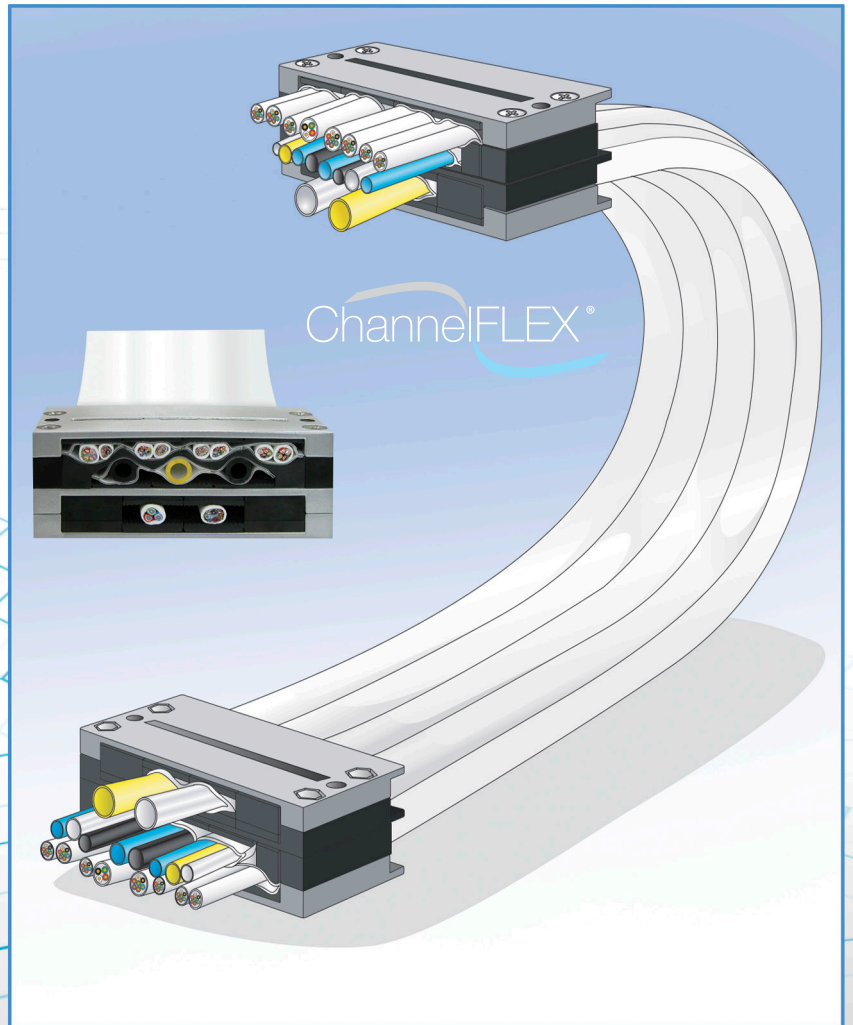


## ChannelFLEX™ Flat Cable Solutions

Self-Supporting Suitable for  
Medical, Semiconductor and  
Display Clean Rooms



1

## ChannelFLEX® Benefits

### 1. Self Supporting

ChannelFLEX™ is a unique cabling solution that permits the owner to safely run cables and/or hoses in flat pods, from Point A to Point B, without concerns of binding or kinking. ChannelFLEX™ utilizes an internal structure that supports the entire construction and eliminates the need for C-track in assembled form. ChannelFLEX™ reduces installation time, minimizes cable related downtime, and ensures maximum performance of the applications operating over it.

### 2. Pod Based Designs

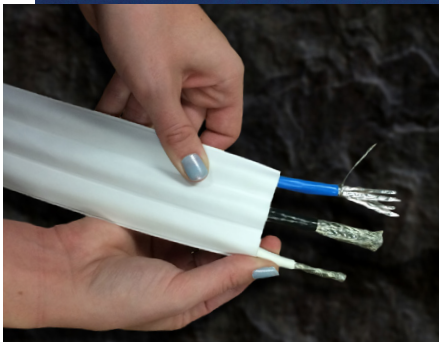
C-track material, when flexed, generates particulates. ChannelFLEX™ utilizes enclosed pods made from ultra-low friction material that encapsulate and trap unwanted particulate. ChannelFLEX™ pods are designed to accommodate a number of cables and/or tubes carrying gases or liquids.



### 3. High Flex

ChannelFLEX™ is designed for long and predictable flex life applications (up to 30,000,000 cycles or more for some cables).





Laminated design shown above.

