F-Drive Series R12
Installation Manual

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Introduction

Congratulations on your purchase of the ETC F-Drive Series R12. The F-Drive Series R12 LED power control solution provides a modular, centralized approach for controlling LED luminaires. The R12 is a card cage enclosure that can hold up to 12 low-voltage driver cards, providing power and data to multiple circuits per card. By maintaining remote, easy access to the driver cards and power supplies, LED-based systems can be easily installed and serviced, while ensuring critical components are readily accessible to support staff.

Document Conventions

This document uses the following conventions to draw your attention to important information.

Note: *Notes are helpful hints and information that is supplemental to the main text.*

CAUTION: *A Caution statement indicates situations where there may be undefined or unwanted consequences of an action, potential for data loss or an equipment problem.*

WARNING: A Warning statement indicates situations where damage may occur, people may be harmed, or there are serious or dangerous consequences of an action

WARNING: RISK OF ELECTRIC SHOCK! This warning statement indicates situations where there is a risk of electric shock.

All ETC documents are available for free download from our website: etcconnect.com.

Please email comments about this manual to: TechComm@etcconnect.com.

Help from ETC Technical Services

If you are having difficulties and your problem is not addressed by this document, try the ETC support website at support.etcconnect.com or the main ETC website at etcconnect.com. If none of these resources are sufficient, contact ETC Technical Services directly at one of the offices identified below. Emergency service is available from all ETC offices outside of normal business hours.

When calling for help, take these steps first:

- Prepare a detailed description of the problem
- Go near the equipment for troubleshooting
- Find your notification number if you have called in previously

Americas

ETC, Inc.
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3031 Pleasant View Road
Middleton, WI 53562
800-775-4382 (USA, toll-free)
+1-608 831-4116
service@etcconnect.com

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France

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Technical Services Department
Ohmstrasse 3
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Safety

The F-Drive Series R12 is intended for professional use only. **Read the entire manual before using this equipment.**

IMPORTANT SAFEGUARDS

When using electrical equipment, basic safety precautions should always be followed including the following:

˙READ AND FOLLOW ALL SAFETY INSTRUCTIONS.

- Do not use outdoors.
- Do not let power supply cords touch hot surfaces.
- Do not mount near gas or electric heaters.
- Equipment should be mounted in locations and at heights where it will not readily be subjected to tampering by unauthorized personnel.
- The use of accessory equipment not recommended by the manufacturer may cause an unsafe condition.
- Do not use this equipment for other than intended use.
- To reduce the risk of fire and overheating, make sure all connections are tight.
- Turn off electrical power before modifying the lighting system in any way.

SAVE THESE INSTRUCTIONS

Note: *Cable bundling limitations apply to F-Drive R12 Class 2 output cables. For reference on maximum number of four-pair cables in a bundle, see NFPA 2017 National Electric Code, table 725.144 and table 310.16.*

Chapter 1

Overview
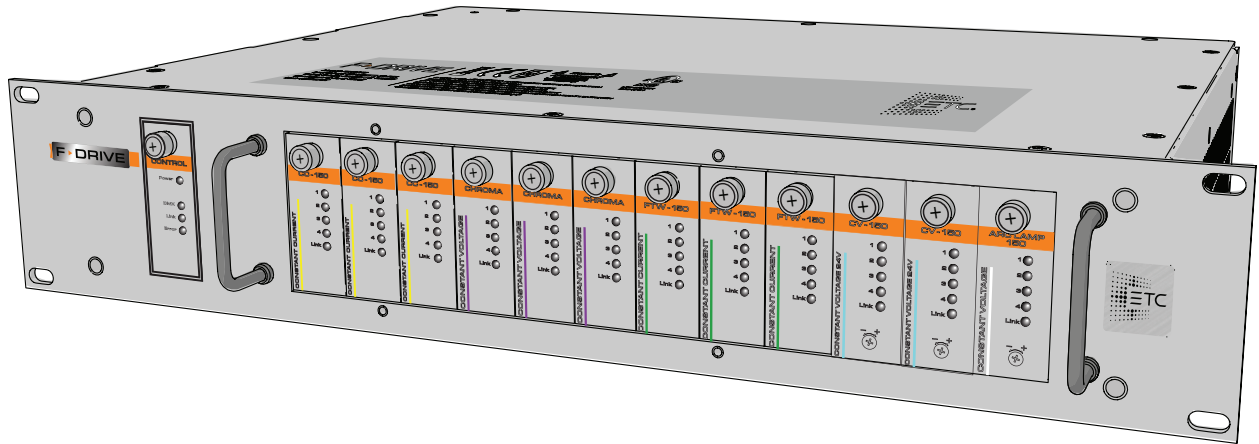
F-Drive R12 Driver

Features

- Compatible with a wide range of control systems
- Compact size: fits EU or US 19-inch rack, 2U height, 12.8 inch depth
- Requires 48 VDC input from an external power supply, recommended minimum 1500 W
- Holds up to 12 low-voltage driver cards for remote control of up to 48 circuits
- Hot-swappable output cards
- DMX/RDM control input with per-circuit patching
- 48 VDC pass-through for connection to downstream sense equipment
- Panic/emergency contact input suitable for connection to external emergency systems

Driver Cards

R12 driver cards are available for a variety of low-voltage load types. Driver cards are sold separately.

FTW-150 Card

The FTW-150 Card is designed for use with Navis Fade to Warm luminaires.
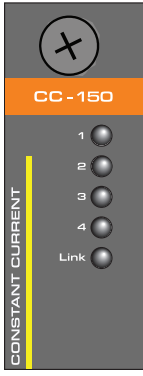
	Output	constant current, maximum 450 mA per channel
	Output Channels	four channels on a single RJ45 or eight-pin terminal block
	Loads	up to four Navis Fade to Warm luminaires per card
	Maximum Load	50 W per channel, 150 W per card
	Model Number	FDROCFTW150
	Part Number	7148K1010
	Label Stripe Color	green to match Navis Fade to Warm luminaire face and cap labeling

Note: *Use ONE type of output connector for each card. For example, use the RJ45 receptacle OR the eight-pin terminal block on a FTW-150 Card or a CC-150 Card.*

CC-150 Card

The CC-150 Card is designed for use with Navis White luminaires, most ArcSystem Pro One-Cell White luminaires, and 200–700 mA fixtures by other manufacturers.

	Output	adjustable 200–700 mA constant current per channel, default output 600 mA (see *Configure the CC-150 Card on page 27*)
	Output Channels	four channels on a single RJ45 or eight-pin terminal block

	Loads	• up to four Navis White luminaires per card
		• up to four ArcSystem Pro One-Cell White luminaires per card
		  - Pro One-Cell
		  - Pro One-Cell Small
		  - Pro One-Cell Micro
		• 200–700 mA fixtures manufactured by others

	Maximum Load	50 W per two-pin channel, 150 W total per card
	Model Number	FDROCCC150
	Part Number	7148K1011
	Label Stripe Color	yellow to match Navis White luminaire face and cap labeling

Note: *The CC-150 Card does not support ArcSystem Pro One-Cell **High Output** luminaires.*

Note: *Use ONE type of output connector for each card. For example, use the RJ45 receptacle OR the eight-pin terminal block on a FTW-150 Card or a CC-150 Card.*

CAUTION: *Setting the F-Drive CC-150 Card to output more current than the manufacturer recommends for the loads may reduce the lifetime or cause damage to the load. See Configure the CC-150 Card on page 27.*

CV-150 Card

The CV-150 Card is designed for use with 24 VDC fixtures by other manufacturers.

