5 | |
| | 1280 × 1024i | 50.0 | 86.0 | 80.0 | |
| | | 50.0 | 94.0 | 80.0 | |
| | | 46.4 | 86.7 | 78.7 | |
| MAC | 1280 × 960 | 75.0 | 75.1 | 126.0 | |
| | 1280 × 1024 | 80.0 | 75.1 | 135.2 | |
| SXGA+ | 1400 × 1050 | 64.0 | 60.2 | 108.0 | HDMI/RGB |
| | | 65.4 | 60.1 | 122.9 | |
| | | 65.1 | 59.9 | 122.4 | |
| WXGA+ | 1440 × 900 | 55.9 | 59.9 | 106.5 | |
| | | 74.9 | 60.0 | 161.9 | RGB |
| UXGA | 1600 × 1200 | 75.0 | 60.0 | 162.0 | |
| | | 81.3 | 65.0 | 175.5 | |
| | | 87.5 | 70.0 | 189.0 | |
| | | 93.8 | 75.0 | 202.5 | |
| WSXGA+ | 1680 × 1050 | 65.3 | 60.0 | 146.3 | HDMI/RGB |
| WUXGA | 1920 × 1200 | 74.0 | 59.9 | 154.0 | |
| | | 74.6 | 59.9 | 193.3 | RGB |

***1 The "i" appearing after the resolution indicates an interlaced signal.**

### Serial connector

The serial connector complies with RS-232C. To control the projector from a personal computer, commands must be input through communication software, based on the format and satisfying the communication conditions shown below.

### Pin assignments and signal names




D-sub 9-pin (male)
Serial input

| No. | Signal name | Description | No. | Signal name | Description |
|---|---|---|---|---|---|
| 1 | – | NC | 6 | – | NC |
| 2 | TXD | Send data | 7 | – | NC |
| 3 | RXD | Receive data | 8 | – | NC |
| 4 | – | NC | 9 | – | NC |
| 5 | GND | Ground | | | |

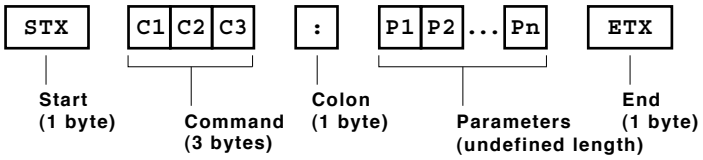
### Communication conditions (factory setting)

| | |
|---|---|
| Signal level | RS-232C-compliant |
| Synchronization method | Start-stop synchronization |
| Baud rate | 19,200 bps |
| Parity | None |

| | |
|---|---|
| Character length | 8 bits |
| Stop bit | 1 bit |
| X parameter | None |
| S parameter | None |

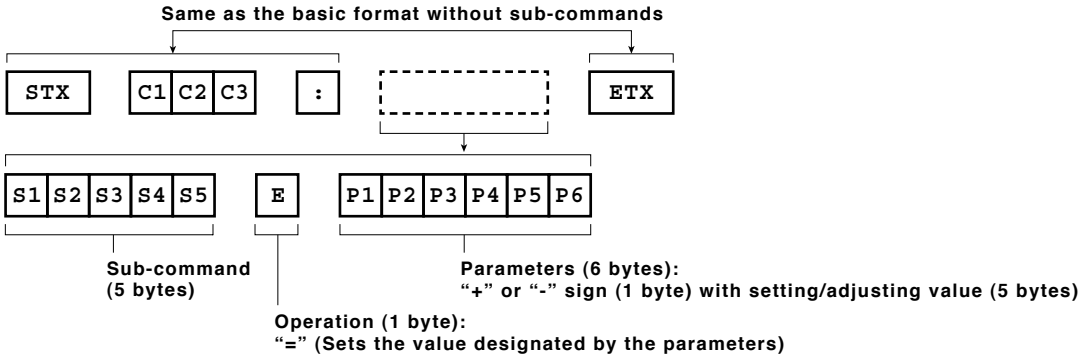
### Basic format

Transmission from the computer begins with STX, then command, parameter, and ETX are sent in this order. Add parameters according to the details of control.




