

WATER RESISTANT USB3.0 CONNECTOR SERIES ASSEMBLY INSTRUCTIONS

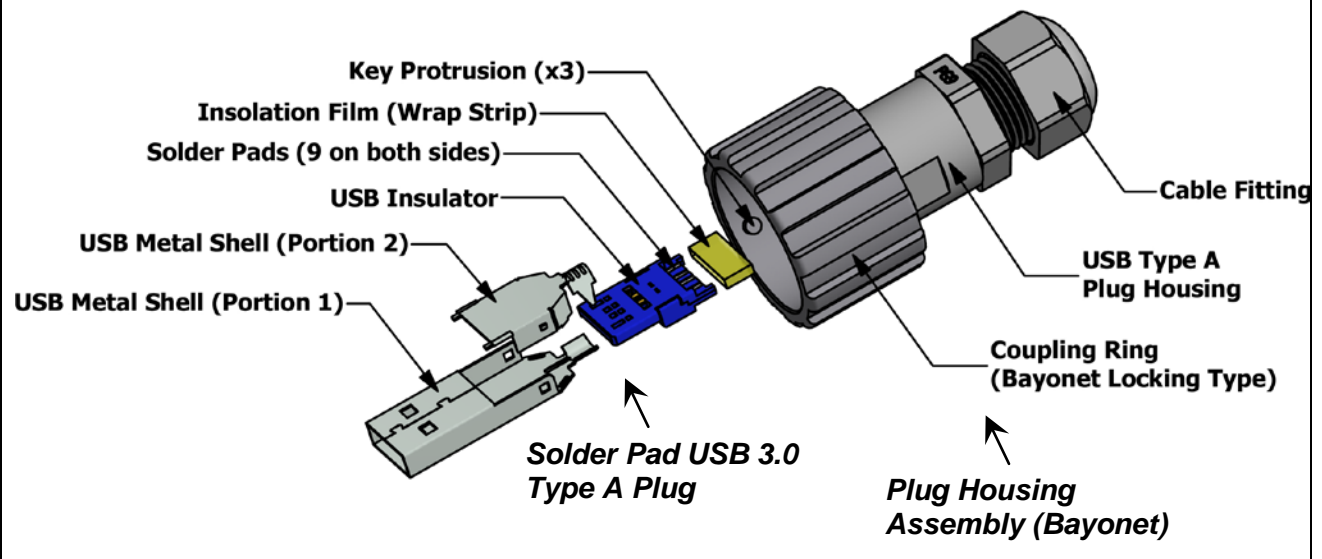
CONEC IP67 USB3.0 Connector Series consists of a **USB3.0 Type A Plug Assembly Kit**, a **USB3.0 Cable Strain Relief Kit**, a **USB3.0 Type A Receptacle Kit** and a **Protective Cover Assembly** as well as the **USB3.0 Patch Cords**.

1. The USB3.0 Type A Plug Assembly Kit (Bayonet Locking Style)

1.1 Introduction

The USB3.0 type A plug Assembly kit consists of a solder pad **USB3.0 Type A Plug** and a **Plug Housing Assembly (Bayonet)**. The solder cup USB Type A plug consists of 2 portions of the metal shell, 1 piece insulator and 1 piece of isolation film. See Figure 1-1 for details.

Figure 1-1: The USB 3.0 Type A Plug Kit

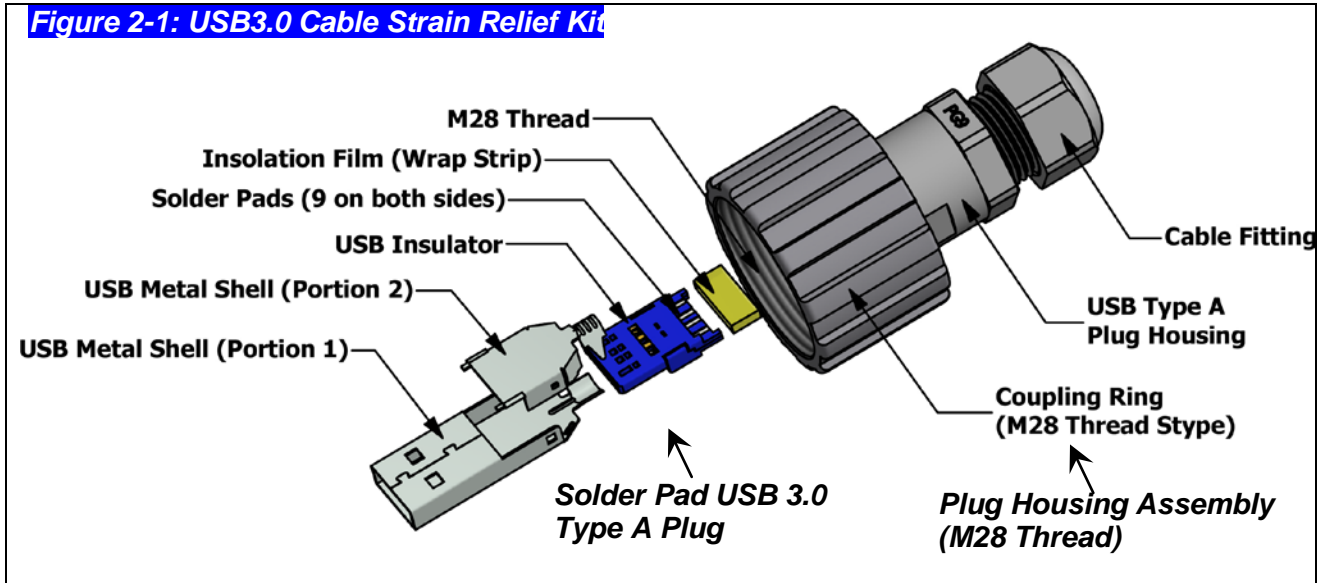


2 USB3.0 Cable Strain Relief Kit (M28 Thread)

2.1 Introduction

The USB3.0 cable strain relief kit consists of a solder pad **USB3.0 Type A Plug** and a **Plug Housing Assembly (M28 Thread)**. The solder pad USB type A plug consists of 2 portions of the metal shell, 1 piece insulator and 1 piece isolation film. See Figure 1-2 for details.