	Output	adjustable 24–28 VDC constant voltage
	Output Channels	four channels on an eight-pin terminal block*
	Loads	24 VDC fixtures
	Maximum Load	50 W per channel, 150 W per card
	Model Number	FDROCCV150
	Part Number	7148K1013
	Label Stripe Color	blue

*The RJ45 receptacle is present, but disabled.

Chroma Card
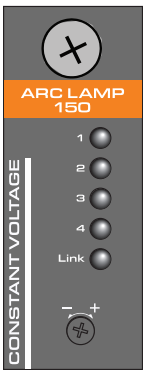
The Chroma Card is designed for use with Navis RGBW luminaires.

	Output	48 VDC power and data
	Output Channels	four channels on a single RJ45†
	Loads	up to four Navis RGBW luminaires per card
	Maximum Load	22 W per channel, 100 W per card
	Model Number	FDROCCHC100
	Part Number	7148K1014
	Label Stripe Color	purple to match Navis RGBW luminaire face and cap labeling

†The eight-pin terminal block is present, but disabled.

ArcLamp 150 Card

The ArcLamp 150 Card is designed for use with ETC ArcLamp retrofit screw-in LED lamps. For information on the installation of ArcLamps, see the *ArcLamp System Installation Manual*. ETC documents are available free of charge at etcconnect.com.

	Output	adjustable 24–28 VDC power and data
	Output Connectors	four channels on an eight-pin terminal block*
	Loads	up to eight ArcLamps per channel and a maximum of thirty-two ArcLamps per card
	Maximum Load	50 W per channel, 150 W per card
	Model Number	FDROCAC150
	Part Number	7148K1012
	Label Stripe Color	white

*The RJ45 receptacle is present, but disabled.

Before You Begin Installation

Review the following information before installing the F-Drive R12.

Installation Requirements

- Ambient operating temperature 0–40°C (32–104°F), 5–95% non-condensing humidity.
- Dry locations only.
- The R12 requires a 19-inch equipment rack that must support the weight of an R12 frame, 12 driver cards, and any power supplies and accessories.
- The R12 is a 48 VDC input product that requires an external power supply for operation.

Clearance Requirements

MEAN WELL Power Supply Frame

If you are installing a MEAN WELL RKP-1UI or RKP-1UI-CMU1 three-bay external power supply frame, the built-in DC fans require 10 cm clearance around the ventilation holes after mounting the three-bay frame in the 19-inch equipment rack.

WARNING: RISK OF ELECTRIC SHOCK! Maintain 20 mm (3/4 in) clearance behind the installed MEAN WELL three-bay frame. Equipment mounted above or below a MEAN WELL three-bay frame must be 35 cm (14 in) or less in depth. Equipment with a depth of more than 35 cm (14 in) mounted immediately above or below a MEAN WELL three-bay frame may cause an unsafe electrical connection due to mechanical interference with the power bussing connections.

AVERTISSEMENT : RISQUE DE CHOC ÉLECTRIQUE! Conservez un espace de 20 mm (3/4 po) derrière le châssis du rack MEAN WELL installé. Tout équipement monté au-dessus ou au-dessous d'un rack MEAN WELL doit avoir une profondeur de 35 cm (14 po) ou moins. Tout équipement d'une profondeur de plus de 35 cm (14 po) monté immédiatement au-dessus ou au-dessous d'un rack MEAN WELL peut provoquer une connexion électrique dangereuse en raison d'interférences mécaniques avec les connexions de bus d'alimentation.

Note: *If you are bussing two or more RKP-1UI or RKP-1UI-CMU1 rack systems together, they must be installed vertically adjacent in the equipment rack.*

F-Drive R12 Driver

CAUTION: *To reduce risk of fire, do not install closer than 3 inches to cabinet wall.*

ATTENTION : *Pour reduire les risques d'incendie, n'installez pas plus de 3 pouces au mur de l'armoir.*

Voltage Drop

Voltage drop along load wiring is an issue for constant voltage loads. Voltage drop calculations vary by project and are based on the type, length, and gauge of wire. The CV-150 Card and the ArcLamp 150 Card have an adjustable dial on the front of the driver card to set the 24–28 VDC (+/-5%) output. Measure the voltage at the load and adjust the dial to achieve 24 VDC at the load. Contact a qualified electrician and read the following sections for additional information.

- *Configure the CV-150 Card and ArcLamp 150 Card on page 27*
- *ArcLamp below* for special considerations for ArcLamp installations
- *R12 Driver Card Wire and Terminal Specifications on page 11* for recommended wire gauges

ArcLamp

Voltage drop is an important factor to consider when determining the installation location of an R12 with ArcLamp 150 Cards. The installation location determines the maximum wire distance to the ArcLamp loads. For your convenience, an interactive voltage drop calculator is available at etcconnect.com/ArcLamp.

Note: *Do not bridge outputs on R12 ArcLamp driver cards. If your installation requires more than eight ArcLamps per circuit, consider a standalone ArcLamp wall-mount or rack-mount driver.*

Power Disconnect Device

Before installation, make sure you have an accessible input power disconnect device installed ahead of your F-Drive R12.

WARNING: RISK OF DEATH BY ELECTRIC SHOCK! Failure to disconnect all power to the system before installation, maintenance, cleaning, or any other system modification could result in serious injury or death.

AVERTISSEMENT : RISQUE DE MORT PAR DÉCHARGE ÉLECTRIQUE! Négliger de débrancher toutes les sources d'alimentation du système avant l'installation, l'entretien, le nettoyage ou toute autre modification du système peut causer des blessures graves ou la mort.

De-energize main feed to F-Drive Power Control products and follow appropriate Lockout/Tagout procedures as mandated by NFPA 70E. It is important to note that electrical equipment such as breaker panels can present an arc flash hazard if improperly serviced. This is due to the high amounts of short-circuit current available on the electrical supply to this equipment. Any work must comply with OSHA Safe Working Practices.

WARNING: Circuits that are installed without an accessible power disconnect device cannot be serviced or operated safely.

AVERTISSEMENT : Il est imprudent d'utiliser ou de réparer les circuits installés sans qu'un dispositif de déconnexion de l'alimentation ne soit accessible.

Chapter 2

Prepare to Install the R12

Inspect the Shipment

Before you begin installation, check your shipment and confirm that it arrived complete and undamaged.

1. Check the shipping container for physical damage.
   • If you find damage, document it to help with a claim against the shipper.
2. Inspect the order for completeness.
   • Check the box contents received against the packing list to ensure that your order is complete.
   • If you discover a problem with the contents of the shipment, contact ETC. See *Help from ETC Technical Services on page 2*.

R12 ships with the control card (ETC part number 7148K1000) installed and with blanks covering the slots for the driver cards.

