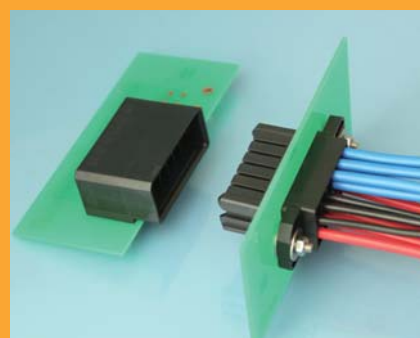
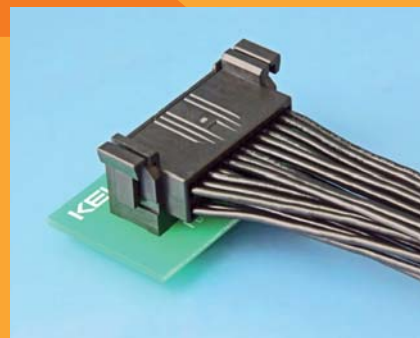
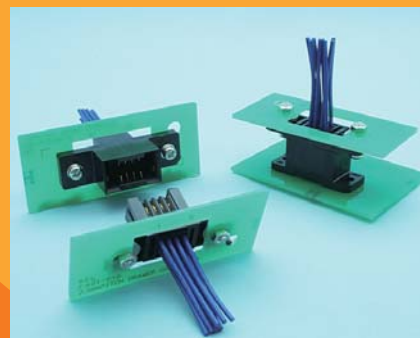


# KEEL

## CRIMP CONNECTORS HANDBOOK



# Crimp connectors

## Crimp connectors full of unique ideas

Crimp connectors have long been contributing to the electronics industry as electronic equipment connection. Recently, customer demands for high performance and easy to use crimp connectors have increased.

KEL is developing unique crimp connectors such as drawer connectors, side cable type connectors, and two-cable-crimp connectors. KEL also develops half-pitch crimp connectors that can be mated to conventional half-pitch connectors.

### Common features of crimp connectors

#### Surface contact in connection part

KEL crimp connector contact is composed from rolled surface of copper material and therefore has a smooth surface with a small friction coefficient.

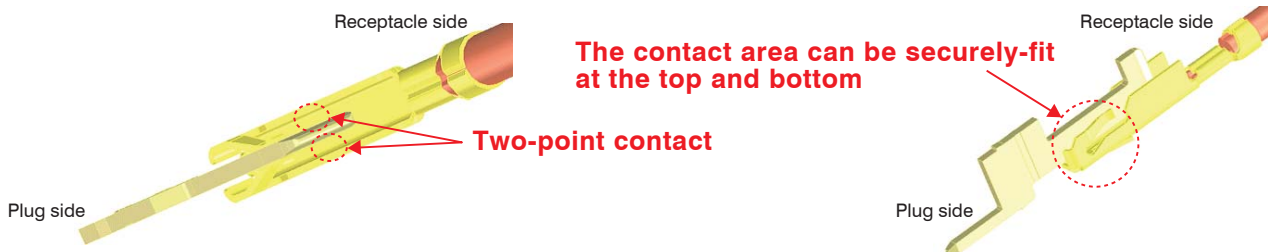
#### Reliable gold plating

Excellent mating durability gives a feeling of smooth insertion and withdrawal. The thick plating type appropriate for multiple insertions and withdrawals are also available.

#### Pinching two-point contact structures

KEL pinching two-point contact structures has the excellent contact reliability and security-fit structure. This contact structures can prevent instantaneous disconnection.