Figure 2-1: USB3.0 Cable Strain Relief Kit



3. USB3.0 Type A Plug (Solder Pad Version) Assembly

3.1 USB3.0 Connector Pin Assignment and description

Figure 3-1 shows the pin number of the contact of the USB3.0 Type A plug and table 3-1 provides the pin assignment and description of the USB3.0 type A connector.

Figure 3-1: Pin Assignment for USB3.0 Type A Plug

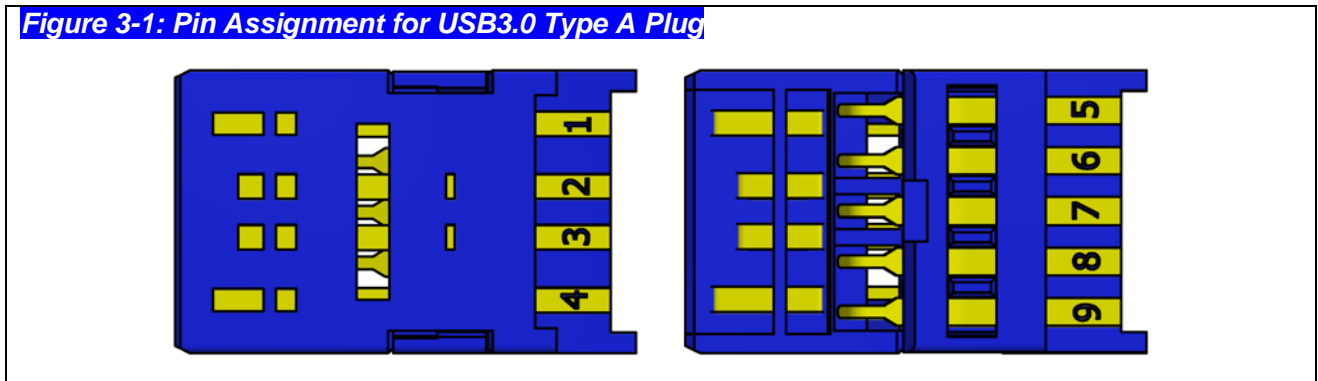


Table 3-1: USB3.0 Type A Connector Pin Assignment

Pin Number	Signal Name	Description	Mating Sequence
1	V _{BUS}	Power	Second
2	D-	USB2.0 Differential Pair	Third
3	D+		
4	GND	Ground for Power Return	Second
5	StdA_SSRX-	SupperSpeed Receiver Differential Pair	Last
6	StdA_SSRX+		
7	GND_DRAIN		
8	StdA_SSTX-	SupperSpeed Transmitter Differential Pair	
9	StdA_SSTX+		
Metal Shell	Shield	Connector metal shell	First

Note: Tx and Rx are defined from the host perspective

The physical location of the pins in the connector is illustrated in Figure 3-1. Note that pins 1 to 4 are referred to as the USB 2.0 pins, while pins 5 to 9 are referred to as the SuperSpeed pins.