Note: *All driver cards and accessories are packaged separately.*

Parts and Tools

The following supplies are required, but not provided:

• Phillips screwdriver
• Flatblade screwdriver
• Wire stripping and cutting tool
• Wire ties

Electrical and Wiring Specifications

Terminal/Connector	Wire Range/Specifications	Strip Length
Power Input	Use provided DC power harness: 2.4 m (8 ft) of 10 mm^2 (8 AWG)	11 mm (7/16 in)
DMX In/Thru three-pin screw-terminal connectors	Belden 9279 or equivalent	See wiring instructions at *Connect DMX on page 20*.
DMX In/Thru three-pin IDC connectors	Cat5e (or better) 0.2 mm^2 (24 AWG) or larger conductors terminated to T568B standard	See wiring instructions at *Connect DMX on page 20.*
Panic three-pin connector	0.05–2.5 mm^2 (30–12 AWG) Follow class 2 wiring methods	6 mm (1/4 in)

R12 Driver Card Wire and Terminal Specifications

Driver Card	Terminal/Connector	Wire Range/Specifcation	Strip Length	Torque Rating
Chroma Card FTW-150 Card CC-150 Card	RJ45 connector for output power or power/data	You must use 0.25 mm^2 (23 AWG) or larger conductors in Category-type cable.	Terminate to T568B standard.	
FTW-150 Card CC-150 Card CV-150 Card and ArcLamp 150 Card	eight-pin connector for power output	0.2–2.5 mm^2 (26–14 AWG) Follow Class 2 wiring methods.	6 mm (1/4 in)	0.4– 0.5 Nm (3.5– 4.4 in-lb)

Note: *Use ONE type of output connector for each card. For example, use the RJ45 receptacle OR the eight-pin terminal block on a FTW-150 Card or a CC-150 Card.*

Note: *Cable bundling limitations apply to F-Drive R12 Class 2 output cables. For reference on maximum number of four-pair cables in a bundle, see NFPA 2017 National Electric Code, table 725.144 and table 310.16.*

Rack-Mount Safety

The R12 and R12 External Power Supply install into a standard 19-inch rack enclosure.

- **Elevated Operating Ambient:** If the R12 is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may elevate above the room ambient. Do not operate the device in an enclosed environment above 40°C (104°F).
- **Reduced Air Flow:** When installing the R12 in an equipment rack, the rack must be vented and have adequate airflow to maintain an operating temperature below 40°C (104°F).
- **Mechanical Loading:** The R12 and R12 External Power Supply must be installed in a rack in a horizontal flat orientation to ensure even mechanical loading in the rack, avoiding hazardous or dangerous loading conditions.
- **Circuit Overloading:** When installing the R12 in an equipment rack, consider the connection of the equipment to the rack or power source to avoid overloading the rack circuit or supply wiring. Consider the rack or power distribution in the equipment rack during installation.
- **Reliable Grounding:** Maintain reliable grounding of the rack-mounted equipment. Give particular attention to any supply connections other than direct connections to the branch circuit (for example, the use of power strips).

Chapter 3

Install 48 VDC Power Supplies

The MEAN WELL RKP-1UI rack-mount units are 1U, low-profile power distribution solutions perfectly suited for providing 48 VDC power to the ETC F-Drive R12.

The MEAN WELL rack-mount unit should only be installed by a qualified electrician or service technician.

Note: *Each MEAN WELL three-bay frame ships with an RJ45 terminator that must be installed in one of the JK1 ports if you are bussing multiple three-bay frames together. See Bussing Kits on page 16.*

Note: *Each MEAN WELL three-bay frame ships with a DB-25 terminator that must be installed in the CN500 port in order for the three-bay frame to power on. See Final Installation Steps on page 18.*

ETC Part Number	MEAN WELL Model	Description
PS505	MEAN WELL RKP-1UI	custom RKP-1UI rack-mount unit for ETC
PS504	MEAN WELL RCP-2000	2000 W power supply module

Technical Information from MEAN WELL

For current technical information, view the RKP-1UI specifications on the MEAN WELL website at https://www.meanwell.com. The RCP-2000/RKP-1UI Instruction Manual is available at https://www.meanwell.com/webapp/product/search.aspx?prod=RCP-2000&pdf=UkNQLTIwMDAsUktQLTFVLUUucGRm&a=4.

MEAN WELL RKP-1UI

Features

- RKP-1UI three-bay frames fit in an EU or US 19 inch equipment rack
- Each RKP-1UI rack-mount unit (three-bay frame) supports up to three RCP-2000 power supply modules from MEAN WELL.
- Three RCP-2000 power supply modules provide up to 6000 W to a single RKP-1UI rack-mount unit.
- Bussing kits are available to bus together up to three rack systems. See *Bussing Kits on page 16*.
- Three bussed RKP-1UI rack-mount units bussed together and containing nine RCP-2000 power supplies can provide a maximum of 18000 W.
- ETC provides three power supply cord options for the RKP-1UI rack-mount unit:
  - 15A Edison plug to locking IEC connector (Model FDRPSCICE2, ETC Part W6638)
  - 20A Ceeform plug to locking IEC connector (Model FDRPSICC16, ETC Part W6639)
  - 16A Schuko plug to locking IEC connector (Model FDRPSICS16, ETC Part W6640)

MEAN WELL RKP-1U with three RCP-2000 modules
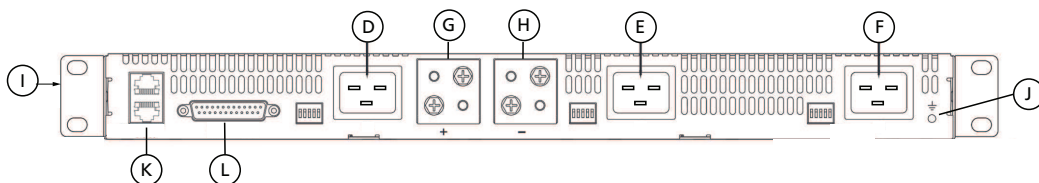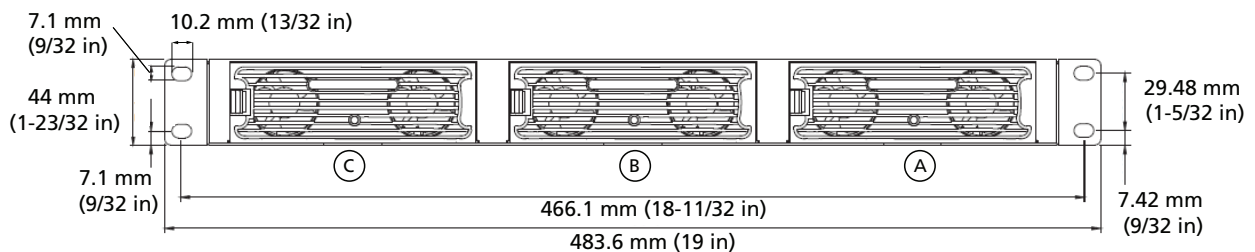
A	Module A	**G**	DC output terminal "+"
B	Module B	**H**	DC output terminal "-"
C	Module C	**I**	Mounting bracket
D	AC input for module A	**J**	Ground/Earth stud
E	AC input for module B	**K**	JK1 ports
F	AC input for module C	**L**	CN500 port

Note: *Each MEAN WELL three-bay frame ships with an RJ45 terminator that must be installed in one of the JK1 ports if you are bussing multiple three-bay frames together. See Bussing Kits on page 16.*

Note: *Each MEAN WELL three-bay frame ships with a DB-25 terminator that must be installed in the CN500 port in order for the three-bay frame to power on. See Final .*

Install the Power Supply in the Rack

WARNING: RISK OF ELECTRIC SHOCK! Maintain 20 mm (3/4 in) clearance behind the installed MEAN WELL three-bay frame. Equipment mounted above or below a MEAN WELL three-bay frame must be 35 cm (14 in) or less in depth. Equipment with a depth of more than 35 cm (14 in) mounted immediately above or below a MEAN WELL three-bay frame may cause an unsafe electrical connection due to mechanical interference with the power bussing connections.