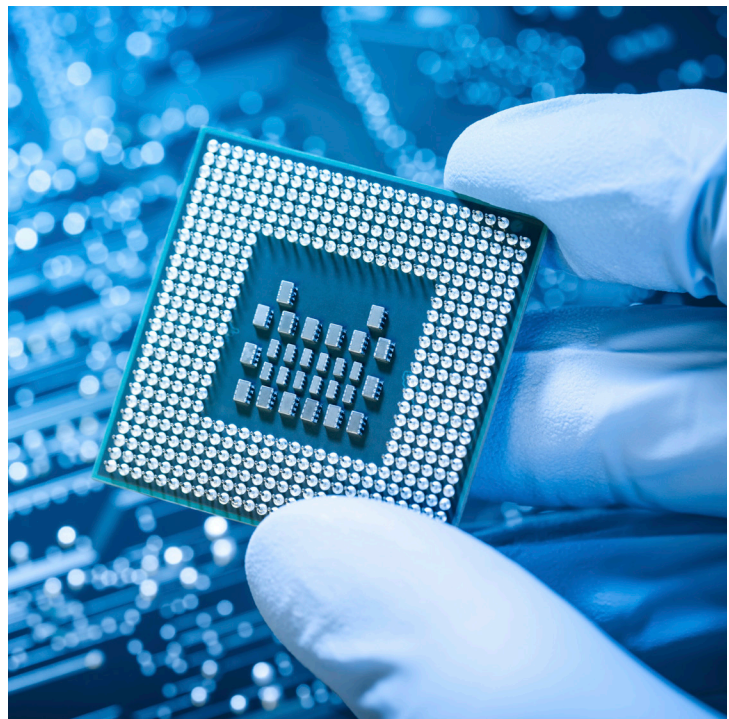
## 4. Custom Design Options

The quantity of pods in the ChannelFLEX™ link can also be customized. You can have individual or multiple cables per pod. If desired, a self-supporting non-metallic chain can be inserted into a pod to allow the link to maintain a minimum bend radius. This feature ensures cable and tube bend radius minimums are not exceeded.

- Pod layers can be stacked.
- Custom pod cable quantity & pod width.
- Factory configured cable for large quantities in a laminated design.
- We can populate pods for you.
- Multiple bend radius options.

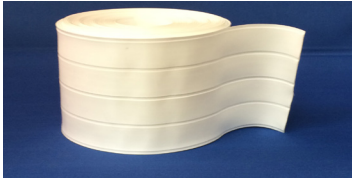
## 5. Cleanroom Applications

ChannelFLEX™ protects the environment in which it is used. The pods trap and hold any particulate released by the flexing cables and tubes within. And, since the ChannelFLEX™ link is IPA Class 1 rated for particulate emissions, it can be used in cleanroom environments, such as those in medical or semiconductor manufacturing.



<b>Maximum Stroke Life:</b>	SM R40: 1,200mm, SM R70: 2,000mm, SM R100: 2,500mm, SM R130: 2,800mm
<b>Maximum Length of Cable:</b>	8,000mm
<b>Minimum Bend Radius:</b>	R.40mm
<b>Maximum Velocity:</b>	2m/sec
<b>Maximum Acceleration:</b>	4G
<b>Flex Life:</b>	Up to 30 million cycles (varies depending on acceleration and supporting member)
<b>Ambient Temperature:</b>	-10°C to +80°C
<b>Cable Diameter:</b>	3mm - 10mm
<b>Cable Types Available:</b>	I/O, Encoder, IEEE 1394, Ethernet, Power, Video, Pneumatic Tubes
<b>Cleanroom:</b>	IPA Class 1
<b>Cable Certifications:</b>	CE & UL

## 3 ChannelFLEX™ Options



### **ChannelFLEX™ options make it easy!**

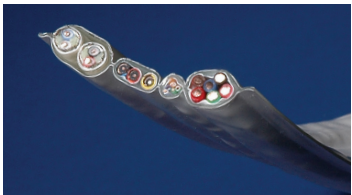
#### **Option 1: Pod material only**

You can buy rolls of pod material configured to your specifications. See page 6 for pod options.



#### **Option 2: Application cables only**

You can purchase cables from our wide selection of ChannelFLEX™ application cables. All cables are designed to be incorporated into the ChannelFLEX™ solution but can be purchased separately. See pages 9 and 10 for more information.



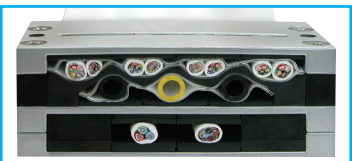
#### **Option 3: Laminated cables**

ChannelFLEX™ application cables can be encapsulated in a laminated jacket. You choose the application cables (and/or tubes) that you want and configure the order to your specifications. Hitachi Cable America (HCA) will laminate it to produce a custom laminated cable. Minimum quantities required. Laminated cables are ideal for higher volume applications where C-track is utilized or internal self-supporting chains are not required. Minimum quantity of 5,000 feet (1524 meters) or more required. See page 5 for more information.



