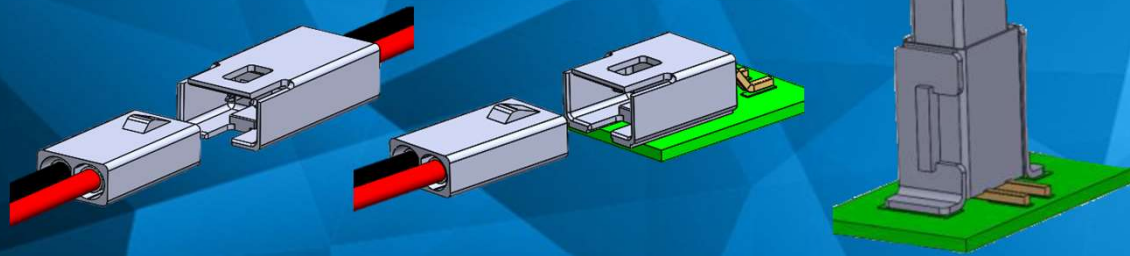


LED Lighting Connectors for Zhaga Book 20 Standard Indoor Lighting



**Amphenol Information Communications
and Commercial Products**

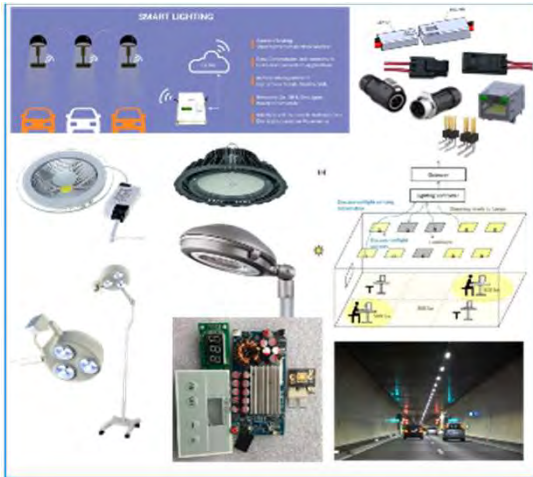
**Industrial IO &
Lighting Solutions**

Amphenol ICC

LED Lighting Products

Commercial / Industrial Lighting, Indoor & Outdoor

Industrial IO & Lighting
Solutions



The use of LED Lighting products and systems is growing substantially in both new and existing applications. Amphenol is focused on Commercial and Industrial applications, with a growing range of interconnect products.

- Roadway & Smart Lighting
- Industrial Lighting
- Indoor & Outdoor Commercial Lighting
- Medical Lighting
- Agricultural Lighting



Roadway Dimming & Sensor Connectors



2 different Standards

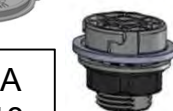
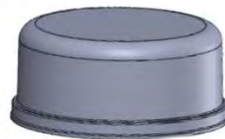
- NEMA/ANSI
- Zhaga Book 18

Mount on Roadway Lights, Connect Dimming and Sensor Modules.

- Receptacles
- Bases
- Covers
- Caps

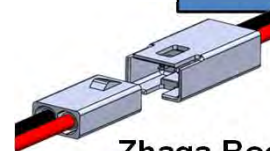


NEMA/
ANSI



ZHAGA
Book 18

Other Connectors for LED Lighting



Zhaga Book 20

Interior connector 2 contact for module components (DALI)



FLH – IP67

Sealed WTW, 2-6 contact for modular interior/exterior connections



MRD – IP67

Sealed WTW/WTP, secure latching, for exterior lighting and other Industrial applications