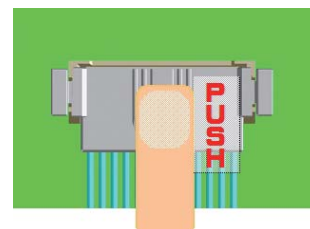
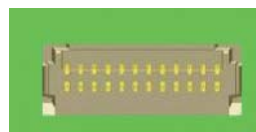
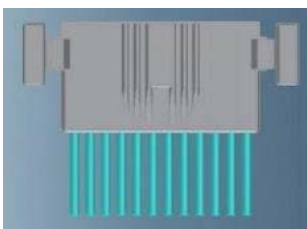
\* Not applicable to 8929E



#### Original locking mechanism

KEL's unique easy-to-use locking system, such as E-lock and eject lock.

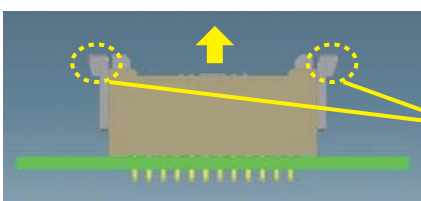
##### At mating



Mate from the top with the aligned orientation

Push in the center of the upper surface of the connector to realize secure mating

##### At withdrawal




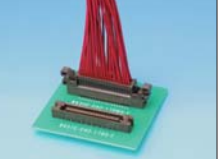


E-Lock mechanism

Grasp both ends of the E-lock, push up, and then pull out

The E-lock structure improves the operability of mating. It enhances the connection stability.

## Product list

		FA	FAS	FBC	FTC	8929E
Series name						
Pitch		2.5 mm	1.5 mm	2.0 mm	5.08 mm	1.27 mm
Number of contacts		4 ~ 40	4 ~ 40	26 ~ 40	12, (20)	30 ~ 68
Contact number type *1		18	19	3	1	5
Connection Type	Right Angle	—	—	—	○	○
	Straight	○	○	○	○	○
	Relay	○	○	—	△	—
Current rating *2		3 A	1.5 ~ 3.0 A	3 A	7 ~ 16 A	1 A
Mounting Type		DIP	DIP	DIP	DIP	DIP / SMT
Lock mechanism		—	—	E-Lock	Lock-type available	Eject lock
Drawer mechanism		○	○	—	○	—
Insertion and extraction durability		2,000	2,000	20	500	500
Operating temperature		-40°C ~ +85°C	-40°C ~ +85°C	-40°C ~ +85°C	-55°C ~ +105°C	-40°C ~ +85°C

\*1 Products with more poles and different pole-number types are being added. Please consult a KEL sales representative.

\*2 It is possible to design a current capacity exceeding the standard current rating depending on pin count & cable size. Please contact your local KEL sales office.

## Application

### Application Examples

Crimp connectors are widely used for connection between electronic devices. Within KEL, they are employed in many applications such as power-generation equipment, ATM, ticket machines, electronic appliances, and office automation equipment.



MFP



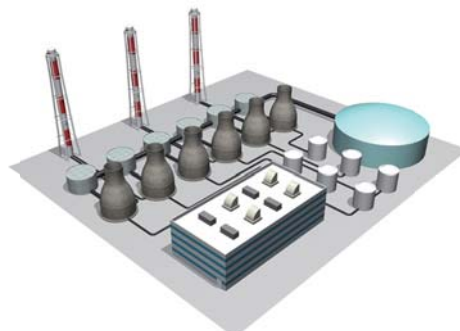
ATM



Semiconductor Manufacturing Machine



Ticket Gate



Power Plant

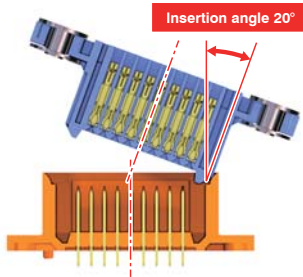


Elevator

# Drawer connectors

## What is a drawer connector?

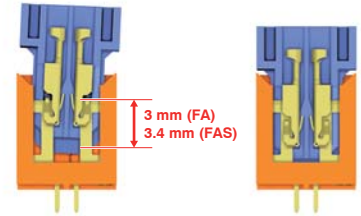
The term "drawer" means drawer such as that of a chest of drawers. Drawer connectors are used for unit-to-unit connection, such as connection between the opening and closing panel to that of the main body, in electric appliances such as copiers, printers, gaming equipment, multifunction printers, and fax machines. In principle, because drawer connectors are often used for connecting parts that are not visible, easy mating and strength are required. Therefore, the guiding function of mating, the floating function, and sufficient mating length have been achieved.