AVERTISSEMENT : RISQUE DE CHOC ÉLECTRIQUE! Conservez un espace de 20 mm (3/4 po) derrière le châssis du rack MEAN WELL installé. Tout équipement monté au-dessus ou au-dessous d'un rack MEAN WELL doit avoir une profondeur de 35 cm (14 po) ou moins. Tout équipement d'une profondeur de plus de 35 cm (14 po) monté immédiatement au-dessus ou au-dessous d'un rack MEAN WELL peut provoquer une connexion électrique dangereuse en raison d'interférences mécaniques avec les connexions de bus d'alimentation.

1. Ensure power to the rack is off.
2. Mount all rack-mount units in a 19-inch equipment rack using the supplied rack-mounting rails.
   - Each three-bay frame is equipped with built-in fans that require 10 cm clearance around the ventilation holes after mounting in the 19-inch rack.
   - See *Rack-Mount Safety on page 11*.
3. Insert MEAN WELL RCP-2000 power supplies with the same output voltage and current into the three-bay frames.

Note: *MEAN WELL power supplies are factory-calibrated. If you find it necessary to calibrate the output of each MEAN WELL power supply for optimal current-sharing, see the* Output Voltage Adjustment *section of the* RCP-2000/RKP-1U Instruction Manual *from MEAN WELL. See Technical Information from MEAN WELL on page 12.*

Connect Ground/Earth

Each RKP-1UI three-bay frame has a ground/earth stud for connection to the equipment rack ground/earth. ETC provides a 0.6 m (2 ft) harness of 8 AWG insulated wire with a ring terminal on one end and a bare end on the other with the R12 bussing kits for this purpose. See *Bussing Kits on page 16* for more information about bussing kits. Follow all local and national codes.

Wire the DC Power Output

The box for each F-Drive R12 includes a red-and-black DC power wiring harness with an F-Drive R12 power input plug on one end and bare ends on the other. You should also have a bussing kit with tin-plated bus bars. See *Bussing Kits on the next page* for available bussing kits.

Note: *If you are bussing two or more RKP-1UI rack systems together, they must be installed vertically adjacent in the equipment rack.*

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1. Ensure power to the rack is off.
2. Use a Phillips screwdriver to remove all screws from the "+" and "-" terminals on each three-bay frame.
3. Install a bus plate to the "+" terminal of one three-bay frame using the screws provided with the MEAN WELL three-bay frame. See *Bussing Kit Illustration on page 17*.
    a. Install a 1U bus bar if you are installing a single three-bay frame.
    b. Install a 2U bus bar to the "+" terminals of two three-bay frames, located in adjacent positions in the same equipment rack.
    c. Install a 3U bus bar to the "+" terminals of three three-bay frames, located in adjacent positions in the same equipment rack.
4. Repeat step 3 for the "-" terminals of the three-bay frames.
5. Strip the free end of each wire on all DC power harnesses to 11 mm (7/16 in).
6. Insert the red wire from each DC power harness into a terminal on the positive bus bar.
7. Insert the black wire from each DC power harness into a terminal on the negative bus bar.
8. Tighten the screws securing each bus bar to the terminals and tighten the screws securing each wire into a terminal.
9. Install the bus-bar cover to the standoffs on the bus bars using the provided nylon screws.
10. If you are installing multiple three-bay frames with a 2U or 3U bussing kit, connect the JK1 ports on the three-bay frames in parallel using the RJ45 cables provided in the bussing kit.
    - Install two of the RJ45 terminators included with the MEAN WELL three-bay frames.

Note: *The current-sharing features of the MEAN WELL power supplies in multiple three-bay frames will not work unless the JK1 ports are connected in parallel. See the* Parallel Operation *section in the* RCP-2000/RKP-1U Instruction Manual *from MEAN WELL (see* Technical Information from MEAN WELL on page 12*) and the* Bussing Kit Illustration on page 17*.*


Bussing Kits

ETC offers bussing kits for installations with one, two, or three RKP-1UI rack-mount units. The following bussing kits are available:

Bussing Kit Model Number	Bussing Kit Part Number	Number of RKP-1U Rack-Mount Units	Number of R12s	Bussing Kit Contents			
				Number of Ground Harnesses	Number of DC Power Harnesses	Number and Size of Bus Bars and Bus Bar Covers	Number of RJ45 Bussing Cables
FDRPS1BK1-1	7148K1001	1 (1U)	1	1	1	• Two 1U bus bars • One 1U bus bar cover	None
FDRPS1BK1-2	7148K1002		2		2		
FDRPS1BK1-3	7148K1003		3		3		
FDRPS1BK2-4	7148K1004	2 (2U)	4	2	4	• Two 2U bus bars • One 2U bus bar cover	1
FDRPS1BK2-5	7148K1005		5		5		
FDRPS1BK2-6	7148K1006		6		6		
FDRPS1BK3-7	7148K1007	3 (3U)	7	3	7	• Two 3U bus bars • One 3U bus bar cover	2
FDRPS1BK3-8	7148K1008		8		8		
FDRPS1BK3-9	7148K1009		9		9		

Kit Details
- Each DC power harness is 2.4 m (8 ft) of 10 mm^2 (8 AWG) with one red wire and one black wire, pre-terminated to R12 input plugs on one end with bare ends on the other.
- Each ground harness is 0.6 m (2 ft) of 8 AWG insulated wire with a ring terminal on one end and a bare end on the other.
- Each bus bar cover comes with M4x12 mm nylon screws for installation to the standoffs on the bus bars.
- Each RJ45 bussing cable is 0.3 m (1 ft).

Bussing Kit Illustration

1U Bus Bar
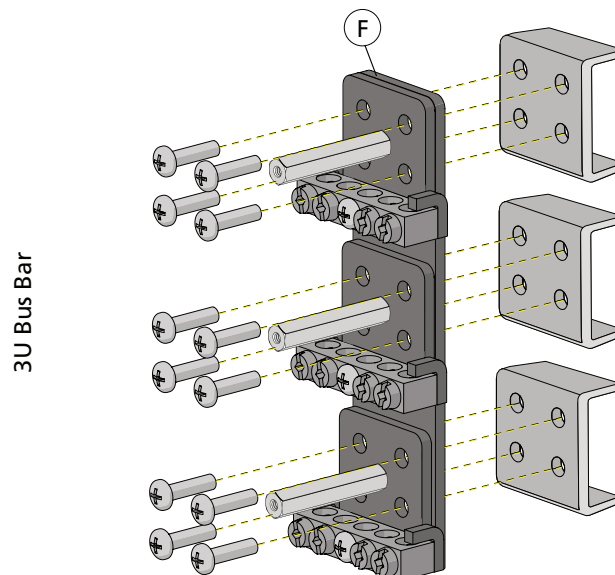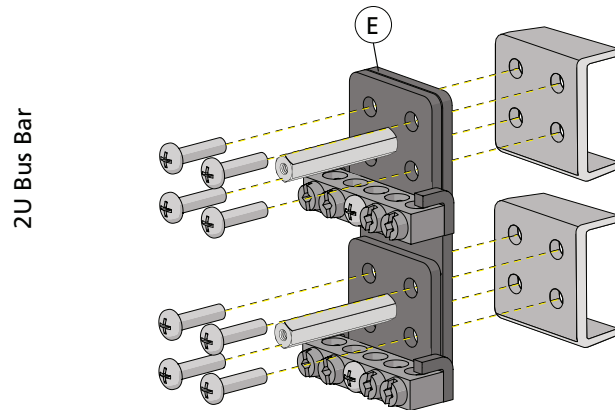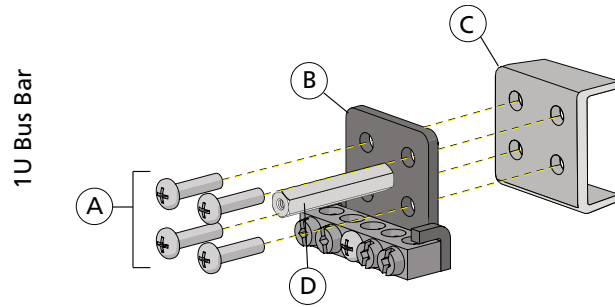
2U Bus Bar