#### **Option 4: Pods & cables**

Choose the number of pods you want, the application cables (and/or tubes) you want and how you want them configured. You can then choose to build your assembly yourself with HCA providing you the materials, or you can have HCA build it for you. For pod options see page 6 and application cable options see pages 9 & 10.



#### **Option 5: Pods, cables & clamps (non-connectorized assembly)**

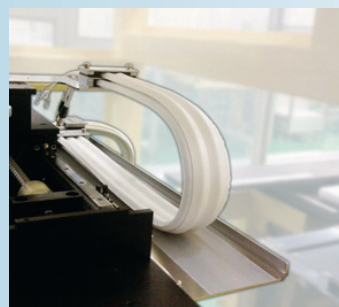
Choose the number of pods, the application cables (and/or tubes) and HCA will build your ChannelFLEX™ cables and install the clamps per your specifications. See page 7 for more information.



#### **Option 6: Pods, cables, clamps & terminations (connectorized assembly)**

This option includes everything necessary for a complete cable assembly. Custom built to your specifications, the ChannelFLEX™ cable comes terminated with the appropriate connectors for your application cables. See pages 6 & 7 for more information.

## Semiconductor & Cleanroom Solutions

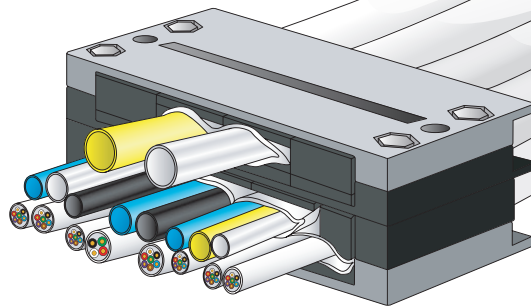
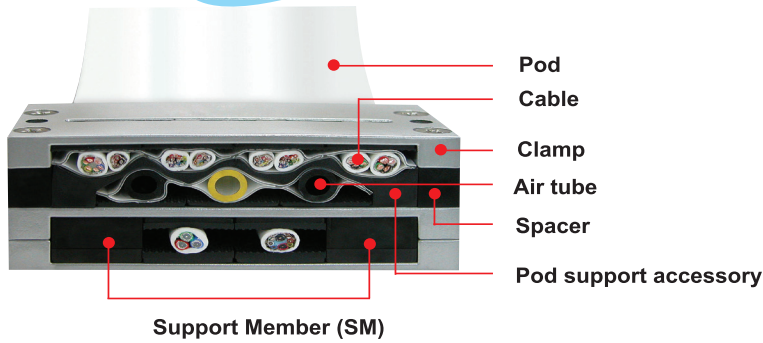


ChannelFLEX®

4

## System Overview

ChannelFLEX®



Note: Pigtail length is custom.  
Image is for representation only.

## Features

	<b>Pod</b>	<b>Fluoroplastic expanded PTFE (ePTFE). Layers bonded with thermoplastic</b>
<b>Cables</b>	<b>Conductor</b>	<b>Tinned copper wire or bare copper wire where applicable</b>
	<b>Insulation</b>	<b>Fluoroplastic (FEP, ETFE, PFA)</b>
	<b>Binder Tape</b>	<b>Fluoroplastic (ePTFE)</b>
	<b>Shield</b>	<b>Tinned copper wire or bare copper wire, dual-spiral serve where applicable</b>
	<b>Sheath</b>	<b>PVC LF (lead free)</b>
	<b>Support Member</b>	<b>Engineered plastic</b>
	<b>Clamp</b>	<b>Aluminum</b>

Note: Materials used in these products are RoHS 2 and REACH compliant.





UL Style: 21090  
 UL Voltage Rating: 300V  
 UL Temp: 150°C

## Build a Laminated Cable

- Composite laminated EPTFE outer jackets
- Eliminates migrating particulates
- Trackless construction where C-track is utilized or internal self-supporting chains are not required
- Extended flexlife construction
- Stackable configuration
- More compact configuration with custom pod shapes
- High-volume/low cost solution

**APPLICATIONS** Robotic, linear motion, pick and place, medical and pharmaceutical, wafer manufacturing and handling.

### If you want Hitachi to provide a laminated cable assembly.....

*Please provide us the following information:*

- # of pods
- the application cables to be used in each pod or sequence of pods
- overall length of the cable to be produced. Note: Minimums do apply
- desired width of pod material. For widths beyond 4 inches, please consult with HCA

Note: Self-supporting chains are not available in laminated constructions.