- The guiding angle of 20° realizes smooth mating. Drawer connector housings are fitted each other until plug and receptacle contacts are aligned, then after, the electrical contact mating is performed. Contact deformation and buckling can be prevented.



- There is a floating mechanism with a special ring that absorbs location errors during and after mating.

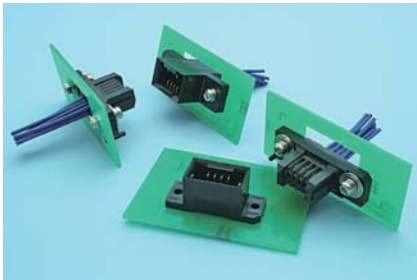


- Effective mating length  
FA Series: 3 mm  
FAS Series: 3.4 mm

## 2.5-mm-pitch drawer connector

### FA Series

FA series is the drawer connector of 2.5mm pitch. FA Series has the features of pin buckling prevention, easy mating adjustment, reduced stress at mating, and contact reliability. In addition, the contact uses a unique pinching two-point contact structure. FA series provides wide variations of pin counts and mating patterns.

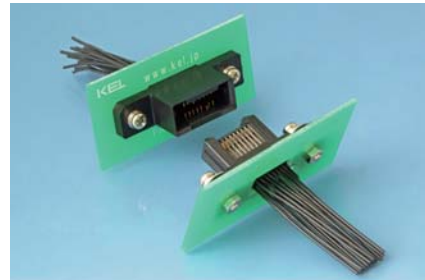


Insulator material	Glass-filled PBT(UL94V-0), Black
Contact material	Copper alloy
Contact plating	(Contact / Terminal area) Gold over Nickel (Crimping area) Tin over Nickel
Washer / Rivet material	Stainless steel
Current rating	3 A per contact
Contact resistance	30 mΩ max.
Dielectric withstanding voltage	650 V AC for 1 minute
Insulation resistance	1000 MΩ min. at 500V DC
Operating temperature	-40°C to +85°C
Recommended cable	Discrete wire cables AWG #22/24/26/28
Durability of insertion and withdrawal	2,000 times * Multiple insertion and extraction types are also available. Please consult a KEL sales representative. FA01/FA12 mating: 7,000 times. FA01/FA11 mating: 5,000 times.
Mounting type (Board side)	DIP

## 1.5-mm-pitch drawer connector

### FAS Series

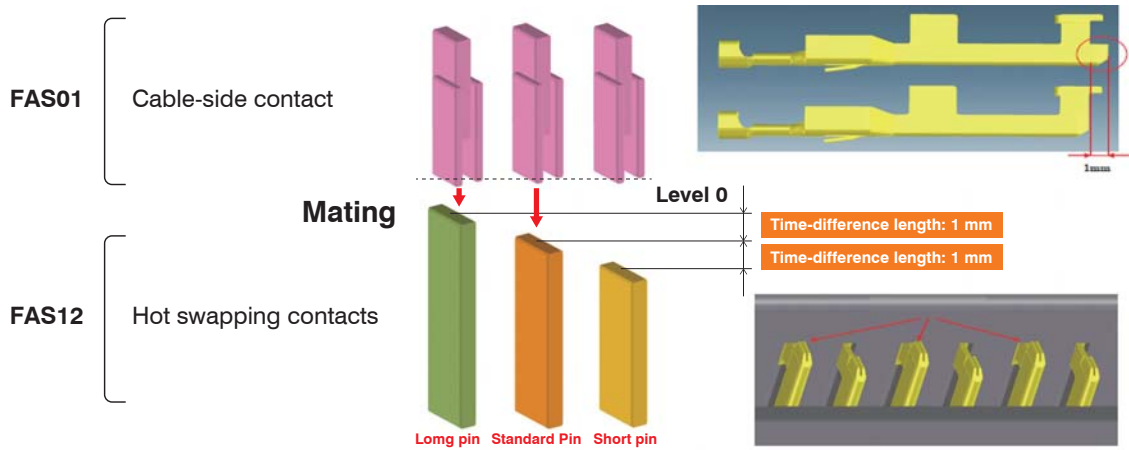
FAS series inherits the same design concept of FA series, such as sufficient resistance to pin buckling, easy mating adjustment, reduced mating stress, and high reliability, but miniaturized with 1.5 mm pitch. A reduction of over 30% in occupied board area has been realized compared to FA series.



