USB3F TV *(USB-A)*

USB connection system for harsh environment

NEW USB3.0

ROHS COMPLIANT N & BZ

With USB Field, you can insert a standard USB 3.0 cordset into a metallic plug which will protect it from shocks, dust and fluids.
No hazardous on-field cabling and grounding!
Also available a version including plug + cordset: see next page.

This metallic plug is connected into a receptacle, using a Tri Start Thread coupling mechanism (MIL-DTL-38999 series III type) with anti-decoupling device for high vibrations.

Applications

- Embedded computers
- Data acquisition and transmission in harsh environment
- Railways
- Battelfield communication systems
- Navy systems

Data transmission

USB specification 3.0
Data rate: up to 5Gb/s for high speed USB

Dataspeed
10 x higher
than USB2.0

Main characteristics

- Sealed against fluids and dusts (IP68)
- Shock, vibration and traction resistant
- No cabling operation in field and no tools required
- Improved EMI protection
- Tri Start Thread coupling mechanism (MIL-DTL-38999 series III type) with anti-decoupling device - Shell size 15
- 2 mechanical coding / polarization possibilities (receptacle insert rotation)
- USB3F TV plug retention in the receptacle: 100 N in the axis
- Mating cycles: 500 minimum

Environmental protection

- Sealing (when mated): IP68 (temporary immersion)
- Salt spray: 48 h with nickel plating
  > 500 h with olive drab cadmium
  500 h with marine bronze shell
- Fire retardant / low smoke: UL94 V0 and NF F 16 101 & 16 102
- Vibrations: 10 – 500 Hz, 10 g, 3 axes: no discontinuity > 1micro s
- Shocks: IK06: weight of 250 g drop from 40 cm [15.75 in] onto connectors (mated pair)
- Humidity: 21 days, 43°C, 98% humidity
- Temperature range: - 40°C / +85°C

Part number code: plug and receptacles without cordset.

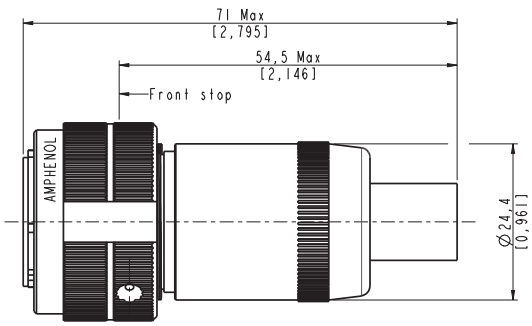
Series USB3 Field TV	USB3F TV	2	A	G
Shell type **6:** plug (without cordset) - *For cordset solution, see page 88.* **2:** square flange receptacle with female USB3.0 termination - *For cordset solution, see page 90.* **7:** jam nut receptacle with female USB3.0 termination - *For cordset solution, see page 90.*				
Coding (for receptacle only) **A** or **B**				
Shells material & finish **G:** aluminium shell - olive drab cadmium plating **N:** aluminium shell - nickel plating - *ROHS compliant*				

Examples: *- plug, olive drab cadmium plating:* ***USB3F TV 6 G***
- jam nut receptacle, coding B, nickel plating: ***USB3F TV 7 B N***

Plug without cordset

- Shell type 6

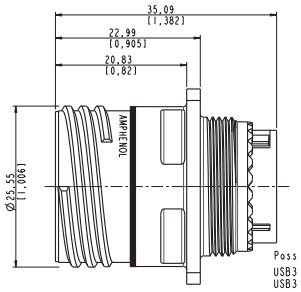
Part number type: **USB3 FTV 6 x**
***Nota**: assembling instructions on page 89*

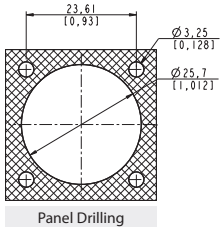


Amphenol

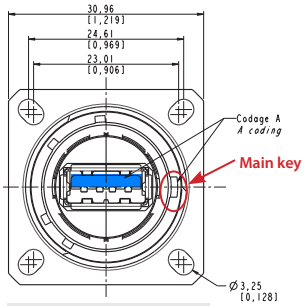
Receptacles

■ Square flange receptacle
4 mounting holes - Shell type 2
Part number type: **USB3 FTV 2 x**

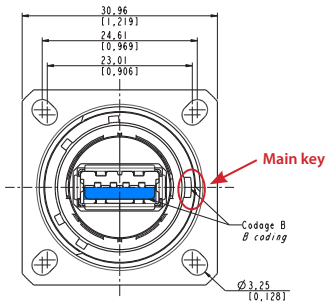




Panel Drilling

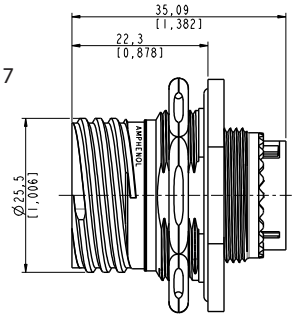


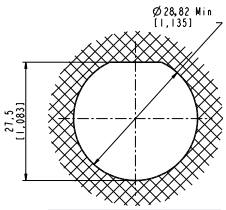
Coding A



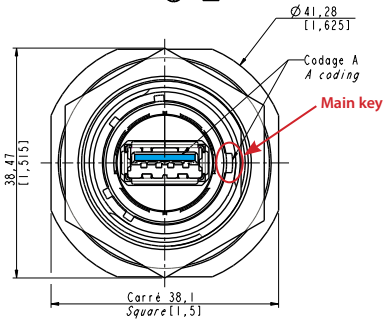
Coding B

■ Jam nut receptacle
Hexagonal nut mounting - Shell type 7
Part number type: **USB3 FTV 7 x**