3.2 Cable Construction and Wire Assignment

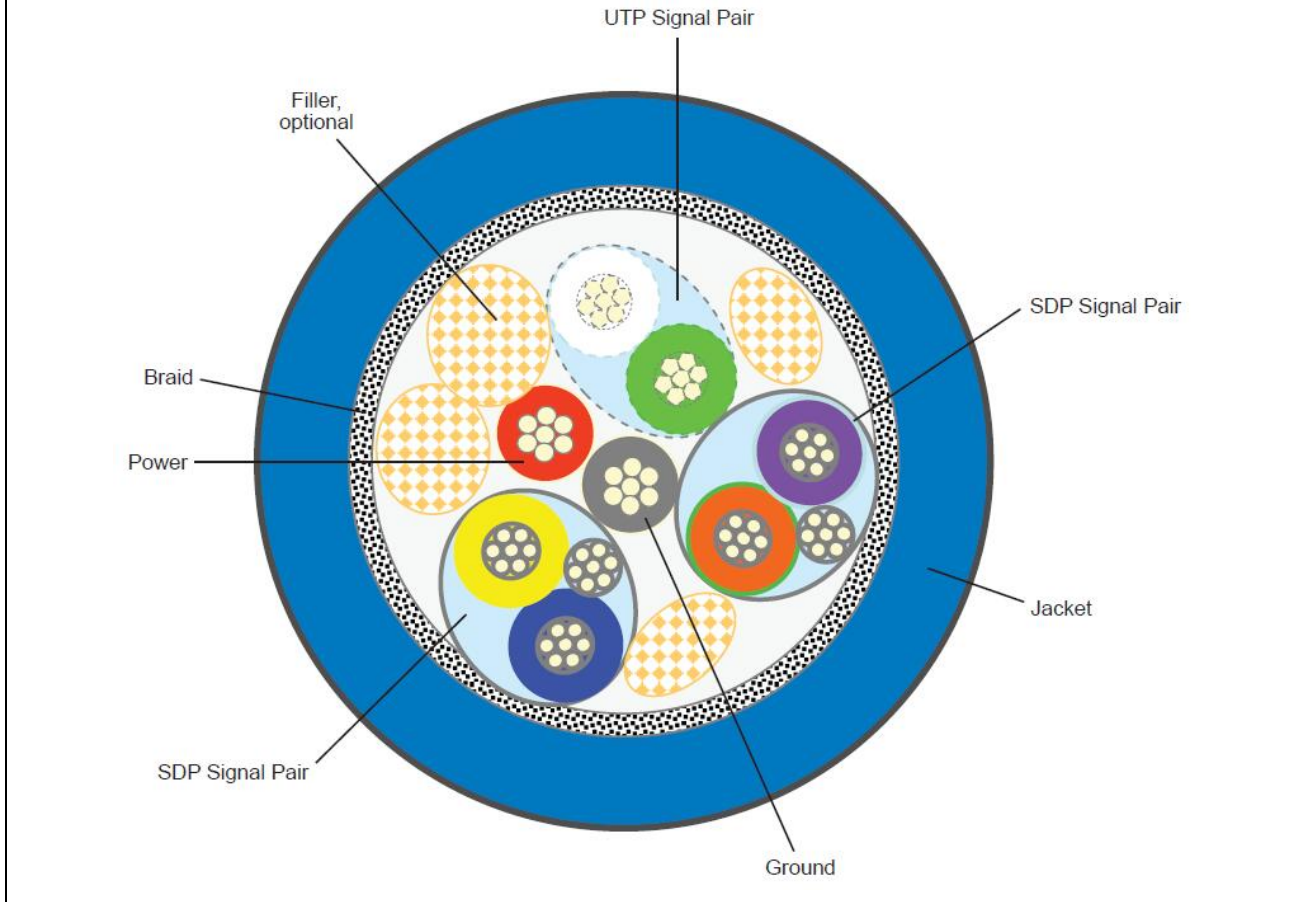
3.2.1: Cable Construction

Figure 3-2 illustrates a USB 3.0 cable cross-section. There are three groups of wires: UTP signal pair, Shielded Differential Pair (SDP, twisted or twinax signal pairs), and power and ground wires.

The UTP is intended to transmit the USB 2.0 signalling while the SDPs are used for SuperSpeed; the shield is needed for the SuperSpeed differential pairs for signal integrity and EMI performance. Each SDP is attached with a drain wire, which is eventually connected to the system ground through the GND_DRAIN pin(s) in the connector.

A metal braid is required to enclose all the wires in the USB 3.0 cable. The braid is to be terminated to the plug metal shells, as close to 360° as possible, to contain EMI

Figure 3-2: Illustration of a USB3.0 Cable Construction



3.2.2 Wire Assignment

Table 3-2: Defines wire number, signal assignment and wire color

Wire Number	Signal Name	Description	Color
1	PWR	Power	Red
2	UTP_D-	Unshielded twist pair, negative	White
3	UTP_D+	Unshielded twist pair, positive	Green
4	GND_PWRrt	Ground for power return	Black
5	SDP1-	Shielded differential pair 1, negative	Blue
6	SDP1+	Shielded differential pair 1, positive	Yellow
7	SDP1_Drain	Drain wire for SDP1	
8	SDP2-	Shielded differential pair 2, negative	Purple
9	SDP2+	Shielded differential pair 2, positive	Orange
10	SDP2_Drain	Drain wire for SDP2	
Braid	Shield	Cable external braid to be 360° terminated on to plug metal shell	

3.2.3 Wire Gauges and Cable Diameters

This specification chooses not to specify wire gauges. Table 3-3 lists the typical wire gauges *for reference*. A large gauge wire incurs less loss, but at the cost of cable flexibility. One should choose the smallest possible wire gauges that meet the cable assembly electrical requirements.

To maximize cable flexibility, all wires are required to be stranded and the cable outer diameter should be minimized as much as possible. A typical USB 3.0 cable outer diameter may range from 3 mm to 6 mm.

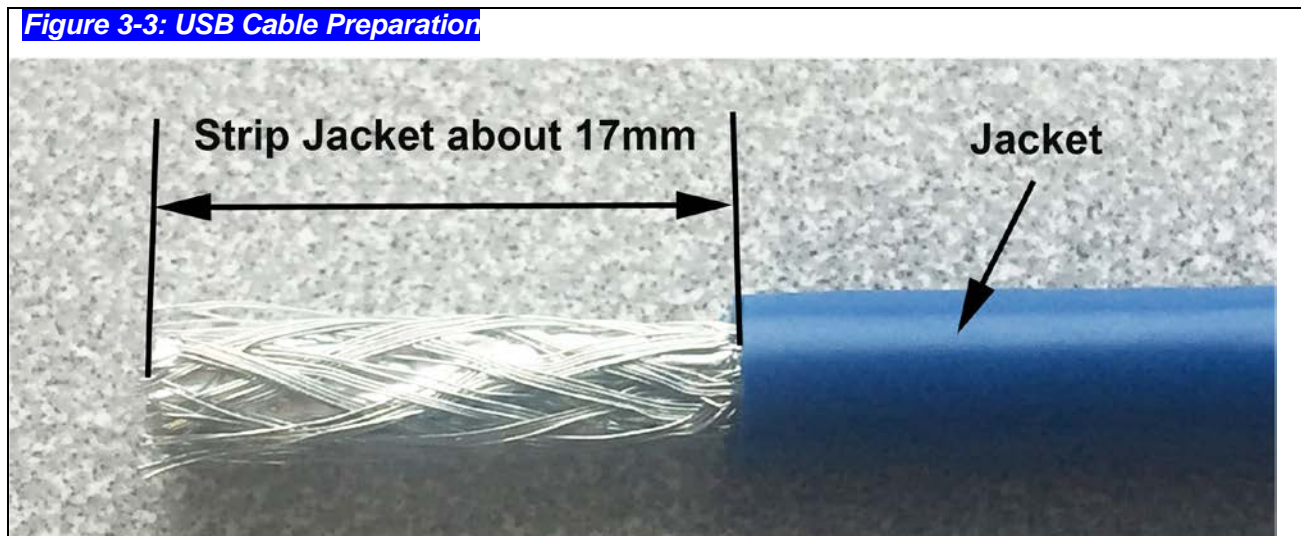
Table 3-3: Reference Wire Gauge

Wire Number	Signal Name	Wire Gauge (AWG)	Color
1	PWR	20-28	Red
2	UTP_D-	28-34	White
3	UTP_D+	28-34	Green
4	GND_PWRrt	20-28	Black
5	SDP1-	26-34	Blue
6	SDP1+	26-34	Yellow
7	SDP1_Drain	26-34	
8	SDP2-	28-34	Purple
9	SDP2+	26-34	Orange
10	SDP2_Drain	26-34	
Braid	Shield	28-34	