**PHYSICAL CONSTRUCTION DESCRIPTION** Various components are laid parallel and fully laminated with composite laminated ePTFE jacket. Each independent construction is made to specific widths and tolerance. Consult HCA for construction options. Examples are below.

Examples	Part Number Put-Up	Conductor AWG Coating Insulation	# of Conductors Pairs Pods	Shield Design	POD Jackets	Operating Temperature	All Temp Pods Shielded	Bend Radius Inch (mm)	Width Thickness
	20269-38-P-00100 100 feet (30.48 m)	26(19/38) TC 18 (65/36) BC TPE/FEP	38 16 6	All pods 90% Braid TC	TPU	-25°C/80°C	Yes	1.60 (40.64)	2.47 inches (62.73 mm) 0.135 inches (3.42 mm)
	20260-39-P-00100 100 feet (30.48 m)	26(19/38) TC 12 (19/34) TC TPE	39 13 3	All pods 90% Alloy Braid SPC	FEP/PTFE	-25°C/80°C	Yes	1.75 (44.45)	1.66 inches (42.16 mm) 0.208 inches (5.28 mm)
	20268-15-P-00100 100 feet (30.48 m)	24(19/36) TC SPC Alloy FEP	15 0 1	95% Spiral BC	TPU	-30°C/80°C	Yes	1.75 (44.45)	0.62 inches (15.74 mm) 0.135 inches (62.738mm)
	20240-21-P-00100 100 feet (30.48 m)	8(420/34) TC ETFE 20(41/36) TC ETFE 22(19/34) TC FEP 16(105/36) TC ETFE	21 5 9	90% Dual Spiral	TPU	-25°C/80°C	No	3.25 (82.55)	3.16 inches (80.26 mm) 0.250 inches (6.35 mm)



## Build Your Own ChannelFLEX™ Cable

Semiconductor robotics cable or medical cable can be very expensive due to the sizeable minimum order quantities for typical extrusion lines. Now, with the ChannelFLEX™ system from Hitachi, you can avoid the high costs and extra cable length by buying just the cable components you need and assembling the cable at your facility.

**Step 1:** Select the number of pods for your cable. See Table 1 below.

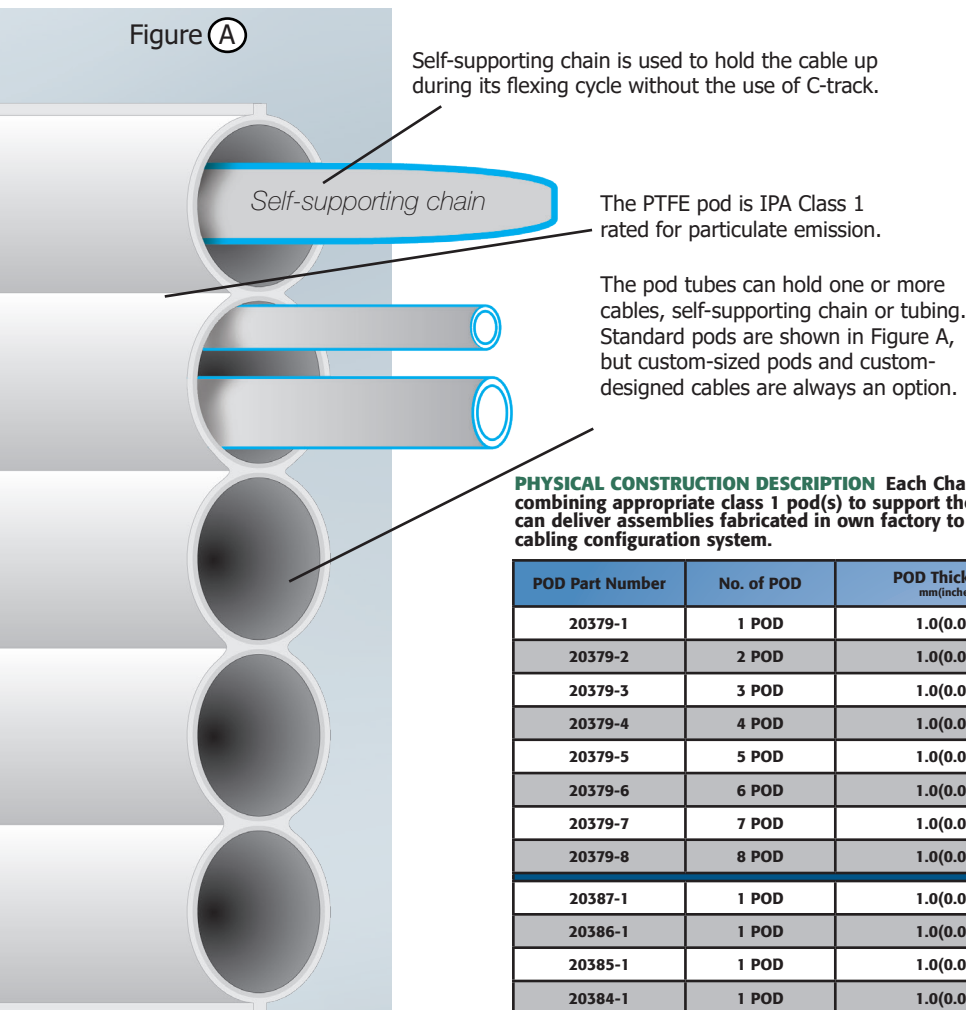
**Step 2:** Choose the application cable(s) needed in each pod. See tables on pages 10 & 11.