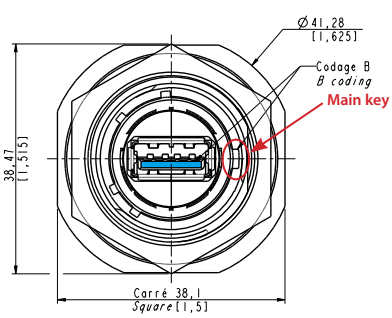




Panel Drilling



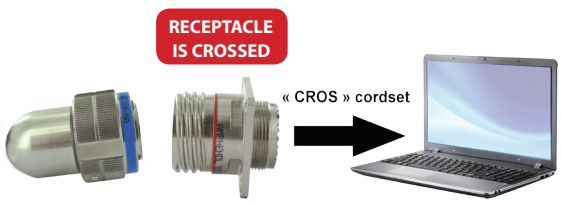
Coding A



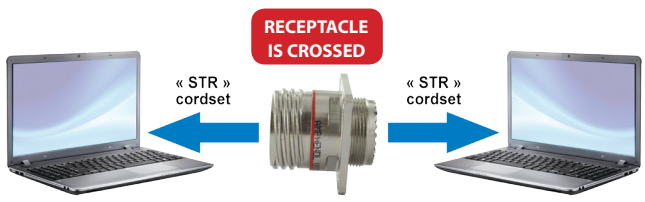
Coding B

Configuration use

For PC to peripheral application, use a crossed USB3 cable
« **CROS** » type in the part number code



For PC to PC application, use a straight USB3 cable
« **STR** » type in the part number code



Part number code: plugs with cordset.

Series USB3 Field TV	USB3F TV	6	A	03	G	STR

Shell type
6: plug (with cordset)

Coding
A or **B**

Cordset length
03: 0.3 m [11.81 inches] **10:** 1 m [39.37 inches]
05: 0.5 m [19.68 inches] **15:** 1.5 m [59.05 inches]

Shells material & finish
G: aluminium shell - olive drab cadmium plating
N: aluminium shell - nickel plating - *ROHS compliant*

Type of cable *
CROS: high reliability USB3 cable crossed
STR: high reliability USB3 cable straight
OPEN: high reliabilty USB3 cable open ⇨ *no plug at the end'*

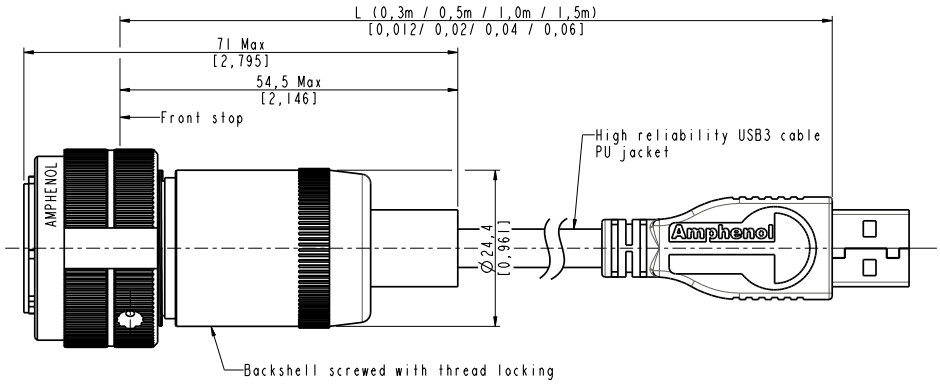
*** IMPORTANT NOTE**
- for PC to PC application, use a "**CROS**" type of cable
- for PC to peripheral application, use a "**STR**" type of cable

*See **Configuration use** on page 87*

Examples: *- plug, coding B, with 0.5m length of high reliability USB3 cable crossed, nickel plating: **USB3F TV 6 B 05 N CROS***
*- plug, coding A, with 1m length of high reliability USB3 cable straight, olive drab plating: **USB3F TV 6 A 10 G STR***
*- plug, coding B, with 0.3m length of high reliability USB3 OPEN, nickel plating: **USB3F TV 6 B 03 N OPEN***