Insulator material	Glass-filled PBT(UL94V-0), Black
Contact material	[FAS01/12] Copper alloy [FAS11] Brass
Contact plating	[FAS01/12] (Contact area) Gold over Nickel (Crimping area) Tin over Nickel [FAS11] Gold over Nickel
Washer / Rivet material	Stainless steel
Current rating	1.5 to 3 A per contact
Contact resistance	30 mΩ max.
Dielectric withstanding voltage	650 V AC for 1 minute
Insulation resistance	1,000 MΩ min. at 500 V DC
Operating temperature	-40°C to +85°C
Recommended cable	Discrete wire cable AWG #24/26/28
Durability of insertion and withdrawal	2,000 times * Multiple insertion and extraction types are also available. Please consult a KEL sales representative. FAS01/FAS12 mating: 7,000 times. FAS01/FAS11 mating: 5,000 times.
Mounting type (Board side)	DIP

## Features of the FAS Series, relay type

Compatible with three-stage hot swapping (time-difference) contacts ⇒ Can be set at any place.



## FA Series Product List

No. of contacts	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	38	40
FA01	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
FA11	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
FA12	—	○	○	—	○	—	○	—	○	—	○	—	—	—	—	○	○	○

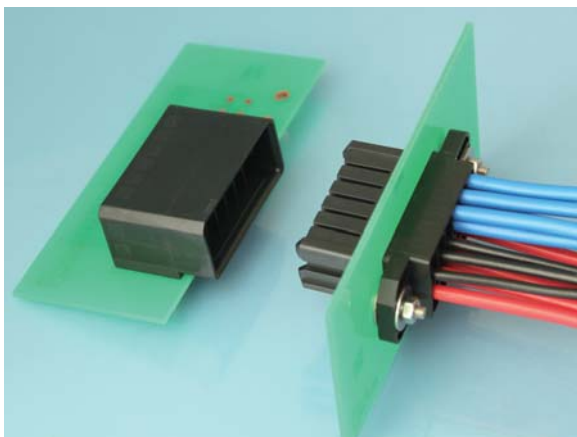
## FAS Series Product List

No. of contacts	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
FAS01	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
FAS11	○	—	—	—	—	—	○	—	—	—	—	○	○	—	—	—	○	○	○
FAS12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

## 5.08-mm-pitch drawer connector for crimping two cables

### FTC Series

The unique feature of FTC series is that it can crimp two cables to one terminal. One-cable crimp and two-cable crimp can be attached to any part of the housing and can be used in parallel. There are merits such as reduced number of pins used for the connector and ability to transmit power without using a terminal block. Mating is easy because of the drawer mechanism. It has the pinching two-point-contact structure. FTC Series also has lock-type connectors. FTC series relay-type is under development.