3.3 USB3.0 Type A Plug (Solder Pad Version) Assembly

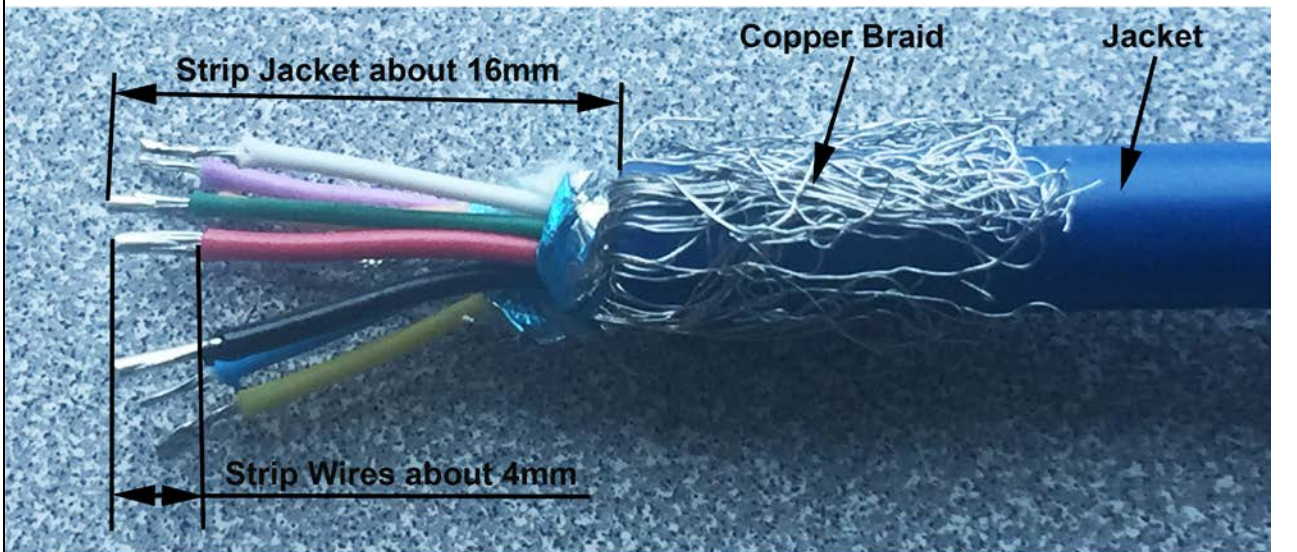
Step 1: Strip the jacket of the USB3.0 cable according to the Figure 3-3.

Figure 3-3: USB Cable Preparation



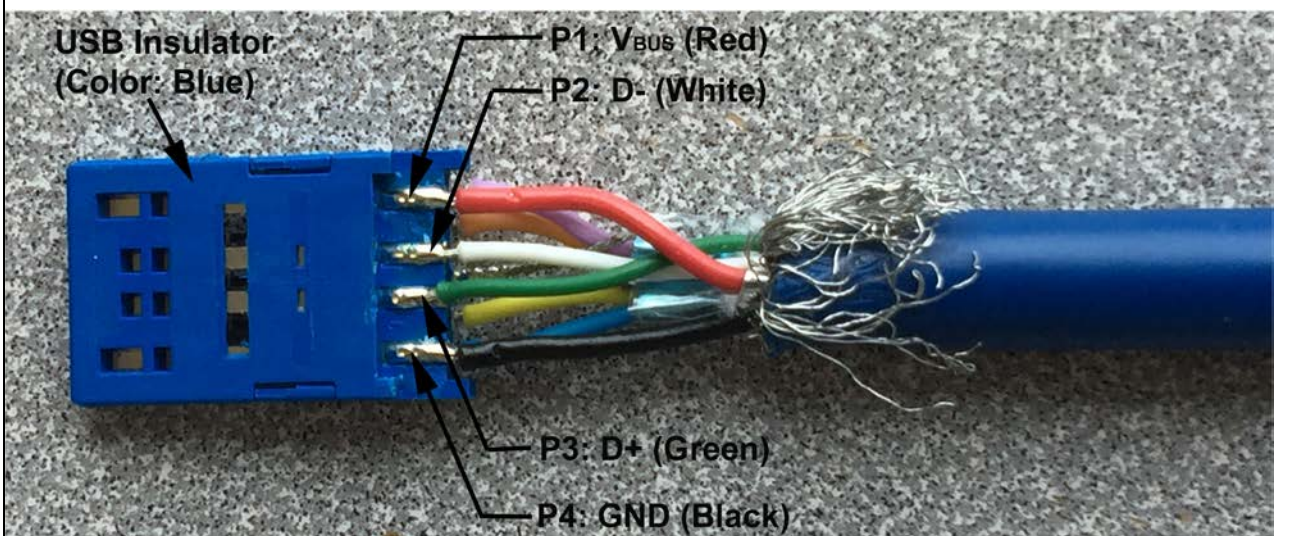
Step 2: Strip the Wires of the USB3.0 cable according to the Figure 3-3.

Figure 3-3: Wire of USB Cable Preparation



Step 3: Solder the wires of the USB3.0 cable to Pin 1 to Pin 4 of the solder pads of the USB3.0 plug according to the Figure 3-4.

Figure 3-4: Layout showing the wires Soldered to Pin1 to Pin4 of the USB Plug



Step 4: Solder the wires of the USB3.0 cable to Pin 5 to Pin 9 of the solder pads of the USB3.0 plug according to the Figure 3-5 (For Type A to Type B, Type A to micro-B Patch Cord Cable Assembly) or Figure 3-6 (For the second Plug of Type A to Type A Patch Cord Cable Assembly only).