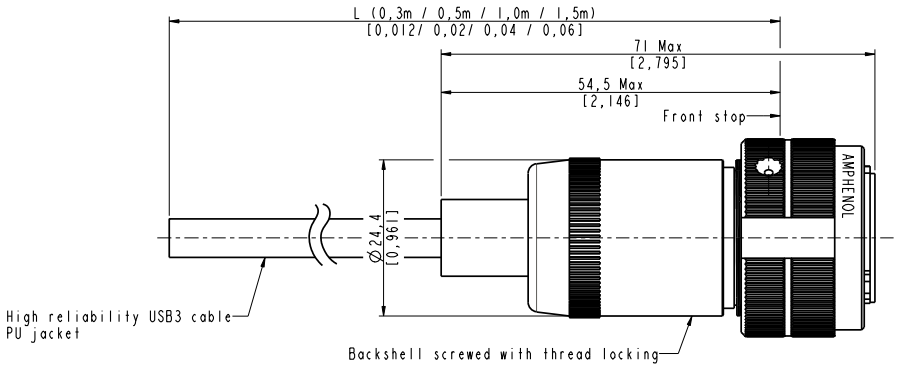
Plug with reinforced USB3.0 cordset

■ Shell type 6
Part number type: **USB3 FTV 6 x xx x CROS**
USB3 FTV 6 x xx x STR

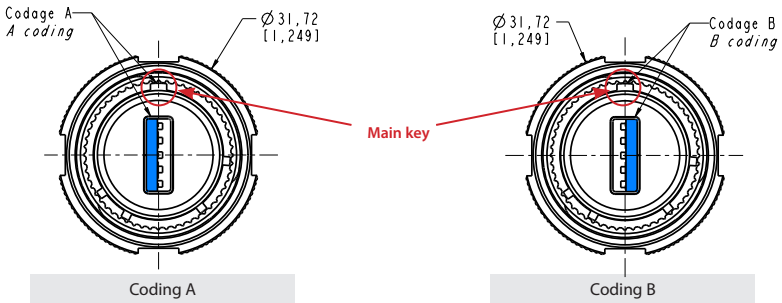


Plug with open reinforced USB3.0 cable

■ Shell type 6
Part number type: **USB3 FTV 6 x xx x OPEN**



2 codings available for plugs

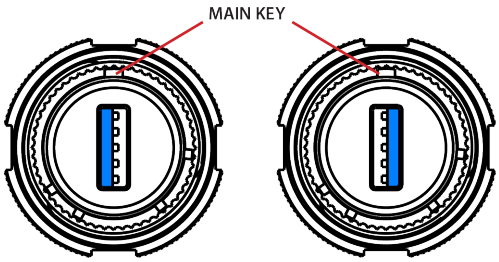


Assembly instructions

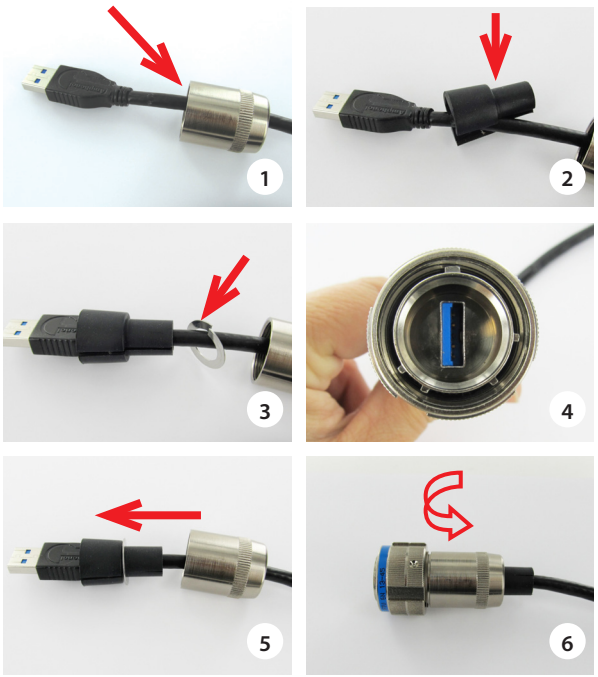
Can be used with most the USB3.0 cordset brands : No tools required!

Plug assembly

1. Insert the USB3 cordset into the metallic backshell
2. Insert the retention spacer laterally to the cable (this spacer is soft, in order to adapt to different shapes of overmolding) and slide the overmolding of the USB3-A plug into this retention spacer
3. Insert the friction ring laterally to the cable
4. Choose the right coding (2 positions) and insert the USB-A plug into the protective plug.Note at this step, the main key is used for polarization through the blue seal.

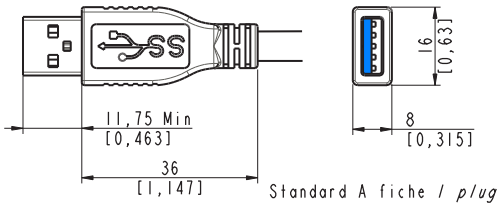


7. Screw the backshell on the plug body. A wrench can be necessary to fully tighten it, and the connection to the receptacle can help



IMPORTANT NOTE
The sealing is done by the blue seal.