**Step 3:** Add a self-supporting chain\*\* of the right radius if required (choose from 40mm, 70mm and 100mm).

**Step 4:** Choose the tubes (if any) that you want. Visit the HCA website for tube information.

**Step 5:** Optional. If you wish to add clamps or have connectors installed, please see page 7.

Figure A

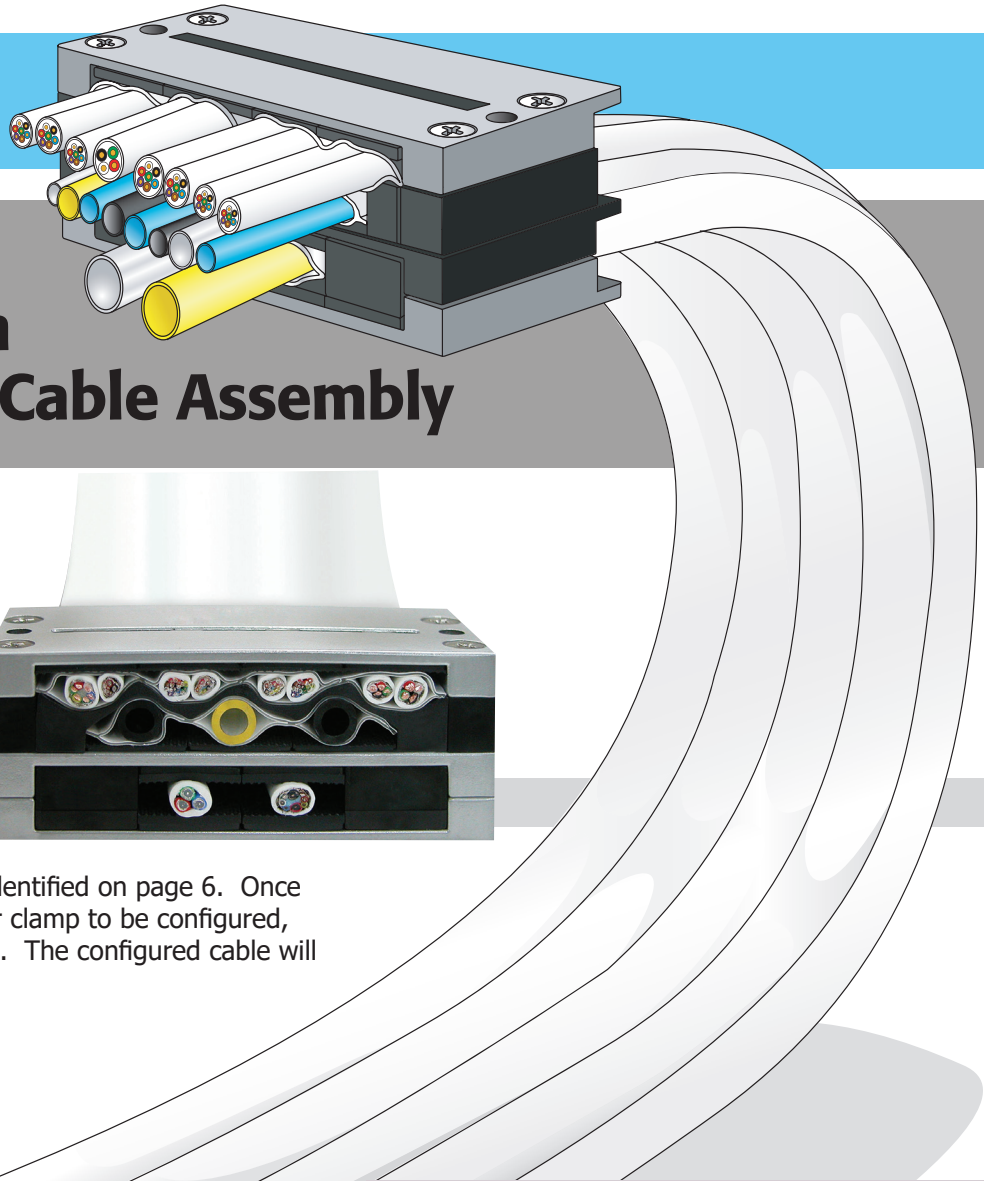


**PHYSICAL CONSTRUCTION DESCRIPTION** Each ChannelFLEX™ assembly is unique to the customer requirement, combining appropriate class 1 pod(s) to support the desired number of cables for each cable assembly. Customer can deliver assemblies fabricated in own factory to any length desired, with the ChannelFLEX™ ultimate custom cabling configuration system.

POD Part Number	No. of POD	POD Thickness mm(inches)	POD Width* mm(inches)	POD Overall Width mm(inches)
20379-1	1 POD	1.0(0.04)	19.0(0.75)	23.6(0.93)
20379-2	2 POD	1.0(0.04)	19.0(0.75)	44.9(1.77)
20379-3	3 POD	1.0(0.04)	19.0(0.75)	66.2(2.61)
20379-4	4 POD	1.0(0.04)	19.0(0.75)	87.5(3.45)
20379-5	5 POD	1.0(0.04)	19.0(0.75)	108(4.29)