3U Bus Bar

A	Screws provided with the MEAN WELL three-bay frame
B	1U bus bar
C	DC output terminal on MEAN WELL three-bay frame
D	Threaded standoff
E	2U bus bar
F	3U bus bar
G	2U and 3U kits only: install RJ45 terminators provided by MEAN WELL.

2U Bussing Kit   **3U Bussing Kit**

JK1   JK1

JK1   JK1

JK1
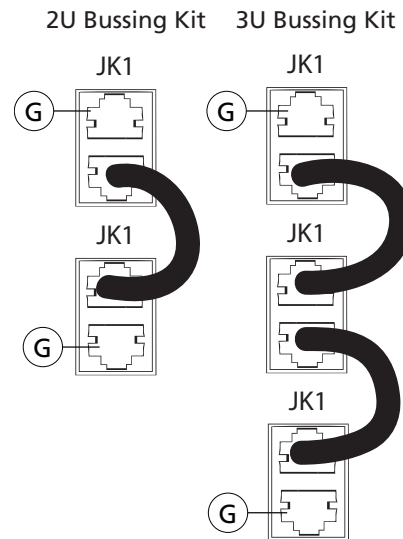
For clarity, only one terminal of each MEAN WELL three-bay frame is shown above. The rest of the three-bay frame is omitted from the illustration.

Final Installation Steps

> **Note:** *Each MEAN WELL three-bay frame ships with a DB-25 terminator that must be installed in the CN500 port in order for the three-bay frame to power on.*

1. Ensure power to the rack is off.
2. Install a DB-25 terminator (included with your MEAN WELL three-bay frame) to the connector CN500 on each three-bay frame.
3. Connect the AC inputs of each power supply module to the AC power source using the provided power input cords.

Chapter 4

Install the R12
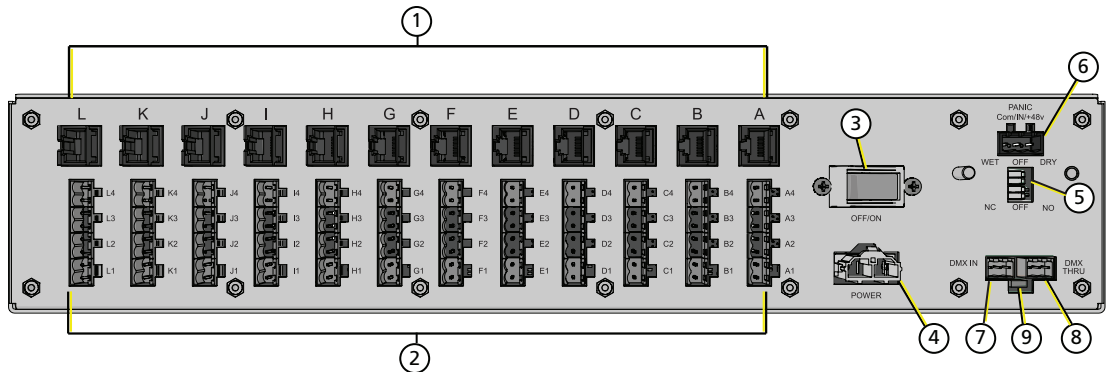
1	RJ45 power and data outputs, one per driver card (A–L)
2	eight-pin terminal power outputs, one per driver card (A1–A4 through L1–L4)
3	breaker
4	power input from external 48 VDC supply
5	Panic switches (see *Panic Connector on page 29*)
6	three-pin Panic connector (see *Panic Connector on page 29*)
7	DMX In
8	DMX THRU
9	DMX termination switch

Rack-Mount the R12

Secure the R12 into the 19-inch rack. See *Rack-Mount Safety on page 11*.

Connect the DC Power Input

In *Wire the DC Power Output on page 15*, you installed bussing kits with DC power harnesses on the MEAN WELL power supply. Connect the R12 power input plug from a DC power harness to the R12 power input receptacle (4 in the illustration above).

Connect DMX

DMX In and DMX Thru cables terminate to three-pin IDC or screw-terminal connectors. The F-Drive R12 includes a DMX termination kit (ETC part number 4268K1004) provides both screw terminal connectors for use with Belden 9729 cable and IDC connectors for use with Cat5 cable.

DMX is installed in a daisy-chain topology and includes one pair of wires (Data + and Data -) plus an ISO ground (common). DMX cables must be acceptable for DMX data transmission, and connections should follow the standard pinouts in the chart below.
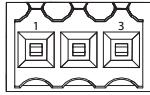
DMX-512 Pinouts for Terminal Header		
Pin	Use	Typical Wire Color
1	Common (shield)	clear/shield
2	Data -	black
3	Data +	red or white

DMX Cable Preparation and Termination

Note: *Not for use with Cat5, Cat5e, or Cat6 cable. When running DMX with these cable types, use the 3-position IDC connector.*

This instruction assumes preparation of Belden 9729 (or equivalent) cable for termination to the three-position screw terminal connector provided.