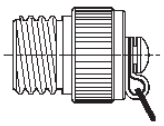
USB3 cordset usable - *Not provided*



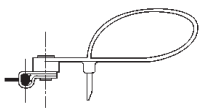
Accessories

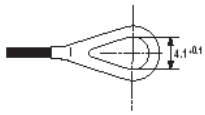
■ **Metallic caps**

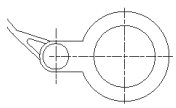
	USBF TVC	2	G
Connector type **6:** plug **2:** square flange receptacle **7:** jam nut eceptacle			
Shells material & finish **N:** aluminium shell - nickel - *ROHS compliant* **G:** aluminium shell - olive drab cadmium **BZ:** marine bronze shell - *ROHS compliant*			


Plug Cap

Receptacle Cap


Plug Cap end


Square flange receptacle cap end


Jam Nut receptacle cap end

■ Panel gasket for square flange receptacle
Thickness: 0,8 mm [.031]
P/n: **JE15**

USB3F TV *(USB-A)*

Transversally sealed receptacles

NEW USB3.0

ROHS COMPLIANT N & BZ

In some applications, a transversal sealing for the receptacle is a « must ». This will prevent fluids and dust from going through the receptacle when plug or cap are not mated to the receptacle. The sealed solution (version "S") has a compound at the rear of the receptacle below. In addition, the Sealed USB3F TV has been successfully tested in very high vibration corresponding to airplane applications.

Main characteristics

- Sealed against fluids and dusts (IP68)
- Shock, vibration and traction resistant
- No cabling operation in field and no tools required
- Improved EMI protection
- Tri Start Thread coupling mechanism (MIL-DTL-38999 series III type) with anti-decoupling device - Shell size 15
- 2 mechanical coding/polarization possibilities by the user (receptacle insert rotation)
- USB3F TV plug retention in the receptacle: 100 N in the axis
- Mating cycles: 500 minimum

Environmental protection

- Sealing (when mated): IP68 (temporary immersion)
- Salt spray: 48 h with nickel plating
  > 500 h with olive drab cadmium
  500 h with marine bronze shell
- Fire retardant / Low smoke: UL94 V0 and NF F 16 101 & 16 102
- Vibrations: 10 – 500 Hz, 10 g, 3 axes: no discontinuity > 1micro s
- Shocks: IK06 ► weight of 250 g drop from 40 cm [15.75 in] onto connectors (mated pair)
- Humidity: 21 days, 43°C, 98% humidity
- Temperature range: - 40°C / +85°C

Applications

- Embedded computers
- Data acquisition and transmission in harsh environment
- Railways
- Battelfield communication systems
- Navy systems

Data transmission

USB specification 3.0
Data rate: up to 5Gb/s for high speed USB

Part number code

Series USB3 Field TV	USB3F TV	2	S	A	03	G	STR
Shell type **2S:** square flange receptacle **7S:** jam nut receptacle							
Coding **A** or **B**							
USB cable length **03:** 0.3 m [11.81 inches] **05:** 0.5 m [19.68 inches] **10:** 1 m [39.37 inches] **15:** 1.5 m [59.05 inches]							
Shells material & finish **G:** aluminium shell - olive drab cadmium plating **N:** aluminium shell - nickel plating - *ROHS compliant*							
Type of cable * **ACROS:** high reliability crossed USB3 cable with plug at the end **ASTR:** high reliability straight USB3 cable with plug at the end **OPEN:** high reliability cable open = no plug at the end							

*** IMPORTANT NOTE**

- for PC to PC application, use a "**CROS**" type of cable
- for PC to peripheral application, use a "**STR**" type of cable

*See **Configuration use** on page 87*

Examples:
*- square flange receptacle, with 0.5m length of high reliability USB3 cable crossed, coding B, nickel plating: **USB3F TV 2 S B 05 N CROS***
*- jam nut receptacle, with 1m length of high reliability USB3 cable straight, coding A, olive drab cadmium plating: **USB3F TV 7 S A 10 G STR***
*- jam nut receptacle, with 0.3m length of high reliability USB3 cable open, coding B, olive drab cadmium plating: **USB3F TV 7 S B 03 G OPEN***

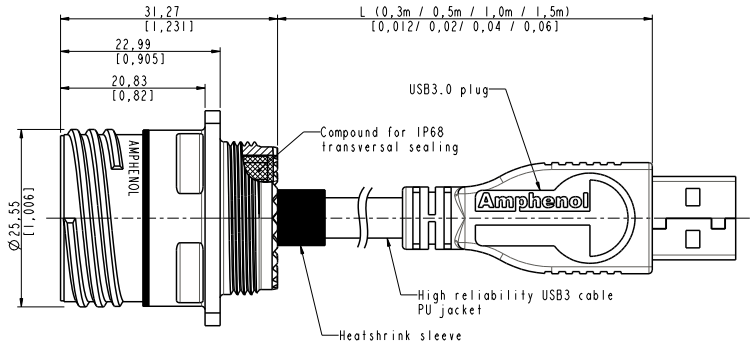
Receptacles with USB-A cordset

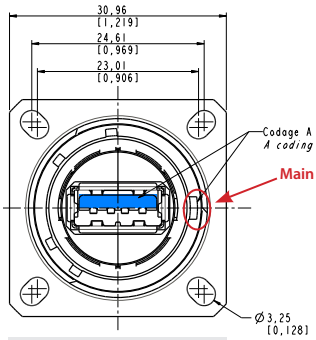
■ Square flange receptacle

4 mounting holes: shell type 2

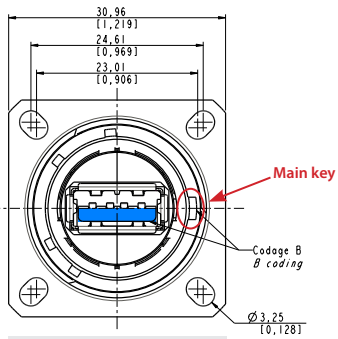
Part number: **USB3 FTV 2 S x xx x CROS**