20379-6	6 POD	1.0(0.04)	19.0(0.75)	130.1(5.13)
20379-7	7 POD	1.0(0.04)	19.0(0.75)	153.7(6.05)
20379-8	8 POD	1.0(0.04)	19.0(0.75)	176.7(6.95)
20387-1	1 POD	1.0(0.04)	30.0(1.18)	34.5(1.36)
20386-1	1 POD	1.0(0.04)	104.39(4.11)	109.0(4.29)
20385-1	1 POD	1.0(0.04)	125.73(4.96)	123.6(5.14)
20384-1	1 POD	1.0(0.04)	38.1(1.50)	42.7(1.68)
20383-1	1 POD	1.0(0.04)	61.72(2.43)	66.3(2.61)
20381-1	1 POD	1.0(0.04)	83.06(3.27)	87.6(3.45)
20388-3	3 POD	1.0(0.04)	38.1(1.50)	123.4(4.86)

TABLE 1 \*19mm is the standard Pod width. Other sizes, considered custom, are available.  
\*\*Self-supporting chain not sold individually.

## Have Hitachi Build a Custom ChannelFLEX™ Cable Assembly



### Configuration & Assembly

To build your cable, follow the steps identified on page 6. Once you have identified how you wish your clamp to be configured, Hitachi will terminate all of the cables. The configured cable will look like that shown in Figure D.

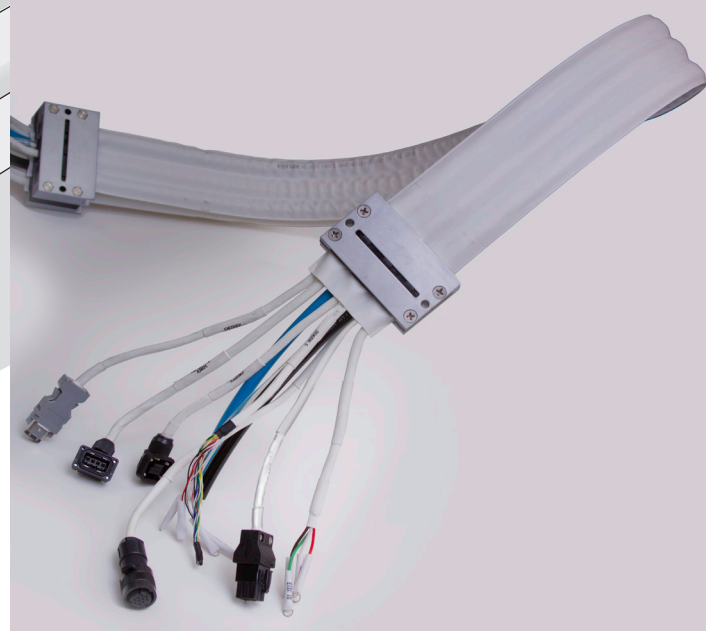
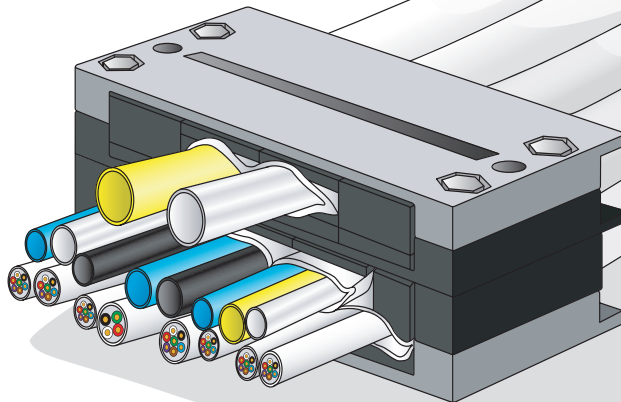


