

SECTION 3



Expanded Beam

Expanded Beam Solutions

F739, F746



Contents

Introduction	
Expanded Beam Solutions	3-2
Markets and Applications	3-2
International Standard Documents Compliance	3-2
Expanded Beam Technology	3-3
Features and Benefits	3-3
Product Range Overview	3-4
EB Tactical Cable Assemblies - F739 Series	
Features and Benefits	3-5
Characteristics and Performance	3-6
Connector Dimensions	3-7
How to Order	3-8
Reels Range	3-9
Range Extension	3-9
EB-LuxCis® Product Range - F746 Series	
Features and Benefits	3-10
Characteristics and Performance	3-10
Product Range	3-11
Range Extension	3-12

Introduction

EXPANDED BEAM SOLUTIONS

Radiall offers a wide range of interconnect solutions based on Expanded Beam (EB) technology. Experience and expertise allow Radiall to provide high quality products in support of demanding applications. Expanded beam is a flexible solution that brings reliable optical performance in harsh environments, especially when ease of cleaning, maintenance or a high number of matings is required.

MARKETS AND APPLICATIONS

Aerospace



Defense



Industrial



Aerospace

Avionics, data link high speed digital transmissions

Military

Field deployable communication, mobile shelters, marine and battlefield environments

Geophysical

Oil and gas, mining, seismic exploration systems

Other Applications

Broadcast, robotics, transportation, sensors



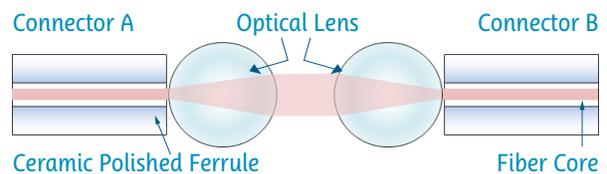
- MIL-DTL-83526/20 and MIL-DTL-83526/21
- RoHS compliant



Introduction

EXPANDED BEAM TECHNOLOGY

Expanded Beam technology uses a precision lens on one mating end (connector A) to collimate and expand the emerging light beam, before a matching lens on the other mating end (connector B) refocuses the light back into the fiber core.



EB technology offers a contactless connection which increases the number of mating cycles compared to connectors based on Physical Contact technology. Due to the signal being expanded, the connection is also less sensitive to particular contamination and supports an easier cleaning process. This makes it the ideal choice for demanding applications requiring ease of maintenance in highly contaminated environments.

The diagram compares a Standard Beam and an Expanded Beam. The Standard Beam is shown as a small circle with a dust particle and a misalignment arrow. The Expanded Beam is shown as a larger circle, also with a dust particle and a misalignment arrow. The Expanded Beam is significantly larger than the Standard Beam, making it less sensitive to dust and misalignment.

- Lateral misalignment has less effect on transmission loss when the light beam is expanded.
- Particulate contamination has less effect on transmission loss when the light beam is expanded.

Reliable Connection

- Contactless connection increasing operational longevity and reliability
- Less sensitivity to lateral misalignment and particulate contamination

Field Optimized Technology

- Easy cleaning
- Resistance to mechanical shock and vibration

Versatile Solution

- Compatible with MultiMode and SingleMode fibers
- Adapted to various cable configurations
- Wide range of Expanded Beam interconnect solutions

Our Most Important Connection is with You.™

Introduction

PRODUCT RANGE OVERVIEW

Radiall offers a variety of custom cable assemblies featuring Expanded Beam technology, in two series:

EB Tactical Cable Assemblies - F739 Series:

Ruggedized and easy to deploy and maintain in the field, cable assemblies equipped with Expanded Beam Tactical connectors are well adapted to outdoor and demanding applications in the field.



EB-LuxCis® Product Range - F746 Series:

EB-LuxCis® product range combines the benefits of the LuxCis® ARINC 801 fiber optic contact and Expanded Beam technology where multipin connectors are widely used.



EB Tactical Cable Assemblies - F739 Series



Radiall designs, manufactures and supplies cable assemblies equipped with EB Tactical connectors to withstand the most demanding environments. These rugged cable assemblies feature high robustness with ease of deployment and low maintenance in the field.

EXPANDED BEAM TECHNOLOGY - KEY BENEFITS:

Reliable Connection

- Contactless connection increasing operational longevity and reliability
- Less sensitivity to lateral misalignment and particulate contamination

Field Optimized Technology

- Easy cleaning
- Resistance to mechanical shock and vibration

Versatile Solution

- Compatible with MultiMode and SingleMode fibers
- Adapted to various cable configurations
- Wide range of Expanded Beam interconnect solutions

EB TACTICAL CABLE ASSEMBLIES - KEY BENEFITS:

Field Optimized

- Hermaphroditic (genderless) design for fast and easy connection, enabling mistake-proof tactical field deployment and daisy chaining (concatenation) configurations to address longer links in the field.

