# K-LINE
# INDUSTRIAL KEYBOARDS

## TECHNICAL OVERVIEW

### Description and Application

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# A. GENERAL INFORMATION

K-Line keyboards are robust and durable input devices intended for applications (e.g. factory automation) in mechanically and chemically stressful environments. Omron's B3F short-travel mechanical keyswitches covered by protective embossed polyester membrane provide a good tactile feedback when typing, as well as a high functional reliability. The front side is resistant to dust, moisture, alcohol, diluted acids, diluted alkalis, esters, hydrocarbons, ketones and household cleaning agents, what makes K-Line keyboards also applicable in hygiene-critical environments.

## A.1. Highlights

FEATURES

- compact keyboards with 101/102 or 104/105 keys
- various national/county layouts available
- integrated pointing devices: trackball or touchpad
- desktop, panel-mount and rack-mount versions
- Omron's B3F short-travel mechanical keyswitches
- water-protected from the front
- USB or PS/2 interface
- supported by generic drivers
- programmable keys with enable/disable function
- implemented "Protect" function provides several access levels (security)

APPLICATIONS

- industrial control panels
- Point-of-Information terminals/ kiosks
- instrumentation & control consoles

PROGRAMMABILITY

- all keys are programmable (default is selected national layout)
- individual key enable/disable function
- different access levels protected by passwords

VERSATILITY

- desktop versions (K**5**4y)
- rack-mount versions (K**6**4y) for standard industrial racks (95 TE x 4 HE) – associated bolts and nuts are enclosed within the packaging
- panel-mount versions (**K**84y) for permanent installation in a control panel – fixing bolts are inserted in the front metal mask
- different national layouts
- optional pointing devices: trackball or touchpad

## A.2. Versions (Variants)

### A.2.1. Desktop Versions

**Figure 1. Standard Layout (K545)**

**Figure 2. Standard Layout with Integrated Touchpad (K547)**

**Figure 3. Compact Layout with Integrated Touchpad (K548)**

### A.2.2. Rack-Mount and Panel-Mount Versions

**Figure 4. Standard Layout (K645 and K845)**

**Figure 5. Compact Layout with Integrated Touchpad (K648 and K848)**

**Figure 6. Standard Layout with Integrated Touchpad (K647 and K847)**

**Figure 7. Standard Layout with Integrated 38 mm Trackball (K642 and K842)**

## A.3. National Layouts

Standard offering includes two national layouts: US English and German. Other national layouts are available on request, as a customization. An example layout is shown in the Figure 8 below.

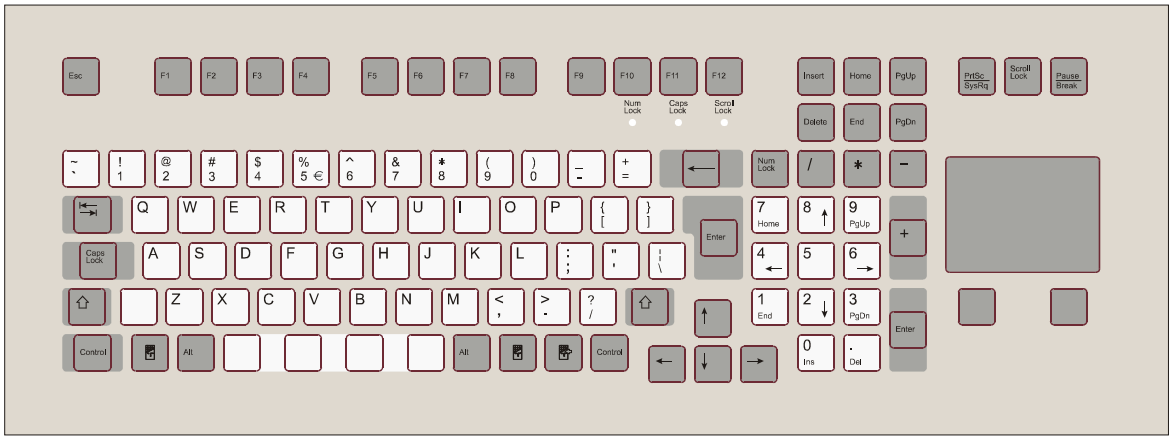

**Figure 8. K847 – US English Layout**

## A.4. Technical Characteristics

ELETRICAL

- **power supply**: 5V ± 5% (from USB or PS/2 interface)
- **current consumption (PS/2 interface)**: see Table 1 below for details**:**
  - keyboards without a pointing device: up to 35 mA (20 mA$_{TYP}$)
  - keyboards with integrated touchpad: up to 45 mA (25 mA$_{TYP}$)
  - keyboards with integrated trackball: up to 55 mA (35 mA$_{TYP}$)