USB3 FTV 2 S x xx x STR

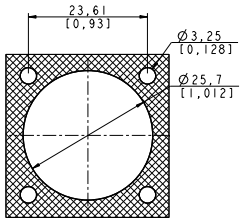




Coding A



Coding B

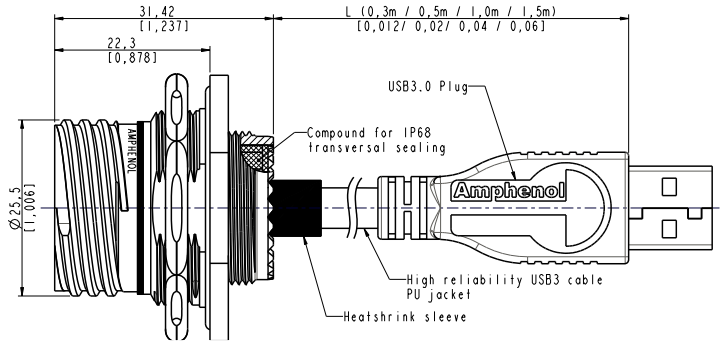


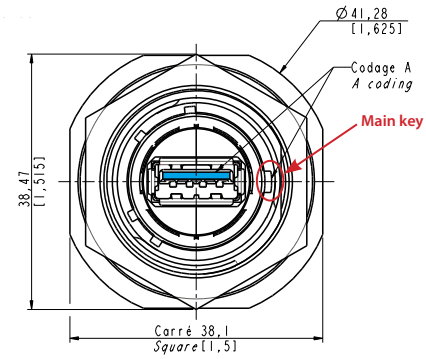
Panel drilling

■ Jam nut receptacle hexagonal nut mounting: shell type 7

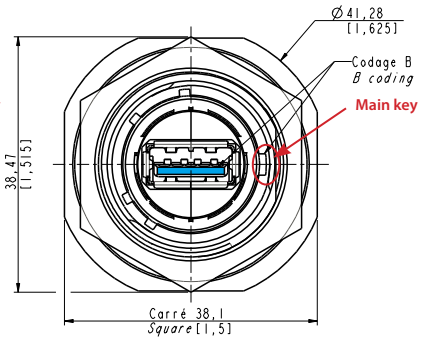
Part number: **USB3 FTV 7 S x xx x CROS**

USB3 FTV 7 S x xx x STR

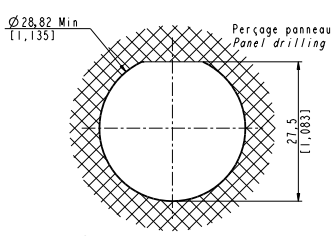




Coding A



Coding B

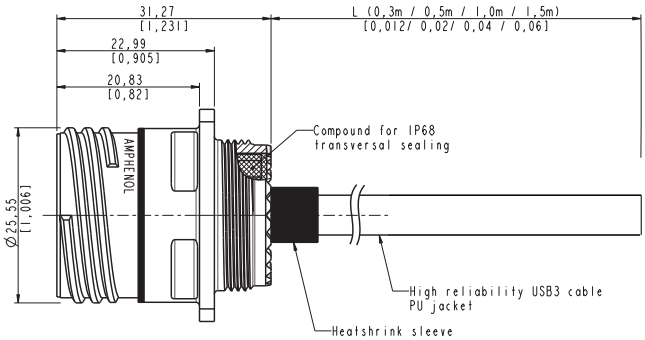


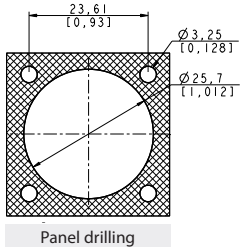
Panel drilling

Receptacles with open reinforced USB3.0 cable

- Square flange receptacle - 4 mounting holes: shell type 2

Part number type: **USB3F TV 2 S A xx x OPEN**

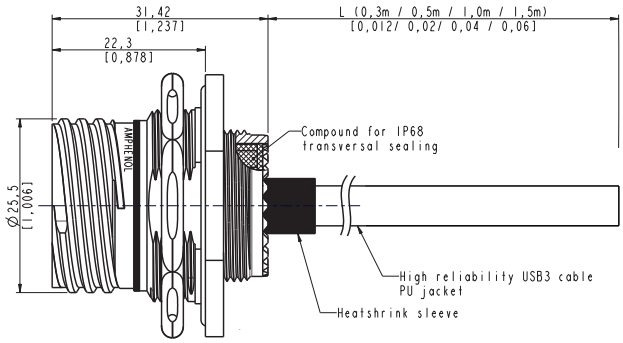


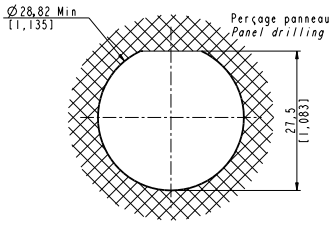


Panel drilling

- Jam nut receptacle hexagonal nut mounting: shell type 7

Part number type: **USB3F TV 7 S A xx x OPEN**





Panel drilling

USB3F TV
Hermetic receptacles

NEW

ROHS COMPLIANT N & BZ

In some applications, a transversal hermiticity for the receptacle is a « must ». This will prevent gas from going through the receptacle when plug or cap are not mated to the receptacle.
The hermetic solution (version "H") has a compound at the rear of the receptacle. Helium leakage is less than 1.10^{-6} cm^3 per second [0.1 micron cubit ft per hour] at one bar [15 psi] pressure differential.