Flexible Configuration

- Different operating wavelengths available (850 nm/1300 nm dual wavelengths, 1310 nm or 1550 nm wavelengths)
- Expanded Beam receptacles available in square flange and jam nut (D-hole)
- EB Tactical connectors are available with up to 4 channels

Ruggedized Solution

- Robust construction with very high mating cycle capability: up to 3000 cycles

EB Tactical Cable Assemblies - F739 Series

The EB Tactical connectors are designed to MIL-DTL-83526/20 & /21 mechanical interface standards.

OPTICAL CHARACTERISTICS

	MultiMode PC 1300 nm	SingleMode PC 1310 nm
Insertion Loss* (Typical)	0.7 dB	0.7 dB
Insertion Loss (Maximum)	1.5 dB	2 dB
Return Loss**		>34 dB

*When tested with reference quality launch/receive cable assemblies

**RL tested unmated

MECHANICAL CHARACTERISTICS

Vibration, sinusoidal	10–500 Hz, 3 directions, 0.75 mm amplitude, 10 G acceleration
Bumps	4000 bumps, 3 directions, 40 G acceleration
Free fall on concrete, severity 1.2 m	500 falls
Mating endurance	Up to 3000 mating cycles

Operating temperature range	-40°C/+85°C
Storage temperature	-55°C/+85°C
Humidity (damp heat)	95% RH
Water immersion	15 m depth

MATERIALS

Shell	Aluminum
Plating	Clear hard anodized
Plug Boot	EPDM rubber (high resistance to tearing and damage, ideal for outdoor exposure)

Expanded Beam connectors are optimized for the following operating wavelengths:

- MM 850 nm
- MM 1300 nm
- SM 1310 nm
- SM 1550 nm

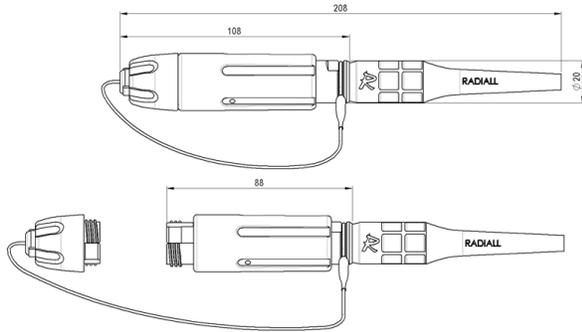
Other wavelengths can be used as well (for WDM applications for example).

For other wavelengths or materials such as Nickel Aluminum Bronze connectors for naval applications, please contact your local Radiall representative.

EB Tactical Cable Assemblies - F739 Series

CONNECTOR DIMENSIONS

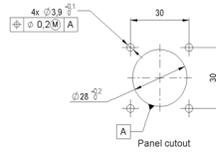
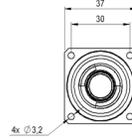
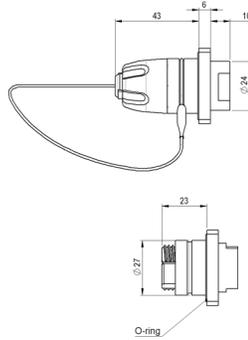
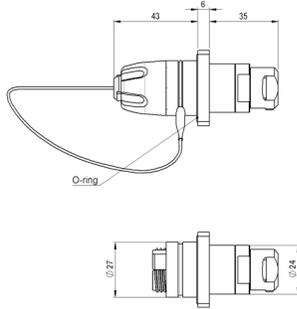
Expanded Beam Tactical Plug



Expanded Beam Tactical Square Flange Bulkhead

For Multi-fiber cable

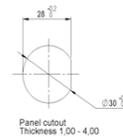
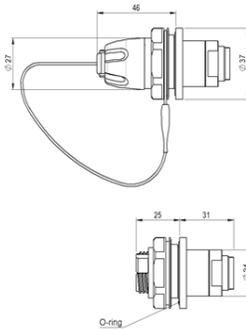
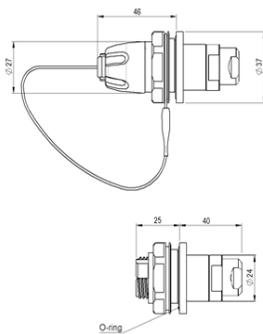
Low profile, to be assembled with up to 4 individual cables, max diameter 1.6 mm