- **current consumption (USB interface)**: see Table 1 below for details**:**
  - keyboards without a pointing device: up to 65 mA (40 mA$_{TYP}$)
  - keyboards with integrated touchpad or trackball: up to 100 mA (70 mA$_{TYP}$)
- **interface connectors (at the computer end of the cable):**
  - mini DIN 6 (PS/2 keyboards without a pointing device)
  - 2 x mini DIN 6 (PS/2 keyboards with a pointing device)
  - USB A (all USB keyboards)

| | *Typical current consumption [mA]* | |
|---|---|---|
| | *PS/2 interface* | *USB interface* |
| **K545** | 20 | 40 |
| **K645** | 20 | 40 |
| **K845** | 20 | 40 |
| **K547** | 25 | 70 |
| **K647** | 25 | 70 |
| **K847** | 25 | 70 |
| **K548** | 25 | 70 |
| **K648** | 25 | 70 |
| **K848** | 25 | 70 |
| **K642** | 35 | 70 |
| **K842** | 35 | 70 |

**Table 1. Typical Current Consumption**

MECHANICAL

- **casing**: plastic polystyrene, light-grey colour RAL 9002
- **net dimensions** (W/D/H) [mm]: see Table 2 below for details
- **weight** [g]: see Table 2 below for details
- **protection (sealing) grade**: according to EN 60529
  - desktop versions: IP 40 (IP 65 from the front)
  - rack and panel-mount versions: up to IP 65 (depending on the integration)

| | *Dimensions [mm]:* | *Weight [g]:* |
|---|---|---|
| **K545** | 370.0 x 180.0 x 28.0 | 1750 |
| **K645** | 482.6 x 177.8 x 42.5 | 1290 |
| **K845** | 482.6 x 177.8 x 42.5 | 1290 |
| **K547** | 478.5 x 180.0 x 28.0 | 2260 |
| **K647** | 482.6 x 177.8 x 42.5 | 1480 |
| **K847** | 482.6 x 177.8 x 42.5 | 1480 |
| **K548** | 370.0 x 180.0 x 28.0 | 1850 |
| **K648** | 482.6 x 177.8 x 42.5 | 1390 |
| **K848** | 482.6 x 177.8 x 42.5 | 1390 |
| **K642** | 482.6 x 177.8 x 38.0 | 1490 |
| **K842** | 482.6 x 177.8 x 38.0 | 1490 |

**Table 2. Dimensions and Weight**

ENVIRONMENTAL

- **operating ambient temperature range**: 0°C to +40°C
- **storage ambient temperature range**: -10° C to +50°C
- **relative humidity range**: 10% to 90% (non-condensing)

# B. INTEGRAL PARTS AND FUNCTIONALITY

## B.1. Keyswitches

All keys in industrial keyboards utilize Omron B3F-4005 short travel mechanical keyswitches with a fair tactile feedback and long lifetime.

- **model:** Omron B3F-4005
- **key travel:** $0.3\ ^{+0,2}/_{-0,1}$ mm
- **lifetime:** $1\times10^6$ operations (minimal)
- **actuating force:** 255 ± 69 cN

## B.2. Metal Mask

The metal mask (made of a 1.5 mm thick soft steel) is affixed to the PCB to improve overall mechanical properties (hardness, strength, toughness) of the keyboard as well as to provide a smooth surface to glue the protective membrane.

## B.3. Protective Membrane

K-Line keyboards are protected with a membrane which is glued on top of the metal mask. The membrane is made of a high-quality textured polyester film printed with a layout and thermally embossed. It is resistant to chemicals, abrasion and scratches and has a long flex life.

- **material:** AUTOTEX® V150
- **colour**: Pantone Warm Grey 2C
- **thickness:** 150 μm ± 10%
- **switch life:** $5\times10^6$ flexes (typical)
- **tensile strength:** 160 MPa - 250 MPa
- **pencil hardness:** 2H
- **dielectric strength:** 15 kV
- **chemical resistance:** diluted acids, diluted alkalis, esters, hydrocarbons, ketones, household cleaning agents

## B.4. Pointing Devices

### B.4.1. Touchpad (Kx47, Kx48)

Industrial keyboards (Kx47-xxx and Kx48-xxx) comprise the Cirque's TSM 9925 capacitive touchpad:

- **model:** Cirque TSM 9925
- **active area:** 62.5 × 46.5 mm
- **resolution:** 40 counts/mm
- **sample rate:** 100 samples/s
- **lifetime:** $1 \times 10^7$ strokes (500 km) (typical)

### B.4.2. 38mm Trackball (Kx42)

Industrial keyboards (Kx42-xxx) comprise the Cursor Controls' trackball:

- **model:** Cursor Controls P38
- **ball size:** Ø38.10 mm (1½")
- **protection (sealing) grade:** IP65 (statically)
- **resolution (nominal):** 241 pulses per ball revolution
- **ball material:** Thermoset Phenolic

## B.5. Connection

### B.5.1. USB

USB industrial keyboards (Kxxx-xx**U**) incorporate a captive (affixed) cable with the USB (Type A) connector at the computer end (to be connected into a downstream port of a USB hub).