Figure 3-5: Layout showing the wires Soldered to Pin5 to Pin9 of the USB Plug 1

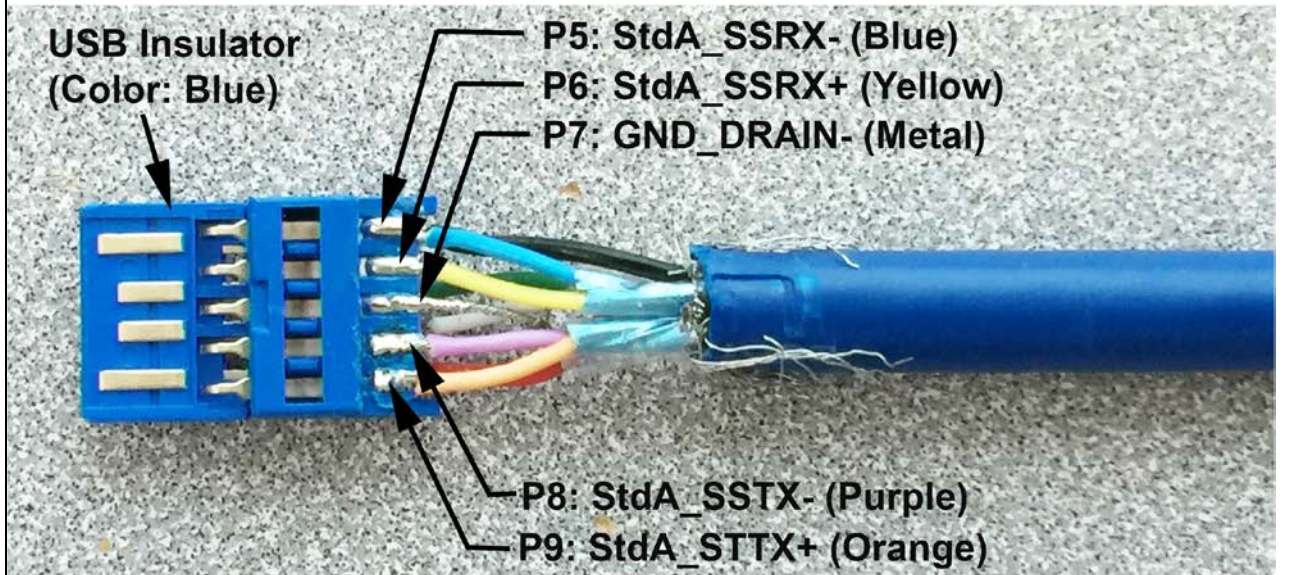
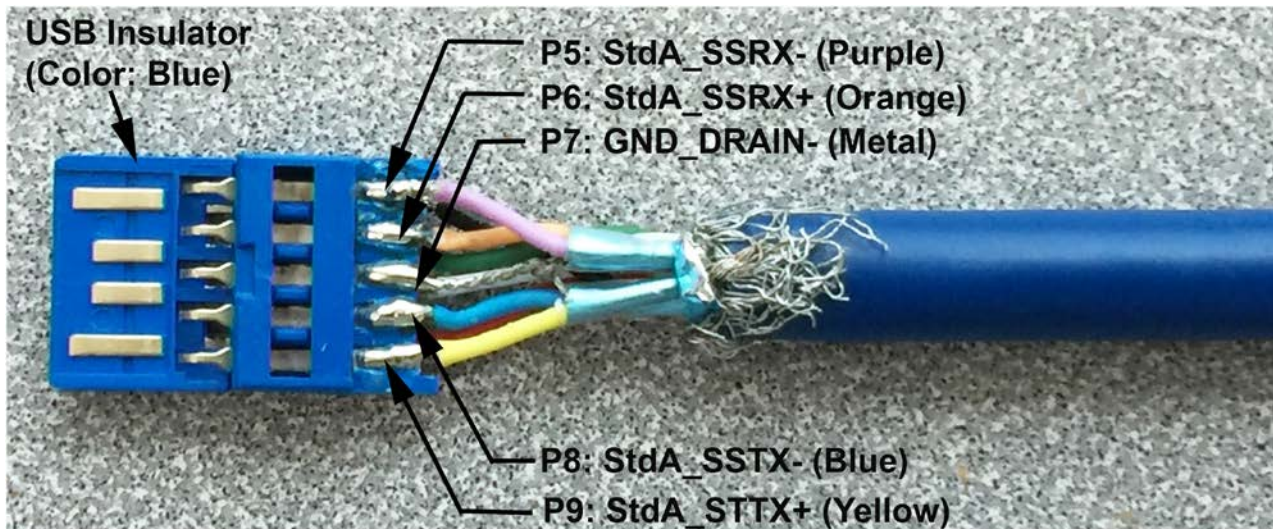
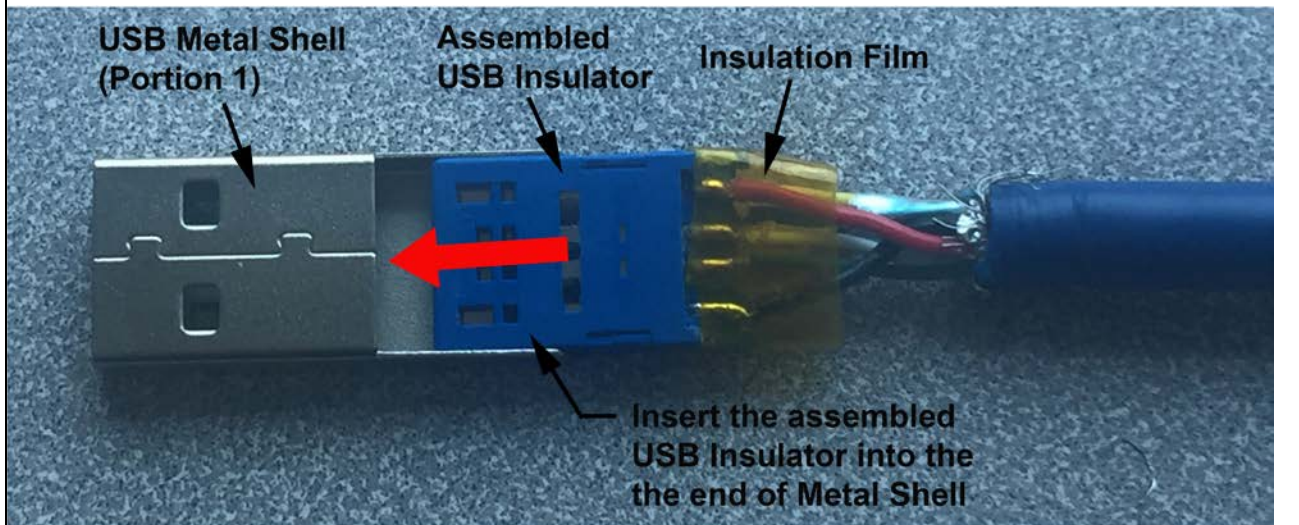