Figure D

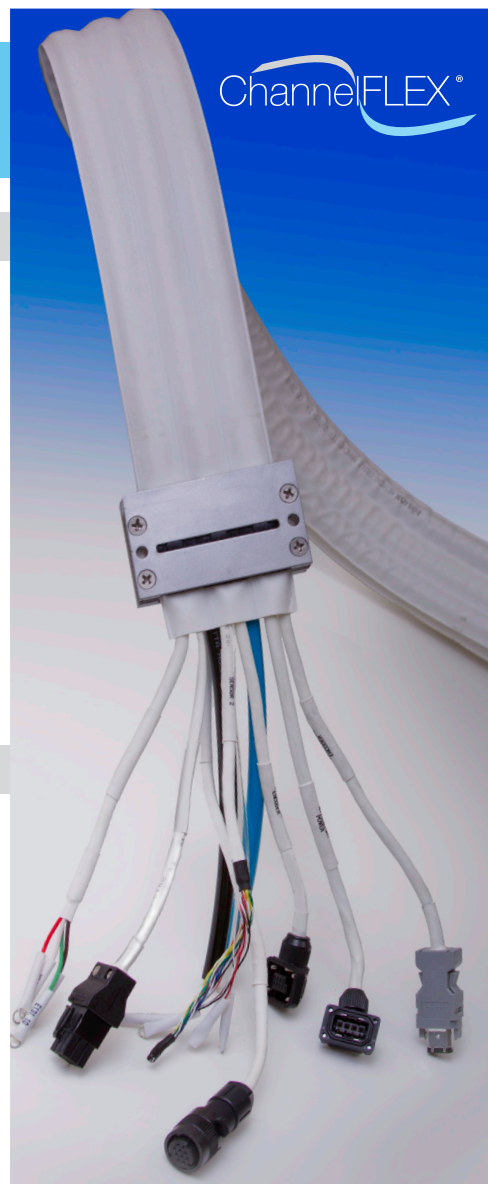


## ChannelFLEX™ *Solution Options*

- Pod choices from 1-8. Customization available upon request
- Wide range of application cables available that include: power, video, low-medium-high speed data transmission, analog & digital video
- Suitable for use with air tubes
- Can be used with or without self-supporting strength chain
- Can be terminated with a wide variety of connectors by a Hitachi partner company

## *Applications*

- Medical equipment applications
- Clean room applications
- Semi-conductor capital equipment applications
- High Flex cable solutions
- Applications where requirements are suitable for flat narrow cross sections
- Any applications requiring internal self-supporting undergoing continuous flexing
- Display equipment applications



## *Configurations & Assembly*

*Assuming you have chosen the cables, support members and pod count for your ChannelFLEX™ assembly, please contact us with your cable design with the information found below so we can prepare a quotation for your final assembly.*

### **Required information includes:**

- The cables or support members to be used in each pod
- Overall length of the assembly
- Connectors to be used on each cable
- Wiring pinout for each connectorized assembly
- Clamp locations and distance from clamp to the ends of the connectors
- Other details (label locations, markings on the labels, packaging, etc...)