**NOTE: When sending commands without parameters, a colon (:) is not necessary.**

### Basic format with sub-commands

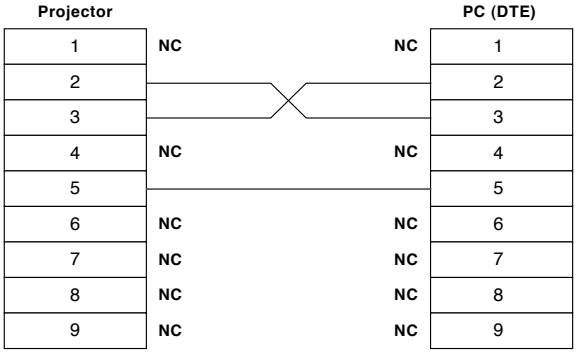



**NOTE: When sending sub-commands that require no parameters, operation (E) and parameters are not necessary.**

**CAUTION**

- **It may not be possible to send or receive commands for about 10 to 60 seconds when the lamp is first turned on. If this occurs, wait for 60 seconds, then try sending or receiving again.**
- **When sending multiple commands, be sure to wait for at least 0.5 second after receiving a response from the projector before sending the next command.**
- **Additional time is sometimes required for response due to processing inside the projector. Set the time-out period for command response to 10 seconds or more.**

## Cable specifications




## Control commands

| Command: <Parameter> | Function | Callback: <Parameter> | Parameter value Min | Max |
|---|---|---|---|---|
| PON*1/*2 | Power on (standby mode on) | PON | – | – |
| POF*1 | Power off (standby mode off) | POF | – | – |
| AVL:<pl> | Volume control | AVL:<pl> | 0 | 63 |
| IIS:<input signal> | Input signal selection | IIS:<input signal> | – | – |
| OFZ:<off on> | Freeze | OFZ:<off on> | 0 | 1 |
| VPM:STD | Picture mode: Standard | VPM:STD | – | – |
| VPM:DYN | Picture mode: Dynamic | VPM:DYN | – | – |
| VPM:CIN | Picture mode: Cinema | VPM:CIN | – | – |
| VPM:REA | Picture mode: Real | VPM:REA | – | – |
| VPM:BBD | Picture mode: Blackboard | VPM:BBD | – | – |
| VPM:CBD | Picture mode: Colorboard | VPM:CBD | – | – |
| VPM:IM1 | Picture mode: Image 1 | VPM:IM1 | – | – |
| VPM:IM2 | Picture mode: Image 2 | VPM:IM2 | – | – |
| VPM:IM3 | Picture mode: Image 3 | VPM:IM3 | – | – |
| VPM:IM4 | Picture mode: Image 4 | VPM:IM4 | – | – |
| AUU | Volume up | AUU | – | – |
| AUD | Volume down | AUD | – | – |
| OSH*1 | AV mute | OSH | – | – |
| DZU | Digital zoom: Enlargement | DZU | – | – |
| DZD | Digital zoom: Reduction | DZD | – | – |

***1 Do not send PON, POF, or OSH commands continuously in a short period of time. Doing so may burst the lamp or shorten the lamp replacement cycle.**

***2 These commands are effective when the standby mode is set to eco. (Other commands are not effective.)**

### Status request commands

| Command | Description | | Callback <Parameter> |
|---|---|---|---|
| QPW | Standby power status | | <power condition> |
| Q$S | Lamp status | | <lamp condition> |
| QIN | Input signal status | | <input signal> |
| QAV | Volume adjustment value | | <pl> |
| QPM | Picture mode status | Standard | STD |
| | | Dynamic | DYN |
| | | Cinema | CIN |
| | | Real | REA |
| | | Blackboard | BBD |
| | | Colorboard | CBD |
| | | Image 1 | IM1 |
| | | Image 2 | IM2 |
| | | Image 3 | IM3 |
| | | Image 4 | IM4 |
| QFZ | Freeze status | | <off_on> |
| Q$L | Lamp run time | | <acctch> |
| QSH | AV mute function status | | <off_on> |
| QKS | Keystone correction status | | <pl> |
| QTE | Color temperature adjustment status | | <color temp> |

**NOTE: If a wrong command is received, the projector will send an ER401 command to the computer.**

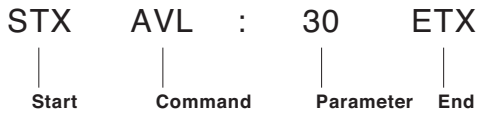
### Parameter format

| Parameter format | Size (Byte) | Definition |
|---|---|---|
| <pl> | 3 (1 or 2 bytes also possible when under control) | Decimal without signs: 0 to 999 (000, 001, 002...999)<br>Decimal with signs: -99 to +99 (-99...-01, +00, +01, +02...+99)<br>Callback from the projector is 3 Byte. |
| <off on> | 1 | 0 = off, 1 = on |
| <input signal> | 3 | HD1 = HDMI, RG1 = computer 1, RG2 = computer 2, VID = video, SVD = S-Video |
| <power condition> | 3 | 000 = power off (standby mode off), 001 = power on (standby mode on) |
| <lamp condition> | 1 | 0 = standby, 1 = lamp on under control, 2 = lamp on, 3 = lamp off under control |
| <acctch> | 4 | Decimal without signs: 0000–9999 hours |
| <color temp> | 1 | 11 = ultra-low, 0 = low, 1 = standart, 2 = high |