### B.5.2. PS/2 (without a pointing device)

PS/2 industrial keyboards without a pointing device (Kxxx-xx**5**) incorporate a captive (affixed) cable with Mini DIN 6 (PS/2) connector at the computer end (to be connected into a PS/2 keyboard port).

### B.5.3. PS/2 (with a pointing device)

PS/2 industrial keyboards with integrated pointing device (Kxxx-xx**9**) incorporate a captive (affixed) cable with two Mini DIN 6 connectors at the computer end (one to be connected into a PS/2 keyboard port, another into a PS/2 mouse port).

## B.6. Drivers

K-Line keyboards do not require proprietary drivers to operate, but rather generic PS/2 or USB HID drivers (keyboard and mouse) of the operating system in use.

## B.7. Packaging

See Table 3 below for package content, approximate dimensions and weight.

| | *Dimensions [mm]:* | *Weight [g]:* | *Content:* |
|---|---|---|---|
| **K545** | 394 x 229 x 70 | 2000 | keyboard |
| **K645** | 505 x 186 x 45 | 1475 | keyboard, rack fixing bolts and nuts (4 pieces) |
| **K845** | 505 x 186 x 45 | 1475 | keyboard |
| **K547** | 508 x 238 x 58 | 2410 | keyboard |
| **K647** | 505 x 186 x 45 | 1665 | keyboard, rack fixing bolts and nuts (4 pieces) |
| **K847** | 505 x 186 x 45 | 1665 | keyboard |
| **K548** | 394 x 229 x 70 | 2100 | keyboard |
| **K648** | 505 x 186 x 45 | 1575 | keyboard, rack fixing bolts and nuts (4 pieces) |
| **K848** | 505 x 186 x 45 | 1575 | Keyboard |
| **K642** | 508 x 238 x 58 | 1735 | keyboard, rack fixing bolts and nuts (4 pieces) |
| **K842** | 508 x 238 x 58 | 1735 | keyboard |

**Table 3. Packaging**

## B.8. Physical Integration

Technical drawings of all K-Line keyboards are available for download from Tipro Internet site at http://www.tipro.net/support/technical-documenation/technical-drawings/

# C. ORDERING CODES

| 1 | 2 | | 3 | 4 | 5 | | 6 | | 7 |
|---|---|---|---|---|---|---|---|---|---|
| **K** | **5** | **45** | - | **B** | **T** | **U** | - | **US** | - xxx |

**K** : Industrial keyboard (**K**-Line)

**1 – Mounting/Integration Method**

5 : Desktop
6 : Rack-Mount
8 : Panel-Mount

**2 – Keyboard Type (Layout)**

42 : Standard layout with built-in 38 mm trackball
45 : Compact layout
47 : Standard layout with built-in touchpad
48 : Compact layout with built-in touchpad

**3 – Keyswitch Technology**

B : Omron B3F-4005

**4 – Housing**

0 : Panel-Mount or Rack-Mount version without back cover
C : Panel-Mount or Rack-Mount version with back cover
T : Desktop version in plastic housing

**5 – Interface & Cable Connector(s)**

5 : PS/2 - MiniDIN6
9 : PS/2 - MiniDIN6 for keyboard + MiniDIN6 for pointing device
U : USB - USB Type A

**6 – National (County) Layout**

**Standard:**
US : US English
DE : German
GB : GB English
SI/HR : Slovenian/Croatian

**Upon request:**
BE : Belgian
CH : Swiss (French/German)
DK : Danish
ES : Spanish
FR : French
NO : Norwegian
SE/FI : Swedish/Finish

**7 – Custom Version**

Three-digit number reserved for product customizations. It is omitted in case of standard version.

# D. REFERENCES

**1.** "INDUSTRIAL KEYBOARDS" – Technical Specification
**2.** "ChangeMe" – User's Manual
**3.** "Security/Protect Feature" – Technical Overview

# E. NOTICES

## E.1. Disclaimer

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