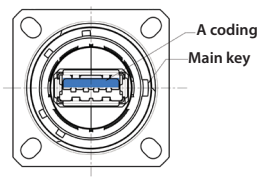
Applications
- Embedded computers
- Data acquisition and transmission in harsh environment
- Railways
- Battelfield communication systems
- Navy systems

Data transmission
USB specification 3.0
Data rate: up to 5Gb/s for high speed USB

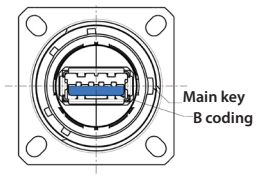
Main characteristics
- Same as the USB3F TV (see page 76)... a complete IP68 sealing of the receptacle is added (even with no plug or no protective cap mated).
- Outside dimensions are the same as the standard USB3F TV (USB-A).
- Vibrations : the compounded version of the USBF TV has been tested in vibration following the NAS 1599 aeronautic specification (ambient temperature):
5 - 3000 Hz, 20g, 2.5 mm [.1 inch] double amplitude, 3 axes, 12 hours
Note: this specification exceeds MIL-C-26500 requirements.

IMPORTANT NOTE
Due to the compound, the coding of the connector must be done in the factory: use the codes A or B in the part number.
Example: USBF3TV 2H **A** 2 N 03 A

Coding A



Coding B



Same for jam nut receptacle.

Part number code

Series USB3 Field TV	USB3F TV	2 H	A	03	G	STR
Shell type **2H:** square flange receptacle **7H:** jam nut receptacle						
Coding **A** or **B**						
USB cable length **03:** 0.3 m [11.81 inches] **05:** 0.5 m [19.68 inches] **10:** 1 m [39.37 inches] **15:** 1.5 m [59.05 inches]						
Shells material & finish **G:** aluminium shell - olive drab cadmium plating **N:** aluminium shell - nickel plating - *ROHS compliant*						
Type of cable * **ACROS:** high reliability crossed USB3 cable with plug at the end **ASTR:** high reliability straight USB3 cable with plug at the end **OPEN:** high reliability cable open = no plug at the end						

*** IMPORTANT NOTE**
- for PC to PC application, use a "**CROS**" type of cable
- for PC to peripheral application, use a "**STR**" type of cable

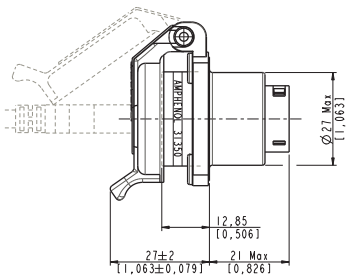
*See **Configuration use** on page 87*

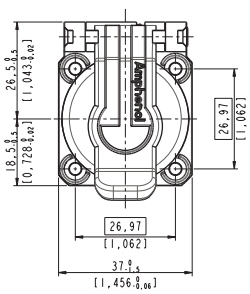
Examples: *- square flange receptacle, with 0.5m length of high reliability USB3 cable crossed, coding B, nickel plating: **USB3F TV 2 H B 05 N CROS***
*- jam nut receptacle, with 1m length of high reliability USB3 cable straight, coding A, ODC plating: **USB3F TV 7 H A 10 G STR***
*- jam nut receptacle, with 0.3m length of high reliability USB3 cable open, coding B, ODC plating: **USB3F TV 7 H B 03 G OPEN***

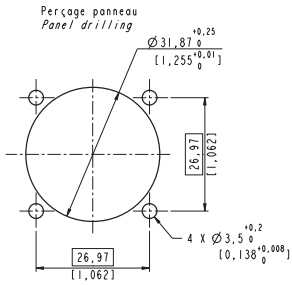
USB3 Receptacle with Self Closing Cap

This Self Closing Cap automatically protects the USB3 square flange receptacles (MIL-C-26482 type), protecting your system from dust and water projections.
The same cap can be used to protect RJ45, USB2.0, USB-B and IEEE1394 receptacles. A spring automatically closes the upper part of the cap when either the RJ Field plug, RJ45 cordset, USB or IEEE1394 cordset, or USB key are removed from the receptacle.