**NOTE: If a wrong command is received, the projector will send an ER401 command to the computer.**

### Command example

To set the volume to +30, send the command as shown below.

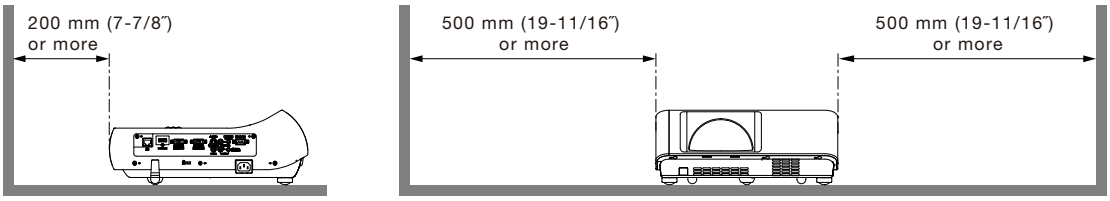



**NOTE: When sending commands without parameters, a colon (:) is not necessary.**

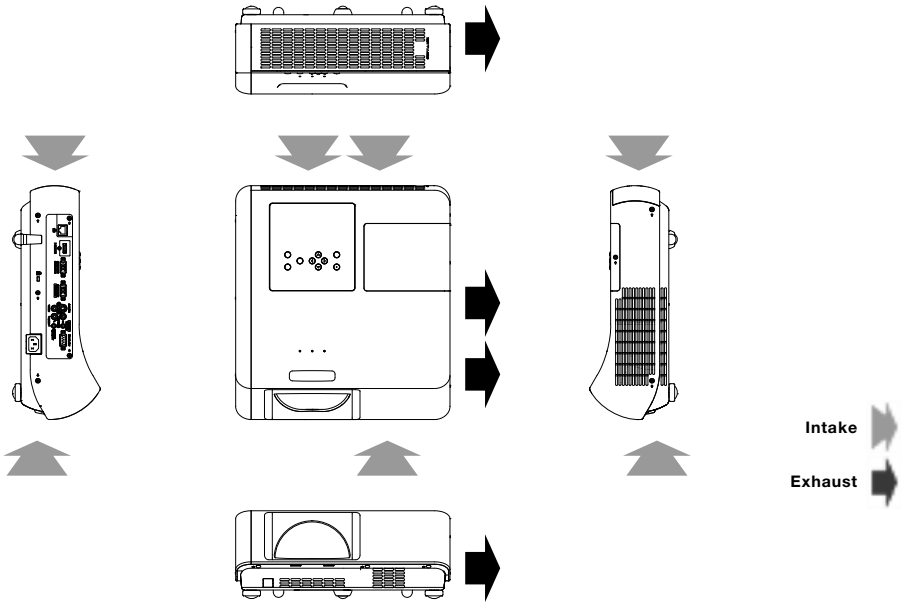
**Notes on projector placement and operation**

The projector uses a high-wattage lamp that becomes very hot during operation. Please observe the following precautions.

1. Never place objects on top of the projector while it is operating.
2. Make sure there is the unobstructed space as shown below or more around the projector's exhaust openings. In addition to this space, also ensure that there is a sufficient work space for removing and installing the lamp, air filter and other parts.
3. Make sure that nothing blocks the projector's air intake and exhaust openings. Also, install the projector so that cool or hot air from other air conditioning equipment does not flow directly toward the projector's air intake or exhaust openings.
4. Do not install the projector in an enclosed space. If it is necessary to install it in an enclosed space, add a separate ventilation system. If ventilation is insufficient, hot air will accumulate at the intake opening. This may cause the projector's protective circuit to interrupt projector operation.




**Direction of air intake and exhaust**




**Operating the projector continuously**

1. If the projector is to be operated continuously 6 hours or more, lamp replacement cycle duration becomes shorter.
2. The lamp replacement cycle duration becomes shorter if the projector is operated repeatedly for short periods (one hour or less).