1. Install the cable so there is an 20 cm (8 in) service loop available at the rear of the gateway.
2. Strip 18 cm (7 in) off the outer jacket.
3. Label the cable with the data type and run designation. (DMX1, DMX2, etc.)
4. Strip the foil shielding from each wire set to within 6 mm (1/4 in) of the outer jacket.
5. Untwist the shield wire from each pair and apply a piece of 1.6 mm (1/16 in) clear heat shrink to each shield wire.
6. Twist each shield wire back onto its data pair, and then apply a 4 cm (1.5 in) piece of 0.5 cm (3/16 in) heat shrink all the way down each 3-wire set. Make sure to capture the foil shielding at the base.
7. Apply the 5 cm (2 in) piece of the 1 cm (3/8 in) heat shrink, centered on the end of the cable jacket and the bases of all the wires in the cable.
8. Cap the ends of the unused pair of wires with a 2.5 cm (1 in) piece of 0.5 cm (3/16 in) heat shrink centered over the end of the wires.
9. Strip 6 mm (1/4 in) of insulation from all of the wires to be used.
10. Maintain the wire pair twist as close to the screw terminal connector as possible and terminate the wires.
    *   Insert the data - wire (typically black) into the terminal labeled "DMX -" and secure.
    *   Insert the data + wire (typically red or white) into the terminal labeled "DMX +" and secure.
    *   Insert the common (shield) wire into the terminal labeled "DMX " and secure.
11. Bend back the unused set of wires and secure them to the cable with a wire tie.
12. Secure the terminated wire sets together with a wire tie 5 cm (2 in) from the connector.
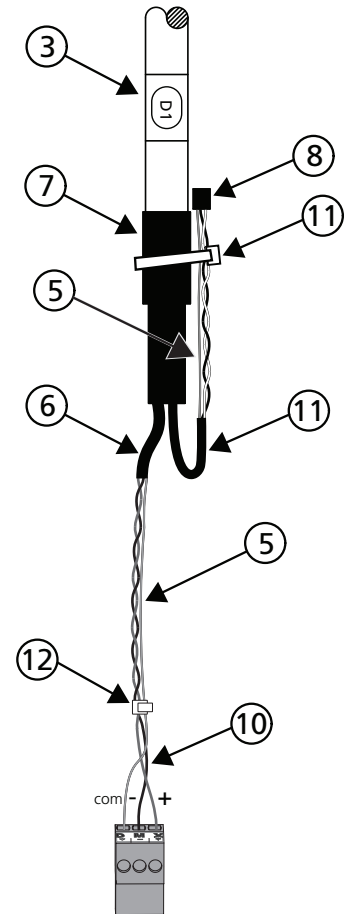
DMX Cat5 Preparation and Termination

This instruction assumes use of Cat5 (or equivalent) cable for termination to the three-position Cat5 insulation displacement connector provided in the termination kit.

1. Follow normal Cat5 wire installation procedures to remove 5 cm (2 in) from the end of the cable jacket.
2. Separate the White/Brown, Orange, and White/Orange conductors from the cable. These conductors are required for DMX out.
3. Cut the remaining unused conductors from the cable flush to the cable jacket.
4. Label the cable with the data type and run designation (for example D1 for DMX run 1).
5. Twist the White/Orange and Orange conductors as close to the 3-position IDC as possible and insert the conductors through the labeled terminals as follows:
   - Common (White/Brown) to terminal 1
   - Data - (Orange) to terminal 2
   - Data + (White/Orange) to terminal 3

6. Fully depress each terminal, closing it onto the wire.
7. Use side-cutters to trim the excess wire from the connector.
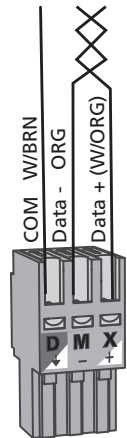
DMX Termination

1. Insert the prepared connector into the "DMX IN" receptacle on the back of the R12.
2. Optionally, terminate DMX thru to the next device in the DMX data run. Up to 32 DMX/RDM devices can be daisy-chained together per data run.
   a. See the specific termination setup guide for the type of cable used in the installation, either Belden 9729 or Category 5. Termination kits are ordered separately.
   b. Insert the connector with wires terminated into the "DMX THRU" receptacle on the back of the R12.
3. Terminate DMX/RDM data signal for the last DMX/RDM device in the data run by setting the termination switch below the DMX receptacle to "ON". All other devices in the data run maintain the factory default termination switch setting: "OFF".

Panic

For information on wiring the Panic input and configuring the Panic switches, see *Panic Connector on page 29*.

R12 Driver Cards

Install the required driver cards. See *Install R12 Driver Cards on page 23*.

Finish Installation

1. Apply power to the unit.
2. Toggle the breaker switch on the rear panel of the unit to "On".

Chapter 5

Install R12 Driver Cards

1	Control card
2	Driver cards
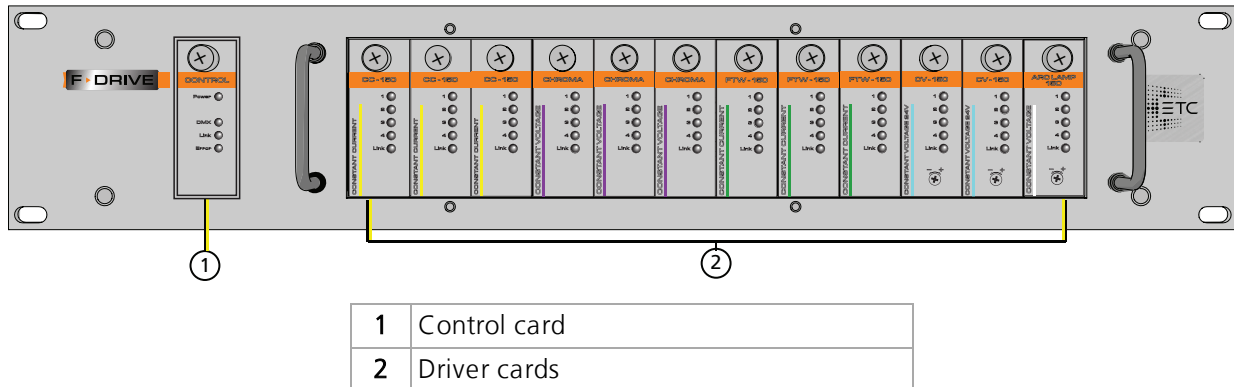
F-Drive R12 driver cards and the control card can be installed and replaced while the R12 is powered on.

WARNING: RISK OF ELECTRIC SHOCK! Working inside the F-Drive with power applied exposes you to the possibility of dangerous currents and voltages.

AVERTISSEMENT : RISQUE DE CHOC ÉLECTRIQUE! Travailler à l'intérieur du F-Drive lorsqu'il est alimenté vous expose à la possibilité de courants et de tensions dangereux.

CAUTION: *Hazardous voltages are present. To reduce the risk of electric shock and danger to personal health, follow the instructions.*

ATTENTION : *Des tensions dangereuses sont présentes. Pour réduire le risque de choc électrique et de danger pour la santé personnelle, suivez les instructions.*

CAUTION: *Static electricity can damage F-Drive components like control cards and driver cards. To avoid damage, keep all static-sensitive devices in their static-protective bags until you are ready to install them. Use anti-static safety precautions during installation.*

CAUTION: *When installing cards, make sure to insert the card in the card guides in the slot. Do not force a card into a slot. Misalignment of cards may cause damage to the card or the backplane board inside the F-Drive R12.*

1. Using a Phillips screwdriver, remove the screw securing the plate that covers the driver card slot.
    - Leave plates in place over empty driver card slots until you are ready to install a driver card.
    - Save any plates and screws that you remove and install them over empty card slots as needed.
2. Align the driver card with the card guides inside the R12.
3. Gently slide the card into the slot until its card edge connector is seated on the backplane.
4. Tighten the thumbscrew on the front of the driver card to secure it in place.

Chroma Card DMX Footprint

The Chroma Card has a different DMX footprint than other driver cards. When you first install a Chroma Card, or if you relocate a Chroma Card in a new slot in a F-Drive R12, you will have to reallocate DMX addresses. See *DMX System Control on page 32* and *RDM Parameters on page 34*.

Mismatched Cards

⚠️ **CAUTION:** *When replacing cards with the power on, make sure to install the same type of card as the card that you removed.*

Mixing types of driver cards (mismatch) may result in poor performance until reboot. At reboot, the control card will detect the mismatch of driver cards and update firmware to mismatched cards.