USB3F 21 X SCC





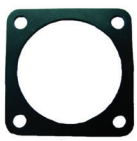


Version: USB-A *(front and back termination)*

		Plating	Metallized inserts (EMI)
Part number *	**USB3F 2B SCC**	Black coated	No
	USB3F 2N SCC	Nickel plated	Yes
	USB3F 2G SCC	Olive drab cadmium plated	Yes

* The part number includes the receptacle + the self closing cap

■ **Note**: Panel gasket with any of these receptacles: **JE18**



RJF 21 X SCC, USBF 21 X SCC, USBBF 21 X SCC, & IEEE1394

RJ45 version

(see page 25)

USB2.0-A version

(see page 107)

USB-B version

(see page 118)

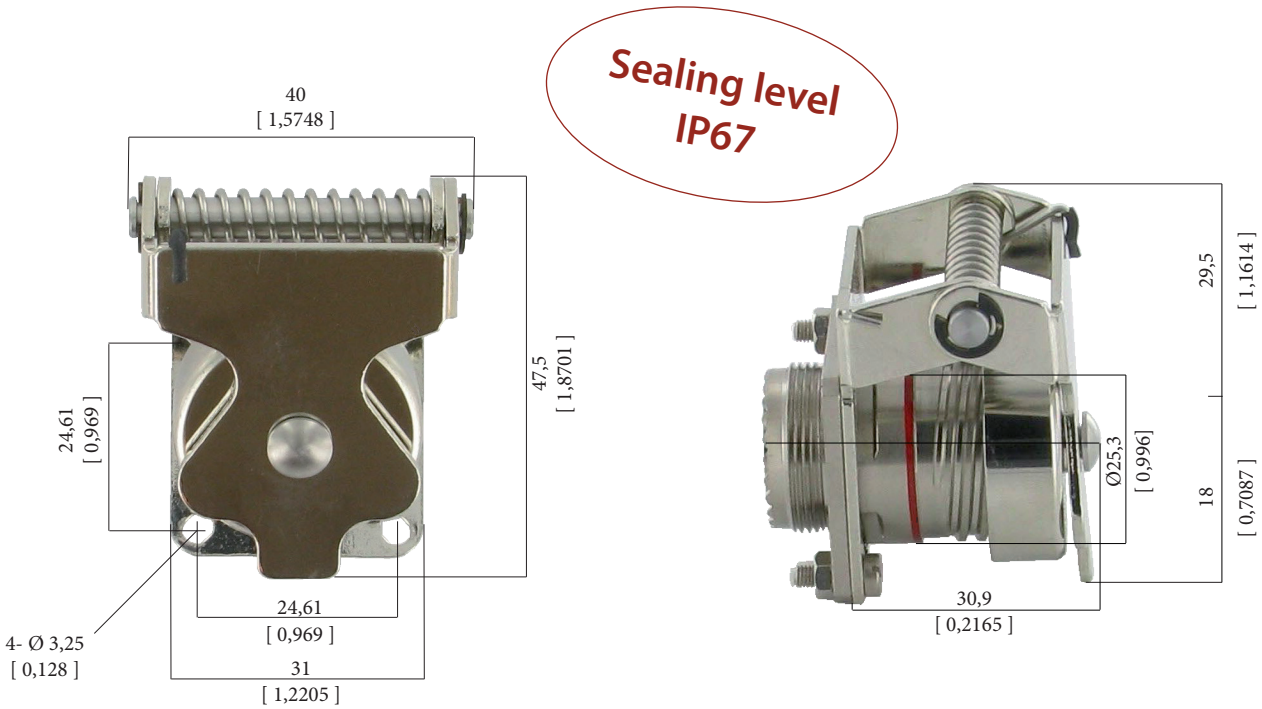
IEEE1394 version

(see page 143)

Metallic Self Closing Cap (SCC)

For USB3F TV square flange receptacles.

This Self Closing cap automatically protects the USB3F TV (type A) square flange receptacles (MIL-DTL-38999 type), protecting your system from dust and water projection.
A spring automatically closes the upper part of the cap when the USB plug is removed from the receptacle.



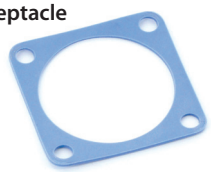
IMPORTANT NOTE
Metal Self Closing caps are sold separately (without receptacle).

	Plating	P/N
Part number	Black - *ROHS compliant*	**USBFTVSCCB**
	Nickel - *ROHS compliant*	**USBFTVSCCN**
	Olive drab cadmium	**USBFTVSCCG**

Remark: also compatible with USBFTV 2.0 (type A) & USBBFTV (type B) square flange receptacles.
USBFTV2XX *(see page 106)*
USBBFTV2XX *(see page 110)*

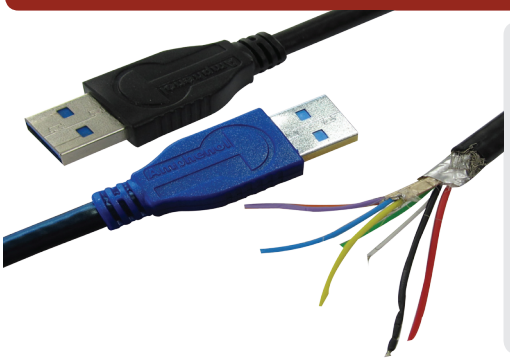
■ **Panel gasket for square flange receptacle (thickness: 0,8 mm [.031]):**

Part number: JE15



High Reliability USB 3.0 Cordsets

ROHS COMPLIANT



General construction: this is a USB-3.0 cable containing two 28 AWG 90Ω USB3.0 parallel shielded pair, one 28 AWG USB2.0 pair, and two 24 AWG power conductors, overall SFTP shields (SFTP = double shielding, braid and foild), jacketed in black UV resistant Polyurethane HFFR*. Designed for fixed or portable applications in industrial and harsh environments.
*HFFR: Halogen Free Flame Retardant.