Expanded Beam Tactical Jam Nut (D-Hole) Bulkhead Receptacle

For Multi-fiber cable

Low profile, to be assembled with up to 4 individual cables, max diameter 1.6 mm



Dimensions in mm

EB Tactical Cable Assemblies - F739 Series

Use this configurator to define a tactical cable assembly using Expanded Beam Junior connectors. This configurator will provide a temporary code that will reflect your desired configuration. Based on this code, Radiall will create a unique Part Number for your custom assembly. EB Junior size tactical connectors are designed to MIL-DTL-83526/20 & /21 mechanical interfaces standards.



Temporary Code: **F739 P P 2 2 1 0 C 200**

F739 Series: EB tactical cable assembly

End 1: Junior size EB tactical connector

- P: EB Plug
- J: EB Receptacle - Jam Nut
- F: EB Receptacle - Square Flange

End 2:

- P: EB Plug
- J: EB Receptacle - Jam Nut
- F: EB Receptacle - Square Flange
- 2: No Termination
- 3: LC UPC
- 4: LC APC
- 5: ST PC
- 6: SC PC
- 8: FC PC
- 7: LuxCis® APC
- 9: LuxCis® UPC

Channel:

- 2: 2 Channels
- 4: 4 Channels

Fiber type:

- 2: Singlemode 1310 nm
- 3: Singlemode 1550 nm
- 4: Multimode 50/125 µm, OM3, 850/1300 nm⁽¹⁾
- 5: Multimode 50/125 µm, OM2, 850/1300 nm⁽¹⁾
- 6: Multimode 62.5/125µm, 850/1300 nm⁽¹⁾

Cable type:

- 1: 5.0-6.0 mm Multifiber
- 4: 5.0-6.0 mm Multifiber, Antirodent
- 5: 1.6-1.8 mm Simplex fiber⁽²⁾
- 6: Armored Multifiber

Reel Option:

- 0: No cable reel (up to 20 m cable length)
- 1: Field deployable reel
- 5: Reel for backpack (applicable for cable up to 900 m)
- 6: Disposable reel

Length unit:

- C: Centimeter
- M: Meter

Length of cable:

- (1): not valid for LC APC and LuxCis APC
- (2): not valid for EB Plugs

Each cable assembly is labeled with a heat shrink sleeve with Radiall PN and date code. For any other cable assembly configuration or specific requirements (additional testing, specific labeling, additional protection or different type of cable), please contact your local Radiall representative and we will provide a technical datasheet for validation.

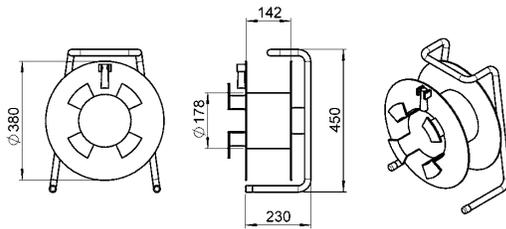
EB Tactical Cable Assemblies - F739 Series

REELS RANGE

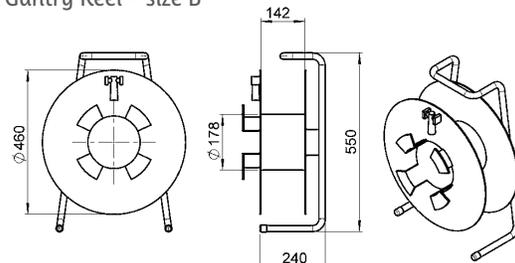
Radiall provides cable assemblies with various field orientated accessories such as reels and backpack reels.

Standard cable drums are available in 3 sizes:

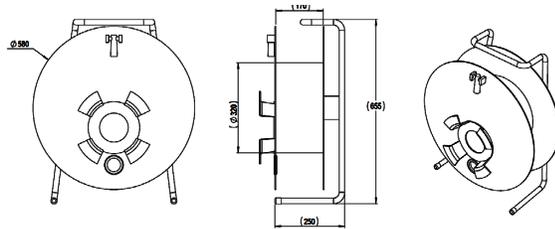
Gantry Reel – size A



Gantry Reel – size B



Gantry Reel – size C



Gantry drum, with braking device and handle crank

	Size A	Size B	Size C
Color	Black		
Weight	5.90 kg	8.20 kg	13.9 kg
Cable assembly max. length	Up to 280 m (with a 6 mm cable)	Up to 450 m (with a 6 mm cable)	Up to 850 m



RANGE EXTENSION

Not all accessories are displayed in this catalog.