ℹ️ **Note:** *Do not install a control card in a driver card slot. Do not install a driver card in the control card slot.*

Wire the Driver Card Outputs

F-Drive R12 driver cards have two output wiring options: an RJ45 receptacle or an eight-pin terminal block.

- Chroma Cards provide RJ45 output. The eight-pin terminal block is disabled.
- FTW-150 Cards and CC-150 Cards provide either RJ45 output or output from the eight-pin terminal block.
- CV-150 Cards and ArcLamp 150 Cards provide output from the eight-pin terminal block. The RJ45 connector is disabled.

ℹ️ **Note:** *Use ONE output connector on each card. For example, use the RJ45 receptacle OR the eight-pin terminal block for a FTW-150 Card or a CC-150 Card.*

ℹ️ **Note:** *If you are installing ArcSystem Navis luminaires, you must use 0.25 mm^2 (23 AWG) or larger conductors in Category-type cable.*

ℹ️ **Note:** *Cable bundling limitations apply to F-Drive R12 Class 2 output cables. For reference on maximum number of four-pair cables in a bundle, see NFPA 2017 National Electric Code, table 725.144 and table 310.16.*

Driver Card RJ45 Output to Navis Luminaires

See the *Navis 100 Installation Guide* for luminaire installation instructions and compatibility with F-Drive R12 driver cards. ETC documents are available for download in PDF format free of charge at etcconnect.com.

Navis 100 luminaires typically connect to the driver card via Category-type cable terminated to RJ45 connectors. Up to four luminaires can be daisy-chained along one run of cable when using the RJ45 output from a driver card. The cable distance of each wiring run must not exceed 100 m (328 ft).

Note: *Connect only the same types of luminaires in a wiring run. Do not mix White, Fade to Warm, and RGBW luminaires in the same wiring run.*

Note: *Each Chroma Card ships with an RJ45 DMX terminator. Navis RGBW luminaires are not self-terminating. You must terminate the last Navis RGBW luminaire in line with a 120Ω resistor.*

To purchase extra RJ45 terminators, please contact your ETC customer service representative and request part number N4086.

Note: *Navis 100 Fade to Warm, White, and RGBW luminaires can be live-plugged into R12 driver cards while the R12 and driver cards are powered.*

## Driver Card Terminal Block Output to Navis Luminaires

Navis 100 Fade to Warm and White luminaires have the alternative option of control via terminal block output from their respective driver cards. When using the terminal block on a driver card, luminaires cannot be daisy-chained together; each luminaire requires two pins of the eight-pin terminal block and must have its own Category-type cable with 0.25 mm^2 (23 AWG) or larger conductors. Connect up to four luminaires per driver card.

The F-Drive R12 ships with twelve eight-pin connectors (ETC part number 7148K1016). Follow these instructions to prepare one cable per luminaire with an RJ45 plug on one end, wired to two pins of the eight-pin screw-terminal connector on the other end.

RJ45 Pinout for Navis 100 Fade to Warm and White Luminaires

RJ45 Pin	Description	Typical Wire Color (T568B standard)
1	Ground	white-and-orange
5	Power	white-and-blue

Terminal Block Pinout
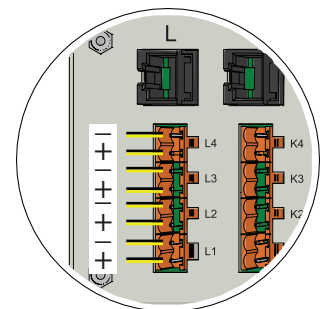
Wire the Eight-Pin Connector

1. Terminate the luminaire end of the cable according to T568B standard.
2. On the end of the cable going to the equipment rack, follow installation procedures for the Category-type cable that you are using and strip the ends of the wires.
3. Separate the pin 1 and pin 5 wires from the cable.
4. Cut the remaining unused conductors from the cable flush to the cable jacket.
5. Label the cable with the data type and run designation.
6. Insert the conductors through two terminals on the provided screw-terminal connector as follows and tighten the screws to secure the wires in the terminals:
   a. Pin 1 to a positive (-) terminal (for example, on "L4").
   b. Pin 5 to the negative (+) terminal on the same labeled location (for example, "L4").
7. Insert the screw-terminal connector into the driver card terminal block receptacles (for example, L1–L4).
8. Plug the RJ45 connector into the "In" receptacle on the luminaire.
9. Repeat steps 2–8 for up to four total luminaires.

> **Note:** *Only connect Fade to Warm Navis 100 luminaires to a FTW-150 Card. Only connect White Navis 100 luminaires to a CC-150 Card. Only connect RGBW Navis 100 luminaires to a Chroma Card.*

Driver Card Terminal Block Output to ArcLamps

ArcLamp is an LED source from ETC that is available in several models including the choice of screw base, color temperature, and clear or frosted glass finish. ArcLamp systems require a ArcLamp 150 Card in order to be powered and controlled by the F-Drive R12. The ArcLamp 150 Card supports a total of thirty-two 4.4 W ArcLamps with up to eight ArcLamps per channel. Each channel requires two pins of the eight-pin terminal block on the ArcLamp 150 Card. The F-Drive R12 ships with twelve eight-pin connectors (ETC part number 7148K1016).

For information on the installation of ArcLamps, see the *ArcLamp System Installation Manual*. ETC documents are avaialble free of charge at etcconnect.com.

> **Note:** *Do not bridge outputs on R12 ArcLamp driver cards. If your installation requires more than eight ArcLamps per circuit, consider a standalone ArcLamp wall-mount or rack-mount driver.*

See *Voltage Drop on page 9* before wiring an ArcLamp 150 Card.

Refer to the *Terminal Block Pinout on the previous page*.

## Driver Card Terminal Block Output to Lighting by Other Manufacturers

The F-Drive R12 ships with twelve eight-pin connectors (ETC part number 7148K1016). Refer to the *Terminal Block Pinout on the previous page*.

Configure the CV-150 Card and ArcLamp 150 Card

The CV-150 Card and ArcLamp 150 Card are capable of 24–28 VDC output to compensate for voltage drop along the cable to the load. Follow these steps to adjust the output voltage:

1. Adjust the dial on the front of the driver card to its minimum value, 24 V.
2. Measure the voltage at the load.
3. Turn the dial on the front of the driver card to increase output voltage until 24 V is measured at the load.
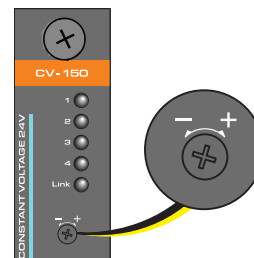
Configure the CC-150 Card

⚠ **CAUTION:** *Setting the F-Drive CC-150 Card to output more current than the manufacturer recommends for the loads may reduce the lifetime or cause damage to the load.*

The CC-150 Card can output 200–700 mA. Output current can be configured via RDM. See *RDM Parameters on page 34*.

Default output current is 600 mA.

ETC Luminaire	Current Requirement
ArcSystem Navis 100 White	600 mA
ArcSystem Pro One-Cell White	600 mA
ArcSystem Pro One-Cell Small White	600 mA
ArcSystem Pro One-Cell Micro White	200 mA

Record Installed Driver Cards

Use this page to record the location of driver cards in your F-Drive R12. Make additional copies as necessary for each R12. The card slot labels run A–L from left to right when facing the front of the R12, and A–L from right to left when facing the back. See the illustration at *Install the R12 on page 19*.