Insulator material	Glass-filled PBT(UL94V-0), Black
Contact material	Copper alloy
Contact plating	[FTC01/02] (Contact area) Gold over Nickel (Crimping area) Nickel [FTC11] (Contact / Terminal area) Gold over Nickel
Current rating *1	7 to 16 A per contact
Contact resistance	10 mΩ max.
Dielectric withstanding voltage	2,200 V AC for 1 minute
Insulation resistance	1,000 MΩ min. at 500 V DC
Operating temperature	-55°C to +105°C
Recommended cable	Discrete wire cable AWG #14/16/18/20
Durability of insertion and withdrawal	500 times

\*1 It is possible to design a current capacity exceeding the standard current rating depending on pin count & cable size. Please contact your local KEL sales office.

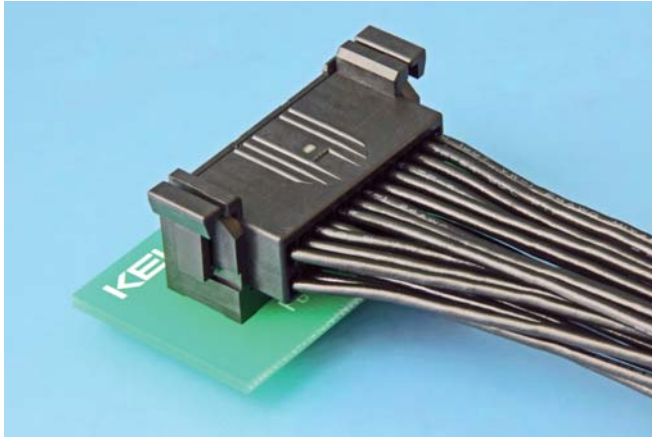
## FTC Series Product List

No. of contacts	12	20	No. of contacts	12	20
FTC01	○	—	FTC11-L	○	○
FTC02	○	○	FTC11-S	△	—

## 2.0-mm-pitch crimp connector, side cable type

### FBC Series

FBC series is a board-to-cable connector of 2.0 mm pitch side cable type with stack connection. By adopting a side cable type, the direction of connector mating and the direction of cable extension are different. This prevents the cable to be easily pulled out and reduces excessive stress due to cable movement. FBC series is equipped with KEL's unique E-lock mechanism, improving the operability of insertion and withdrawal and the connection stability. FBC series employs the pinching two-point-contact structure.