Figure 3-6: Layout showing the wires Soldered to Pin5 to Pin9 of the USB Plug 2



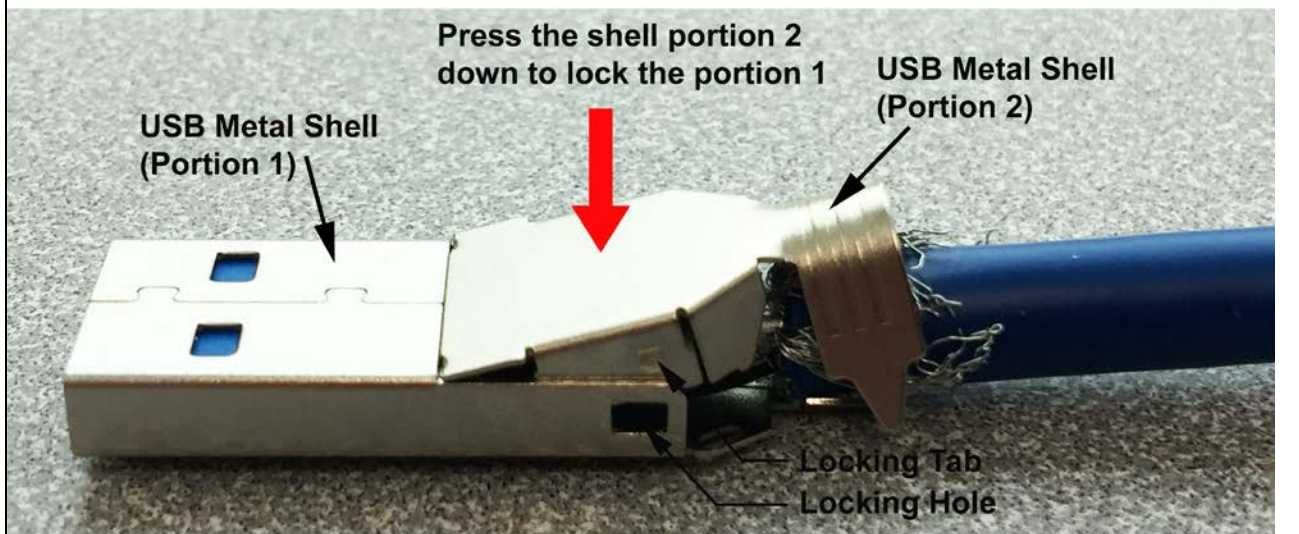
Step 4: Insert the assembled USB3.0 Insulator into the metal shell portion 1 all the way to end.

Figure 3-7: Assembly of the USB3.0 Insulator and Metal Shell Portion 1



Step 5: Place the metal shell portion 2 in the proper position with the portion 1 according to Figure 3-8 and press the portion 2 straight down until both locking tabs of the portion 2 snap into the holes of the metal shell portion 1.

Figure 3-8: Assembly of the Metal Shell



Step 6: Use the crimp tool to crimp 3 grounding fingers of the metal shell portion 2 with portion 1 together, and cut the rest of copper braid and aluminum metalized mylar.

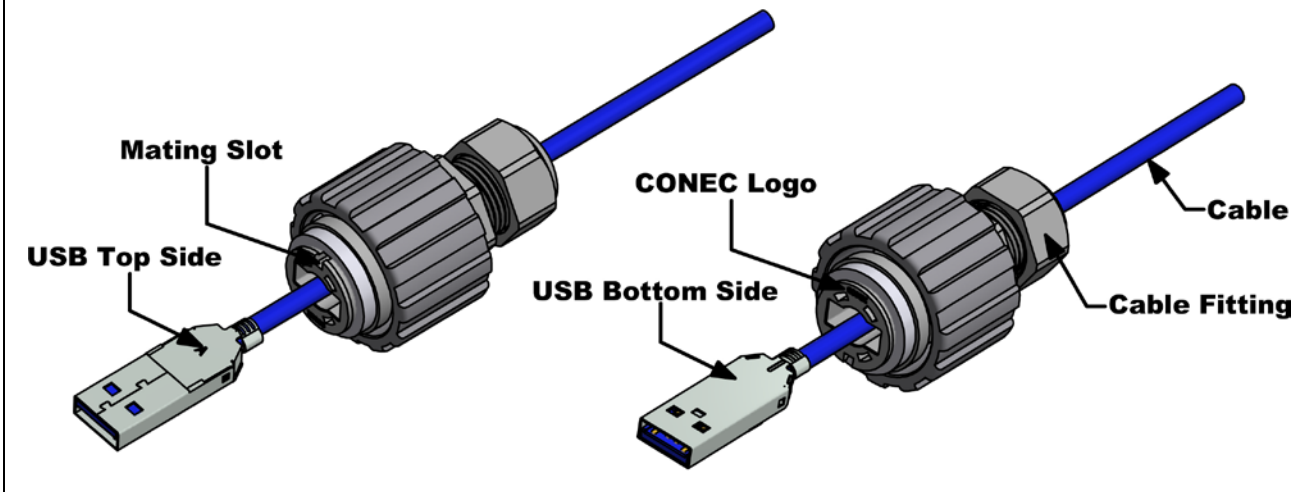
Figure 3-9: Terminate the USB Metal Shells