Radiall is also designing other Expanded Beam solutions that provide:

- Smaller size with the mini insert (shrunken version of the Junior insert)
- More channels
- Hybrid configurations
- Environment specific designs

For any additional information, please contact your local Radiall representative.

EB-LuxCis® Product Range - F746 Series



Radiall's product line also features the EB-LuxCis® product range, bringing the benefits of the LuxCis® ARINC 801 fiber optic contact and Expanded Beam technology where multipin connectors are widely used.

The EB-LuxCis® product range combines the widely used LuxCis® ARINC 801 fiber optic contact inserted in a 2 or 4 channel (MM or SM) Expanded Beam insert, which can be used in various circular or rectangular connectors.

It is the ideal solution for demanding applications requiring ease of maintenance in highly contaminated environments.



FEATURES AND BENEFITS

EXPANDED BEAM TECHNOLOGY - KEY BENEFITS:

Reliable Connection

- Contactless connection increasing operational longevity and reliability
- Less sensitivity to lateral misalignment and particulate contamination

Field Optimized Technology

- Easy cleaning
- Resistance to mechanical shock and vibration

Versatile Solution

- Compatible with MultiMode and SingleMode fibers
- Adapted to various cable configurations
- Wide range of Expanded Beam interconnect solutions

EB-LUXCIS® - KEY BENEFITS:

Improved Field Maintenance

- Combined with standard LuxCis® ARINC 801 contacts, a standardized interface
- Easy insertion and extraction of the contacts using standard tools

Flexible Configuration

- Non-hermaphroditic and hermaphroditic inserts available
- Wide product range available: MIL-DTL-38999, EPX®, NSX ARINC 600, EN 4165

Ruggedized Solution

- Robust construction based on widely used multipin connectors in harsh environments
- Scoop proof inserts available
- Interfacial seal and O-ring system to ensure a good sealing level

EB-LuxCis® Product Range - F746 Series

CHARACTERISTICS AND PERFORMANCE

OPTICAL CHARACTERISTICS

Test	Standard	EB-LuxCis® EN4165 Rack & Panel or D38999 Connector	
		SingleMode PC 1310-1550 nm	MultiMode PC 850 nm
Insertion Loss (maximum)	EN2591-601	2 dB	2 dB
Return Loss	EN2591-605	>30 dB	>20 dB

MECHANICAL CHARACTERISTICS

Test	Standard	EB-LuxCis® EN4165 Rack & Panel or D38999 Connector
Vibration	EN2591-6403 Method B	up to 16 Grms
Shocks	EN2591-6402 Method A 3 directions	100 G
Durability (mating/unmating)	EN2591-6406	500 cycles
Cable retention 1.8 mm diameter		68 N

ENVIRONMENTAL CHARACTERISTICS

Test	Standard	EB-LuxCis® EN4165 Rack & Panel or D38999 Connector
Operating temperature	EN2591-6305	-55°C/+125°C (cable dependent)
Temperature endurance	EN2591-6301 Method B	1000 h at 125°C (cable dependent)
Altitude immersion at low pressure	EN2591-6314	65,000 feet

Note: The EB-LuxCis® has passed a full qualification. Not all the tests performed are described in the tables above. Request for information on a test not mentioned in the table or harsher conditions shall be addressed to your local Radiall representative.

EB-LuxCis® Product Range - F746 Series

PRODUCT RANGE

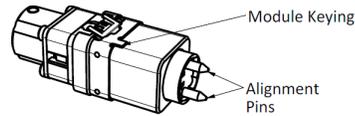
Radiall designs, manufactures and delivers harnesses equipped with EB-LuxCis® interconnect solutions for demanding applications requiring ease of maintenance in highly contaminated environments.

The EB-LuxCis® can accommodate either MultiMode or SingleMode fibers and up to 4 cable assemblies equipped with LuxCis® ARINC 801 contacts. It is available in hermaphroditic (for easier mating possibility) and non-hermaphroditic versions (male/female to avoid channels inversion).

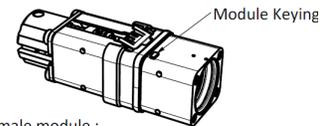
MIL-DTL-38999 size 11 connector



EN4165 module



Male module :
For EN4165 Series III PLUGS



Female module :
For EN4165 Series II RECEPTACLES

RANGE EXTENSION

MPX® MIL-DTL-83527B / AECMA EN3682 connector



EPX® connector



For any additional information, please contact your local Radiall representative.