Modular Jacks

Suitable for PoE Lighting, other internal module interconnects

Amphenol ICC

Zhaga Book 20 FLM Series

WTW, Digital Lighting Control



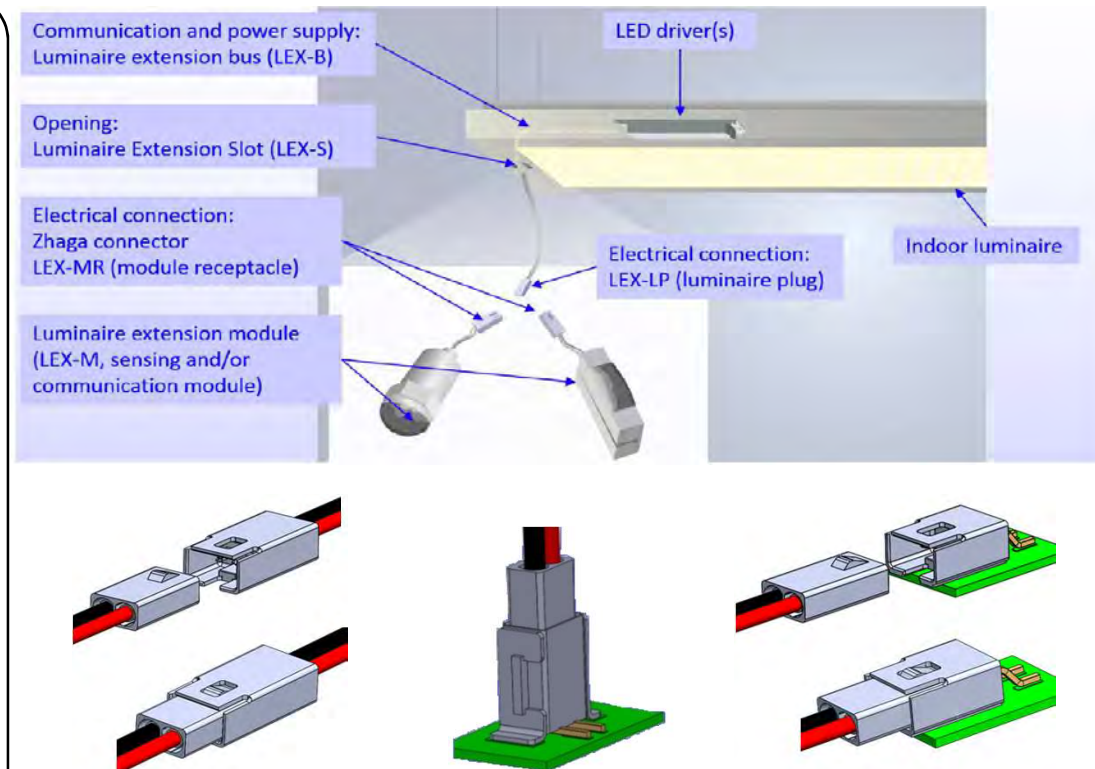
Industrial IO & Lighting
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✓ Industry Standard:

- Zhaga Book 20 defines a separable mating interface for sensors in intelligent building networks.
- Complies with the Digital Addressable Lighting Interface (DALI) standard.
- Enables “plug and play” operability for indoor LED luminaires and sensors or communication modules.
- Amphenol is an integral member of the Zhaga committee.
- Amphenol’s Book 20 connector design now adopted as the new Zhaga standard DALI interface.
- RoHS compliant per EU directive 2011/65/EU & amendments.

✓ Features & Configurations

- 2 position connector (DALI & Ground).
- Snap in housing retention feature ensures reliable connectivity and easy field installation
- Wire to Wire, Wire to Board
- Receptacles have pin contacts; Plugs have socket contacts.
- PCB mount receptacles are SMT, right angle and vertical
- Wire mount receptacles are available for use with crimp pin contacts or with integrated pin contacts for poke-in wire terminations
- Plugs are available for use with crimp socket contacts or with integrated socket contacts for pPoke-in wire terminations



FLM Part Numbering (Zhaga Book 20)



Industrial IO & Lighting
Solutions

ZHAGA BOOK 20 FLM SERIES PLUGS AND RECEPTACLES

Product Numbering System

Series

FLM FLM Series Zhaga Book 20

Part Description

P PIN Connector (LEX-MR Receptacle)
S SOCKET Connector (LEX-LP Plug)