4 Assembly of the USB3.0 Type A Plug Housing

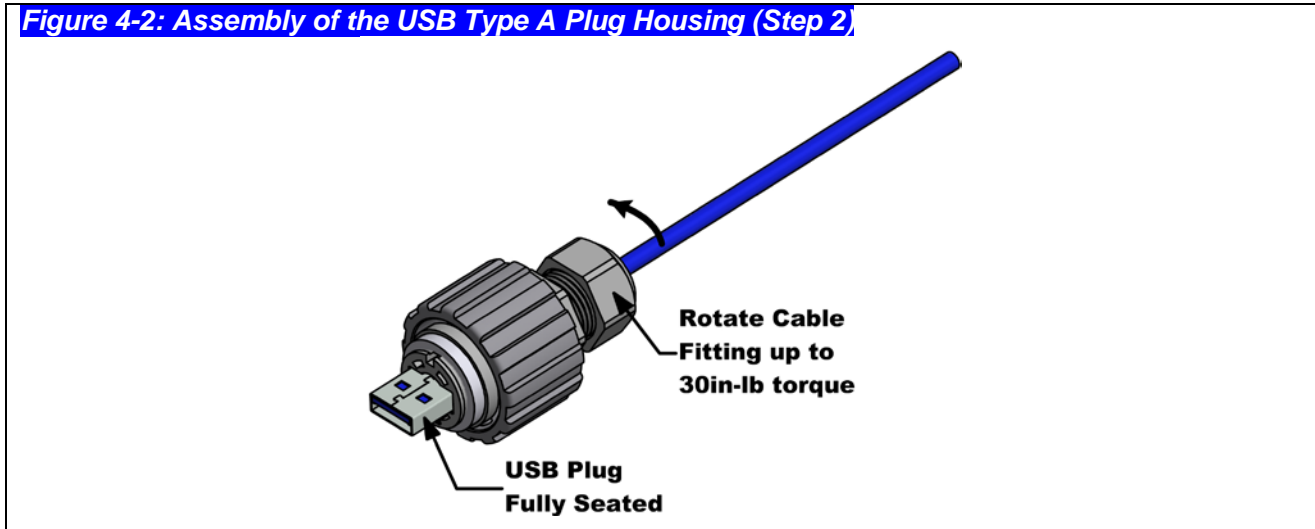
Step 1: Position the USB3.0 Type A plug top side towards the mating slot of the USB3.0 plug housing or position the USB3.0 bottom side towards the CONEC logo of the USB3.0 plug housing shown in Figure 4-1.

Figure 4-1: Assembly of the USB3.0 Type A Plug Housing (Step 1)



Step 2: Gently pull the cable until the plug is fully seated. Hold the plug in position and rotate the cable fitting until tightened to a torque of 2.27 Nm (20 lb-in). See Figure 4-2.

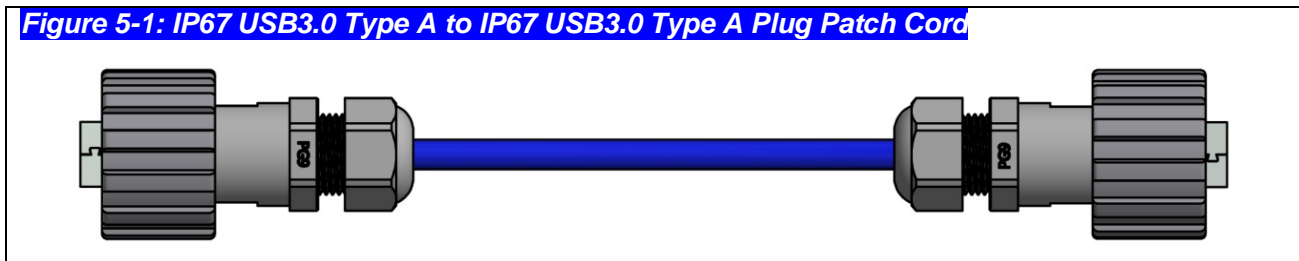
Figure 4-2: Assembly of the USB Type A Plug Housing (Step 2)



5. The USB3.0 Cable Assembly

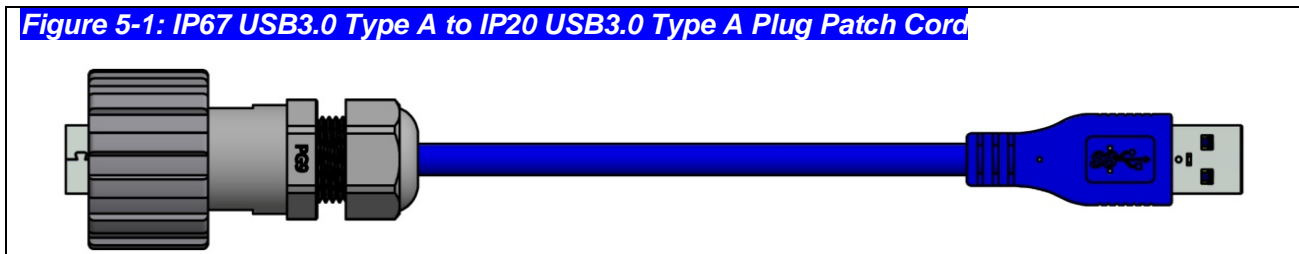
5.1 IP67 USB3.0 Type A to IP67 Type A Plug Cable Assembly

Figure 5-1: IP67 USB3.0 Type A to IP67 USB3.0 Type A Plug Patch Cord



5.2 IP67 USB3.0 Type A to IP20 Type A Plug Cable Assembly

Figure 5-1: IP67 USB3.0 Type A to IP20 USB3.0 Type A Plug Patch Cord



The USB3.0 Type A Plug to USB3.0 Type A Plug cable assembly is defined for operating system debugging and other host-to-host connection applications. Table 5-1 shows wire connections for such a cable assembly.

