K-LINE
INDUSTRIAL KEYBOARDS

TECHNICAL OVERVIEW

Description and Application

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TIPRO
keyboards focusing on your future needs.

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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 38mm 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.

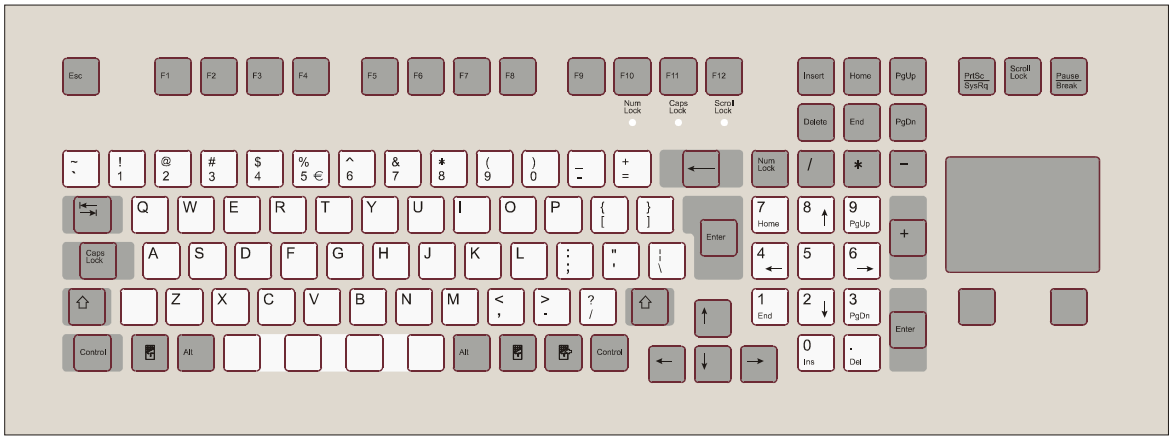

Figure 8. – K847 – US English Layout

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:** 1×10^6 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:** 5×10^6 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:** 1×10^7 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/Documentation.html

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

Upon request:
UK : UK English
FR : French
CH : Swiss (French/German)
DK : Danish
ES : Spanish
NO : Norwegian
BE : Belgian
SE/FI : Swedish/Finish
BE : Belgian
SI/HR : Slovenian/Croatian

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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