Number of Contacts

2 Number of Contacts (always 2 unless otherwise specified)

Termination, Mounting Style

1 Crimp termination, vertical exit
2 Right Angle termination, SMT
3 Push-in wire termination
4 Right Angle PCB termination
5 Vertical SMT with hold down tabs
6 Vertical PCB termination

Modifier

00 Black Housing (Standard)
W0 White Housing
-01-99 Modifier for custom configurations

LEX = Luminaire Extension
MR = Module Receptacle
LP = Luminaire Plug

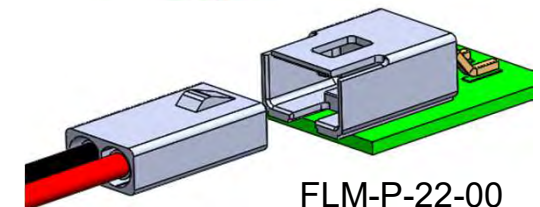
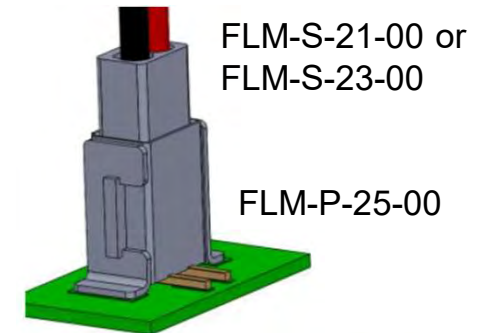
FLM

- X

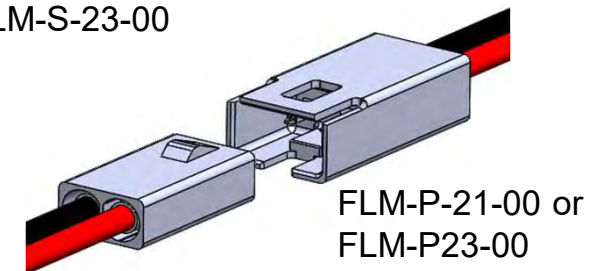
2

X

- XX



FLM-S-21-00 or
FLM-S-23-00



FLM-S-21-00 or
FLM-S-23-00

Electrical Characteristics

Current Rating:	7A max per circuit for 18AWG wire @ 25°C (per IEC 60512, Test 5b) 5A max per circuit for 20AWG wire @ 25°C (per IEC 60512, Test 5b) 3A max per circuit for 22AWG wire @ 25°C (per IEC 60512, Test 5b)
Voltage Rating:	250 VAC/VDC max
Contact Resistance (LLCR):	$\Delta 20\text{m}\Omega$ max after environmental exposure (per IEC 60512-2-1, Test 2a)
Insulation Resistance:	500 M Ω min @ 500 VDC test voltage (per IEC 60512-3-1, Test 3a)
Dielectric Withstanding Voltage:	1.5 kVDC (per IEC 60512-4-1, Test 4a, Method A)

Mechanical/Environmental Characteristics

Mechanical Shock:	50 G's, $\frac{1}{2}$ sine, 11ms (per EIA-364-27)
Vibration:	Per EIA-364-28, Condition VII, Letter D
Mating Cycle Durability:	25 cycles (per EIA-364-09)
Operating Temperature:	-40°C to +105°C
Thermal Shock:	25 cycles between -40°C and +65C (per EIA-364-32)
Temperature Rise:	30°C ΔT @ rated current (Per EIA-364-70)

Material Characteristics

FLM Series components are RoHS compliant per EU directive 2011/65/EU and amendments.