Table 5-1: USB3.0 Type A Plug to USB3.0 Type A Plug Cable Assembly Wiring

USB3.0 Type A Plug #1		Wire			USB3.0 Type A Plug #2	
Pin Number	Signal Name	Wire Number	Wire Color	Signal Name	Signal Name	Pin Number
1	V _{BUS}	1	Red	PWR	V _{BUS}	1
2	D-	2	White	UTP_D-	D-	2
3	D+	3	Green	UTP_D+	D+	3
4	GND	4	Black	GND_PWRrt	GND	4
5	StdA_SSRX-	5	Blue	SDP1-	StdA_SSTX-	8
6	StdA_SSRX+	6	Yellow	SDP1+	StdA_SSRT+	9
7	GND_DRAIN	7 & 10		SDP1_Drain SDP2_Drain	GND_DRAIN	7
8	StdA_SSTX-	8	Purple	SDP2-	StdA_SSRX-	5
9	StdA_SSTX+	9	Orange	SDP2+	StdA_SSTR+	6
Shell	Shield	Braid	Shield		Shield	Shell

5.3 IP67 USB3.0 Type A to IP20 Type B Plug Cable Assembly

Figure 5-1: IP67 USB3.0 Type A to IP67 USB3.0 Type B Plug Patch Cord

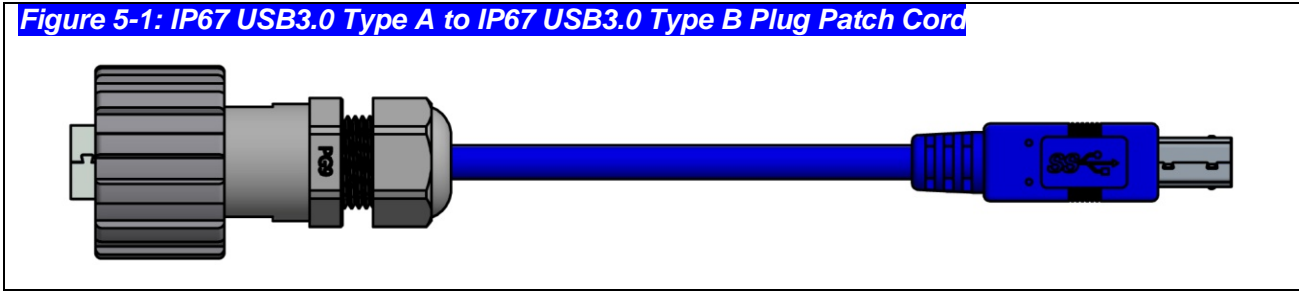


Table 5-2: USB3.0 Type A Plug to USB3.0 Type B Plug Cable Assembly Wiring

USB3.0 Type A Plug		Wire			USB3.0 Type B Plug	
Pin Number	Signal Name	Wire Number	Wire Color	Signal Name	Signal Name	Pin Number
1	V _{BUS}	1	Red	PWR	V _{BUS}	1
2	D-	2	White	UTP_D-	D-	2
3	D+	3	Green	UTP_D+	D+	3
4	GND	4	Black	GND_PWRrt	GND	4
5	StdA_SSRX-	5	Blue	SDP1-	StdB_SSRX-	5
6	StdA_SSRX+	6	Yellow	SDP1+	StdB_SSRX+	6
7	GND_DRAIN	7 & 10		SDP1_Drain SDP2_Drain	GND_DRAIN	7
8	StdA_SSTX-	8	Purple	SDP2-	StdB_SSTX-	8
9	StdA_SSTX+	9	Orange	SDP2+	StdB_SSTX+	9
Shell	Shield	Braid		Shield	Shield	Shell

5.4 IP67 USB3.0 Type A to IP20 USB3.0 Micro-B Plug Cable Assembly

Figure 5-1: IP67 USB3.0 Type A to IP20 USB3.0 Micro-B Plug Patch Cord



Table 5-4 shows the wire connections for the USB3.0 Type A to USB3.0 Micro-B cable assembly. Note that the ID pin in the USB3.0 Micro-B plug shall not be connected, but left in the open condition.

Table 5-3: USB3.0 Type A Plug to USB3.0 Micro-B Plug Cable Assembly Wiring

USB3.0 Type A Plug		Wire			USB3.0 Micro-B Plug	
Pin Number	Signal Name	Wire Number	Wire Color	Signal Name	Signal Name	Pin Number
1	V _{BUS}	1	Red	PWR	V _{BUS}	1
2	D-	2	White	UTP_D-	D-	2
3	D+	3	Green	UTP_D+	D+	3
4	GND	4	Black	GND_PWRrt	GND	5
5	StdA_SSRX-	5	Blue	SDP1-	MicB_SSRX-	6
6	StdA_SSRX+	6	Yellow	SDP1+	MicB_SSRX+	7
7	GND_DRAIN	7 & 10		SDP1_Drain SDP2_Drain	GND_DRAIN	8
8	StdA_SSTX-	8	Purple	SDP2-	MicB_SSTX-	9
9	StdA_SSTX+	9	Orange	SDP2+	MicB_SSTX+	10
					ID	4
Shell	Shield	Braid		Shield	Shield	Shell