## 9 ChannelFLEX™ Application Cables

Cable Cross Section	HCA Part Number	Description	Construction	Diameter (Nominal) mm inch	No. of cables that fit in 19 mm (0.75 inches) POD
	41074-4	20 AWG 4 Conductor Shielded Servo Motor Power Cable	Conductor- bare copper, insulation- FEP, Binder- ePTFE, Jacket - PVC LF1	5.38 mm 0.212 inch	2
	41074-6	20 AWG 6 Conductor Shielded Servo Motor Power/Brake Cable	Conductor- bare copper, insulation - FEP, Binder - ePTFE, Jacket - PVC LF	6.25 mm 0.246 inch	2
	41073-4	18 AWG 4 Conductor Shielded Servo Motor Power Cable	Conductor- bare copper, insulation- FEP, Binder- ePTFE, Jacket - PVC LF	5.97 mm 2.35 inch	2
	41072-4	16 AWG 4 Conductor Shielded Servo Motor Power Cable	Conductor- bare copper, insulation- FEP, Binder- ePTFE, Jacket - PVC LF	6.83 mm 0.269 inch	1
	41426-10	26 AWG 5pr Shielded Servo Motor Encoder Signal Power & Control	Conductor- tinned copper; insulation - ETFE; Binder - ePTFE; Dual Spiral Served Shield; Jacket - PVC LF	5.46 mm 0.215 inch	2
	41414-7	22 AWG 7/c Shielded Power & Control	Conductor- tinned copper; insulation - FEP; Binder - ePTFE; Spiral Served Shield; Jacket - PVC LF	5.97 mm 0.235 inch	2
	41427-6	22 AWG 2c + 26 AWG 2pr Shielded Servo Motor Encoder Signal Power & Control	Conductor- tinned copper; insulation - FEP & ETFE; Binder - ePTFE; Dual Spiral Served Shield; Jacket- PVC LF	5.1 mm 0.200 inch	2

\*C.O. (Counter Opposed) Spiral Shield is a spiral shield in one direction and a second spiral shield on top in the opposite direction. This has the following benefits:

1. Has longer flex life
2. Has improved flexibility
3. Has EMI/RFI shielding performance approaching a braid shield and certainly better than a spiral shield
4. Improved termination of the shield

## Application Cables (continued)

Cable Cross Section	HCA Part Number	Description	Construction	Diameter (Nominal) mm inch	No. of cables that fit in 19 mm (0.75 inches) POD
<p>3/P 26 AWG (.15mm<sup>2</sup>) ETFE Ins. &amp; 2/C 22 AWG (.33mm<sup>2</sup>) FEP Ins. ePTFE Tape C.O. Spiral Shield PVC Jacket F = Filler</p>	41877-8	22 & 26 AWG 8pr Shielded Control Cable Power & Control	Conductors- tinned copper; insulation - ETFE; Binder - ePTFE; Jacket - PVC LF	5.8 mm 0.230 inch	2
<p>4/C 26 AWG FEP EPTFE BINDERS SPIRAL SHIELDS PVC JACKET F = FILLER</p>	41081-4	26 AWG 4 Conductor Shielded IEEE 1394 Communication	Conductor- bare copper; insulation - FEP; Binder - ePTFE; Jacket - PVC LF	5.5 mm 0.216 inch	2
<p>4/P 26 AWG FEP INS. PTFE TAPE DUAL SPIRAL SHIELD PTFE TAPE PVC JACKET</p>	41231-8	26 AWG Cat 5e Ethernet Patch Cable Communication	Conductor- tinned copper; insulation - FEP; Binder - ePTFE; Dual Spiral Served Shield; Jacket - PVC LF	6.10 mm 0.240 inch	2
<p>8 PR. 26AWG ETFE INS. ePTFE Binder PVC Jacket</p>	41410-16	26 AWG 8pr Signal I/O Communication	Conductor- tinned copper; insulation - ETFE; Binder - ePTFE; Jacket - PVC LF	5.6 mm 0.220 inch	2
<p>2/C 22 AWG FEP INS. EPTFE BINDERS SPIRAL SHIELD PVC JACKET F = FILLER</p>	41082-2	22 AWG 2 Conductor Shielded IEEE 1394 Communication	Conductor- bare copper; insulation - FEP; Binder - ePTFE; Jacket - PVC LF	3.8 mm 0.150 inch	2
<p>COMPOSITE CABLE 2 COAX 30 AWG 4/C 26 AWG 2/C 26 AWG PTFE TAPES BRAID SHIELD PVC JACKET</p>	41224-8	24 AWG 3c + 28 AWG 3c + 2c Coaxial Shielded Video & Vision Cable	Conductor- bare copper; insulation - FEP; Binder - ePTFE; Jacket - PVC LF	5.8mm 0.225 inch	1
<p>3 COAX 30 AWG C.O. Spiral Shield ePTFE Tape PVC Jacket</p>	41078-3	3 Conductor 75 Ohms 30 AWG Coaxial Video Cable	Conductor- Silver Plated Alloy copper; insulation - FEP Fluoropolymer; Dual Spiral Served Shield; FEP Inner Jackets; Binder - ePTFE; Jacket - PVC LF	6.73 mm 2.65 inch	1





**HITACHI**  
Inspire the Next

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***DELIVERING TODAY'S INFORMATION AT TOMORROW'S SPEED***