Jacket compound specification:
Halogen Free Flame Retardant Polyether-based Polyurethane. Glossy finish. Excellent hydrolysis resistance. High microbial resistance. UV resistant. High flexibility.

Applications

- Robotics
- Railways
- Battelfield communication
- Motion control
- CNC machines
- Industrial process

PHYSICAL CHARACTERISTICS

DATA CONDUCTORS	Tinned stranded copper, 7/0.13 mm nom (28 AWG)
DATA INSULATION	1 mm nom
COLOR DATA PAIR	Green & white (USB2.0) Yellow & blue, orange & violet (USB3.0)
POWER CONDUCTORS	Tinned copper, 7/0.2 mm (24 AWG)
POWER INSULATION	1.1 mm nom
COLOR POWER WIRE	Red & Black
SHIELDS	USB 3.0 pair: foil + stranded tinned copper drain wire. Overall: foil + shield braiding of tinner copper wires (coverage 85%).
JACKET	PU compound
COLOR JACKET	Black
WEIGHT	31 lbs/1000ft (46 kg/km)
OUTSIDE DIAM.	0.20 inch (5.7 mm nom. +/- 0.2)
MIN BEND RADIUS *(During operation)*	57 mm (10 x O. D.)
MIN BEND RADIUS *(During installation)*	28.5mm (5 x O.D.)
TEMPERATURE installation & operational	Plus 85°C, minus 40°C

ELECTRICAL CHARACTERISTICS

USB3.0 Parallel pair

Conductor resistance	≤ 210 Ohm/km
Insulation resistance	≥ 200 MOhm/km
Capacitance (1 kHz)	nom. 43 nF/km
Time delay	nom. 5.0 ns/m
Time delay skew	≤ 150 ps/10m
Operating voltage (peak)	≤ 100 V
Impedance	90 ±7 Ohm
Test voltage	500 V

USB2.0 Pair

Electrical requirements acc. to USB2.0	
Impedance	90 ±15 Ohm
Test voltage	500 V

Attenuation

USB3.0 pair-db/10m		USB2.0 pair-db/100m	
625 MHZ	10	**1 MHZ**	4
1250 MHZ	15	**4 MHZ**	7.8
2500 MHZ	25	**8 MHZ**	11.4
5000 MHZ	36	**12 MHZ**	13.4
7000 MHZ	47	**24 MHZ**	19
		48 MHZ	27
		96 MHZ	38
		200 MHZ	64
		400 MHZ	116

Datas for cable alone only (without USB plug)

IMPORTANT NOTE
⇨for PC to PC application, use a **CROSSED** cable
⇨for PC to peripheral application use a **STRAIGHT cable**
see page 87

CORDSETS WITH A USBA PLUG OVERMOLDED ON EACH END

	Length (m/ft)	**CROSSED** wiring part number *Black overmolding*	**STRAIGHT** wiring part number *Blue overmolding*
UNDER USB3 SPECIFICATION ≤1.8 M	0.5 m / 1.64 ft	USB 3 A A CROSSED 050 PU HFFR	USB 3 A A STRAIGHT 050 PU HFFR
	1 m / 3.28 ft	USB 3 A A CROSSED 100 PU HFFR	USB 3 A A STRAIGHT 100 PU HFFR
	1.5 m / 4.92 ft	USB 3 A A CROSSED 150 PU HFFR	USB 3 A A STRAIGHT 150 PU HFFR
	1.8 m / 5.91 ft	USB 3 A A CROSSED 180 PU HFFR	USB 3 A A STRAIGHT 180 PU HFFR
OUT OF USB3 SPECIFICATION >1.8 M	2 m / 6.56 ft	USB 3 A A CROSSED 200 PU HFFR	USB 3 A A STRAIGHT 200 PU HFFR
	2.5 m / 8.20 ft	USB 3 A A CROSSED 250 PU HFFR	USB 3 A A STRAIGHT 250 PU HFFR
	3 m / 9.84 ft	USB 3 A A CROSSED 300 PU HFFR	USB 3 A A STRAIGHT 300 PU HFFR
	3.5 m / 11.48 ft	USB 3 A A CROSSED 350 PU HFFR	USB 3 A A STRAIGHT 350 PU HFFR
	4 m / 13.12 ft	USB 3 A A CROSSED 400 PU HFFR	USB 3 A A STRAIGHT 400 PU HFFR
	4.5 m / 14.76 ft	USB 3 A A CROSSED 450 PU HFFR	USB 3 A A STRAIGHT 450 PU HFFR
	5 m / 16.40 ft	USB 3 A A CROSSED 500 PU HFFR	USB 3 A A STRAIGHT 500 PU HFFR