Unless otherwise specified, the materials for each component shall be:

- Housing: High temperature resistant thermoplastic, UL94-V0 flammability rating; white or black
- Contacts: Copper alloy, plated with matte Tin over Nickel

Certifications

UL file# E64911
Zhaga Certified

FLM Product Specification

- **S6172C** Rev 1.2 FLM Zhaga Book 20 Interface Connector

Product Drawings

- **P-FLM-P21-XX:** FLM SERIES, LEX-MR RECEPTACLE WITH CRIMP PIN CONTACTS, RoHS COMPLIANT
- **P-FLM-P22-XX:** FLM SERIES, LEX-MR RIGHT ANGLE SMT RECEPTACLE, RoHS COMPLIANT
- **P-FLM-P23-XX:** FLM SERIES, LEX-MR RECEPTACLE WITH WIRE POKE-IN CONTACTS, RoHS COMPLIANT
- **P-FLM-P25-XX:** FLM SERIES, LEX-MR VERTICAL SMT RECEPTACLE, RoHS COMPLIANT
- **P-FLM-S21-XX:** FLM SERIES, LEX-LP PLUG WITH CRIMP CONTACTS, RoHS COMPLIANT
- **P-FLM-S23-XX:** FLM SERIES, LEX-LP PLUG WITH WIRE POKE-IN CONTACTS, RoHS COMPLIANT
- **P-FLH-PC136-XXX:** FLH SERIES, 2.5MM PITCH PIN CONTACT, CRIMP TERMINATION RoHS COMPLIANT
- **P-FLH-SC136-XXX:** FLH SERIES, 2.5MM PITCH SOCKET CONTACT, CRIMP TERMINATION RoHS COMPLIANT

Product Models (IGES, STEP)

- **M-FLM-P21-XX:** FLM SERIES, LEX-MR RECEPTACLE WITH CRIMP PIN CONTACTS, RoHS COMPLIANT
- **M-FLM-P22-XX:** FLM SERIES, LEX-MR RIGHT ANGLE SMT RECEPTACLE, RoHS COMPLIANT
- **M-FLM-P23-XX:** FLM SERIES, LEX-MR RECEPTACLE WITH WIRE POKE-IN CONTACTS, RoHS COMPLIANT
- **M-FLM-P25-XX:** FLM SERIES, LEX-MR VERTICAL SMT RECEPTACLE, RoHS COMPLIANT
- **M-FLM-S21-XX:** FLM SERIES, LEX-LP PLUG WITH CRIMP CONTACTS, RoHS COMPLIANT
- **M-FLM-S23-XX:** FLM SERIES, LEX-LP PLUG WITH WIRE POKE-IN CONTACTS, RoHS COMPLIANT
- **M-FLH-PC136-XXX:** FLH SERIES, 2.5MM PITCH PIN CONTACT, CRIMP TERMINATION RoHS COMPLIANT
- **M-FLH-SC136-XXX:** FLH SERIES, 2.5MM PITCH SOCKET CONTACT, CRIMP TERMINATION RoHS COMPLIANT

Zhaga Book 20 FLM Series Data Sheet

Industrial IO & Lighting Solutions

Industrial IO & Lighting Solutions



Zhaga Book 20 Compliant – FLM Series

DALI INTERFACE CONNECTORS FOR INDOOR LUMINAIRES

The FLM Series products are compliant with the Zhaga Book 20. Zhaga Book 20 specifies 2 position connectors identified as Luminaire Extension Module Receptacles (LEX-MR) and Luminaire Plugs (LEX-LP), used for DALI-2 (Digital Addressable Lighting Interface) applications. DALI-2 is a smart interface protocol between indoor luminaires and sensors and communication modules.

Amphenol's standardized Book 20 FLM Series connectors allow modules to connect to the LED driver and control system. The modules can be easily field serviced and replaced when necessary. The FLM Series connectors are available in Wire-to-Wire and Wire-to-Board configurations. The pin contact connectors (LEX-MR receptacles) are available as right angle or vertical PCB mount with SMT tails, or as wire termination housings for use with crimp contacts (purchased separately). The socket contact connectors (LEX-LP plugs) are available for use with wire crimp contacts (purchased separately), or with integrated contacts with poke-in wire termination.