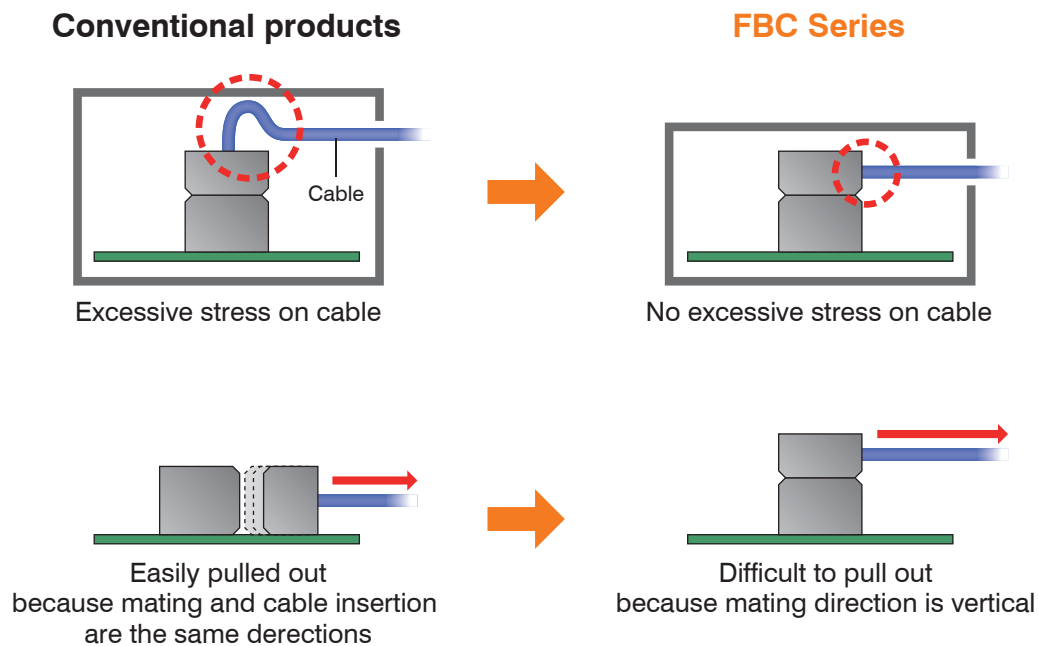


Insulator material	Glass-filled Nylon 66(UL94V-0), Black
Contact material	[FBC02] Copper alloy [FBC11] Brass
Contact plating	[FBC02] (Contact area) Gold over Nickel (Crimping area) Tin over Nickel [FBC11] Gold over Nickel
Current rating	3 A per contact
Contact resistance	40 mΩ max.
Dielectric withstanding voltage	650 V AC for 1 minute
Insulation resistance	1,000 MΩ min. at 500 V DC
Operating temperature	-40°C to +85°C
Recommended cable	Discrete wire cable AWG #22/24/26
Durability of insertion and withdrawal	20 times

#### FBC Series Product List

No. of contacts	26	36	40
FBC02	○	○	○
FBC11	○	○	○

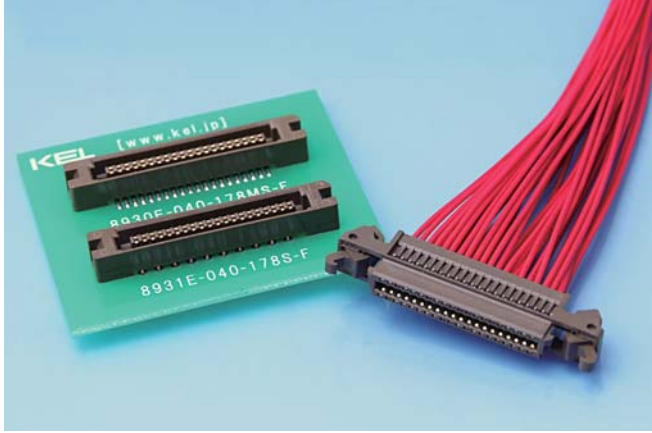
#### Features of FBC series stack-connection and side cable type



# 1.27-mm-pitch crimp connector

## 8929E Series

Crimp cable connectors for the 89 Series (1.27 mm pitch), one of KEL's long-selling products. 8929E series are equipped with KEL's original eject-lock mechanism with high operability, the same as 8925E series. The corresponding board-side connectors are 8930E or 8931E series, which are common mating partners of the 8925E series. 8930E and 8931E board-side connectors can be mated with 8900 series board to board connector series.



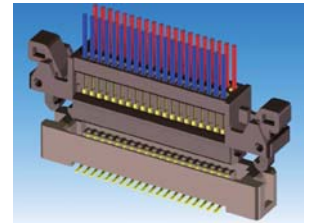
Insulator material	Glass-filled Nylon 66(UL94V-0), Brown
Contact material	Copper alloy
Contact plating	(Contact area) Gold over Nickel (Crimping area) Tin over Nickel
Current rating	1 A per contact
Contact resistance	50 mΩ max.
Dielectric withstanding voltage	300 V AC for 1 minute
Insulation resistance	1,000 MΩ min. at 250 V DC
Operating temperature	-40°C to +85°C
Recommended cable	Discrete wire cable AWG #26/28/30
Durability of insertion and withdrawal	500 times

### 8929E Series Product List

No. of contacts	30	40	50	60	68
8929E	○	○	○	○	○
8930E	○	○	○	○	○
8931E	○	○	○	○	○

### Equipped with the eject-lock mechanism

KEL eject lock mechanism has the lock system that can be attached and detached by pinching both end with one hand, improving the operability and connection stability.