TARGET MARKETS



- Dimple latching with Poka-Yoke mating alignment feature
- DALI-2 bus enables bi-directional communication between luminaires and modules
- Plug available with tool-less poke-in termination
- Compliant with all Zhaga DALI Book 20 applications
- LEX-LP connector provides finger-proof contact protection

FEATURES

- 2 position separable interface with Poka Yoke features
- Integrated low-profile dimple latch feature provides 5N minimum retention
- SMT Receptacles are available in Right Angle and Vertical configurations
- SMT receptacles feature diamond shaped molded alignment pegs
- Plug available with crimp socket contacts (available on reel) or poke-in wire termination options
- LEX-LP connector is IP20 finger-proof design

BENEFITS

- Enables DALI-2 protocol and ensures correct mating alignment
- Provides secure mating, with easy unmating
- Versatile design options
- Holds SMT connectors to board in secure orientation during soldering process
- Options allow high volume assembly, or easy field assembly/servicing
- Housing protects contacts in unmated condition

Zhaga Book 20 Compliant – FLM Series

TECHNICAL INFORMATION

MATERIAL

- Housings: High temperature resistant thermoplastic, UL94V-0
- Contacts: Copper alloy, plated with matte tin over nickel

MECHANICAL PERFORMANCE

- Mechanical Shock: 50G's, ½ sine, 11ms, per EIA-364-27
- Vibration: Cond VII, Letter D per EIA-364-28
- Durability: 25 Mating cycles, per EIA-364-09

ELECTRICAL PERFORMANCE

- Current Rating:
 - 7A max. per circuit with 18AWG wire
 - 5A max. per circuit with 20AWG wire
 - 3A max. per circuit with 22AWG wire
- Voltage Rating: 250VAC / VDC
- Contact Resistance (LLCR): $\Delta 20m\Omega$ max. after environmental exposure
- Insulation Resistance: 500M Ω min. @ 500VDC test voltage
- Dielectric Withstanding Voltage: 1500VAC

PACKAGING

- Tape and Reel (PCB Mount Receptacles)
- Reel (Crimp Contacts)
- Bulk Pack (Wire Termination Housings)

SPECIFICATION

- Zhaga Interface Specification Book 20
- Amphenol Product Specification S6172C
- RoHS Compliant per EU Directive 2011/65/EU and amendments

ENVIRONMENTAL

- Operating Temperature Range: -40°C to +105°C
- Thermal Shock: 25 cycles between -40°C and +105°C, per EIA-364-32
- Temperature Rise: 30°C max. ΔT @ rated current, per EIA-364-70

APPROVALS AND CERTIFICATIONS

- UL Certified – file# E64911
- Zhaga certified

TOOLING INFORMATION

- Crimp contacts to be terminated in accordance with Amphenol Application specification S6174C, using Hand tool FLH-CT-0-01 or Semi Automated machine FLH-CT-0-02

TARGET MARKETS/APPLICATIONS



Light Level Sensing
Presence Detection
Air Quality Monitoring
Push Button Controls
Wireless Networking
People Counting
Temperature Sensing
Audio Sensing

PART NUMBERS

Description	Part Numbers
Receptacle Housing, FLM Series, Zhaga Book 20, LEX-MR for Crimp Pin Contacts	FLM-P21-X0
Receptacle, FLM Series, Zhaga Book 20, LEX-MR, Poke-In Wire termination, Pin Contacts	FLM-P23-X0
Receptacle, FLM Series, Zhaga Book 20, LEX-MR Right Angle SMT, Pin Contacts	FLM-P22-X0
Receptacle, FLM Series, Zhaga Book 20, LEX-MR Vertical SMT, Pin Contacts	FLM-P25-X0
Plug Housing, FLM Series, Zhaga Book 20, LEX-LP for Crimp Socket Contacts	FLM-S21-X0
Plug, FLM Series, Zhaga Book 20, LEX-LP, Poke-In Wire Termination, Socket Contacts	FLM-S23-X0
Pin Contact, Crimp, FLH Series, Reel, 22AWG – 18AWG, Tin Plated	FLH-PC136-T01
Socket Contact, Crimp, FLH Series, Reel, 22AWG – 18AWG, Tin Plated	FLH-SC136-T01

X	Housing Color
0	Black (Standard)
W	White

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Thank you