### 89 series various mating combinations

8929E series uses 8930E/8931E series as board side connectors which are the board-side connectors of 8925E series.

8930E/8931E series also can mate with board-to-board connectors 8903/8903N-FS series.

For combined connection designs, both 8900 series cable side connectors and 8900 series board side connector can be used with the same 8930E/8931E series in common.



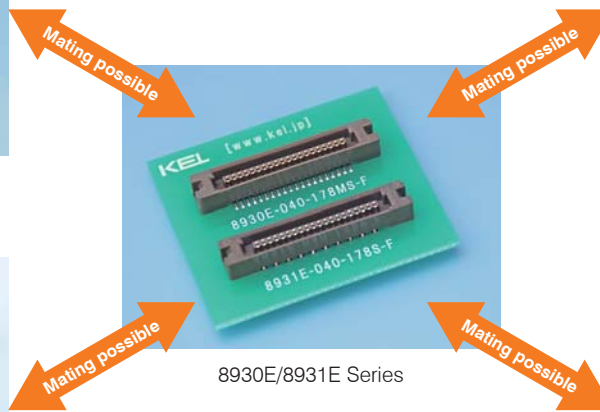
8929E Series



8903 Series  
\* Straight type only



8925E Series



8930E/8931E Series



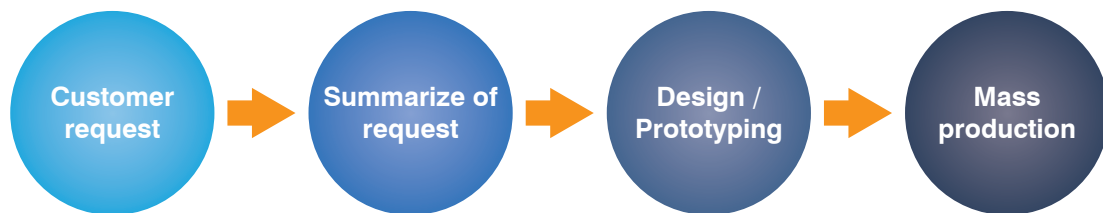
8903N-FS Series

## KEL custom harness

KEL provides the complete wire harness products, which are cable connectors assembled in accordance with the customer's requested specifications. KEL also supports the overall design of harnesses with crimp connectors. The management and procurement of various cables and other necessary components are handled by KEL. Furthermore, KEL ensures the quality of the harness product in their support of customers. KEL provides wire harness products that flexibly respond to customer's demands, utilizing the merit and expertise of a connector manufacturer and their own extensive experience and achievements in the wire harness business.



### Customized harnesses process



### KEL Company Profile

Trade Name : KEL CORPORATION  
 Established : July 23, 1962  
 Total Capital : 1,617 Million Yen  
 President : Etsuro Doi  
 Head Office : 6-17-7 Nagayama, Tama,  
 Address Tokyo 206-0025, Japan  
 URL : www.kel.jp

#### Sales Offices

- Head Office (Tama, Tokyo)
- Utsunomiya Sales Office (Utsunomiya, Tochigi)
- Mito Sales Office (Hitachinaka, Ibaraki)
- Nagoya Sales Office (Nagoya, Aichi)
- Osaka Sales Office (Osaka, Osaka)

#### Factories

- Yamanashi Factory (Nishi-Yatsushiro, Yamanashi)
- Nagano Factory (Kita-azumi, Nagano)
- Minami-Alps Factory (Minami-Alps, Yamanashi)

[www.kel.jp/english/](http://www.kel.jp/english/)

KEL serves systems from connectors to racks.

**KEL CORPORATION**

### Global Network



More Information  
[https://www.kel.jp/english/feature/fafas\\_lp\\_2](https://www.kel.jp/english/feature/fafas_lp_2)