R12 Location/Description:

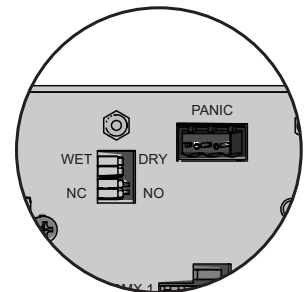| Slot	Driver Card Type (check one) FTW green	CC yellow	CV blue	Chroma purple	ArcLamp white	Description, Quantity, and Location of Loads
Ex.	✓					front left down FTW x4 on A1–A4
A						
B						
C						
D						
E						
F						
G						
H						
I						
J						
K						
L						

Chapter 6

Panic Connector

The R12 supports emergency lighting control bypass in the following ways:

- It accepts input from non-isolated (dry) contact closure powered by the F-Drive R12.
- It accepts input from isolated (wet) contact closure providing +48 VDC.
- It can be configured for normally open or normally closed operation.
- It can be used to trigger the emergency functionality of an F-Drive W1 Emergency Driver in the event of power loss to the R12. This function can be used with or without input from an additional non-isolated (dry) contact closure.

To use the Panic input with a W1 Emergency Driver, see *How to Use R12 with a W1 Emergency Driver on page 31*.

Panic Switches

Switch	Position	Contact Action	Function
WET/OFF/DRY	WET	-	"COM" on the three-pin panic connector is isolated to allow the use of an externally powered contact closure. Use "COM" and "IN" to connect the contact closure.
	OFF	-	"PANIC" "IN" is disabled
	DRY	-	• "+48V" on the three-pin panic connector can be used to power an external contact closure. Use "+48V" and "IN" to connect the contact closure. "COM" is connected to the F-Drive R12 common. • "+48 V" and "COM" on the three-pin "PANIC" connector can also be used as the sense input for an F-Drive W1 Driver.
NC/OFF/NO	NC (normally closed)	close	R12 is in normal state and outputs return to normal DMX control.
		open	R12 is in panic/emergency state and outputs are driven to full.
	OFF	-	Panic behavior is disabled for the R12.
	NO (normally open)	open	R12 is in normal state and outputs return to normal DMX control.
		close	R12 is in panic/emergency state and outputs are driven to full.

Wire the Panic Connector

A three-pin header with a pluggable connector is provided for panic connections (ETC part number 7148K1015). Follow the directions below according to the type of contact you are using.

Non-Isolated (Dry) Contact

1. Strip 6 mm (1/4 in) of insulation from the two panic wires.
2. Locate and remove the panic connector from the back of the R12.
3. Loosen the "IN" terminal and the "+48V" terminal.
4. Insert one wire into the "IN" terminal. Using a jeweler's screwdriver, tighten the screw firmly onto the wire.

Dry Contact

COM   INPUT   +48V

F-Drive R12

5. Insert one wire into the "+48V" terminal. Using a jeweler's screwdriver, tighten the screw firmly onto the wire.
6. Plug the connector into the "PANIC" header on the back of the R12.
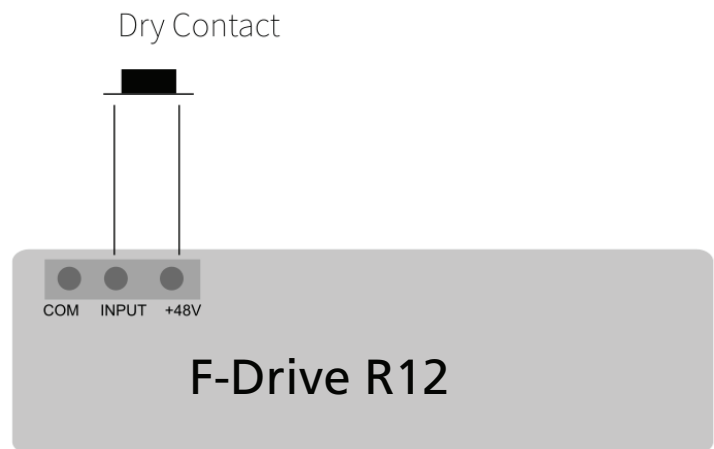
Isolated (Wet) Contact (+48 VDC Signal)

1. Strip 6 mm (1/4 in) of insulation from the two panic wires.
2. Locate and remove the panic connector from the back of the R12.
3. Loosen the "COM" terminal and the "IN" terminal.
4. Insert the common wire into the "COM" terminal. Using a jeweler's screwdriver, tighten the screw firmly onto the wire.

+48VDC

External
PSU

0V

COM   INPUT   +48V

F-Drive R12

5. Insert the +48 VDC wire into the "IN" terminal. Using a jeweler's screwdriver, tighten the screw firmly onto the wire.
6. Plug the connector into the "PANIC" header on the back of the R12.
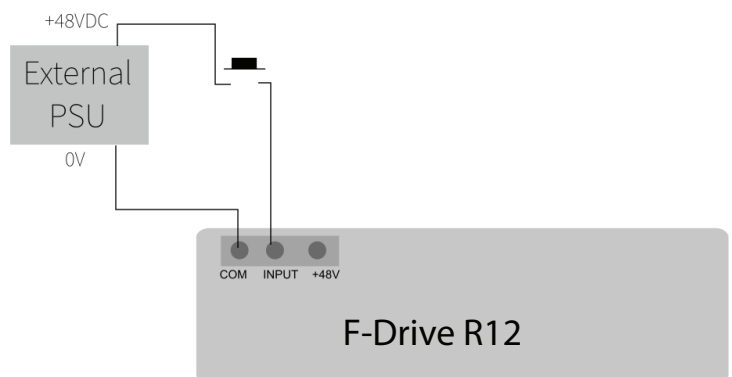
How to Use R12 with a W1 Emergency Driver

The R12 panic connector can be connected to the input of a W1 Emergency Driver to trigger the emergency functionality of the W1 Emergency Driver in the event of power loss to the R12. The R12 "COM" and "+48V" terminals are wired to the W1 Emergency Driver Sense Input terminals. During normal operation, the W1 Emergency Driver senses that power is present at its Sense Input terminals and operates normally. If the R12 loses power, the W1 Emergency Driver goes into emergency state and drives its outputs to full.

The *F-Drive W1 Installation Manual* is available free of charge at etcconnect.com for information about W1 Series driver installation and configuration.

Follow the wiring instructions below:

1. Pull two 0.2–2.5 mm^2 (24–14 AWG) wires through conduit to the W1 Emergency Driver.
2. Strip 6.5 mm (1/4 in) of insulation from each wire.
3. Insert one wire into the W1 Emergency Driver line "L" terminal and torque the terminal to 0.5–0.6 Nm (4.4–5.3 in-lb).
4. Insert the other wire into the W1 Emergency Driver neutral "N" terminal and torque the terminal to 0.5–0.6 Nm (4.4–5.3 in-lb).
5. Pull the wires to the rear of the R12.
6. Locate and remove the panic connector from the back of the R12.
7. Terminate the wire from the W1 Emergency Driver line "L" terminal to the R12 "COM" terminal. Using a jeweler's screwdriver, tighten the screw firmly onto the wire.
8. Terminate the wire from the W1 Emergency Driver neutral "N" terminal to the R12 "+48V" terminal.Using a jeweler's screwdriver, tighten the screw firmly onto the wire.
9. Set the top panic switch on the F-Drive R12 to "DRY".
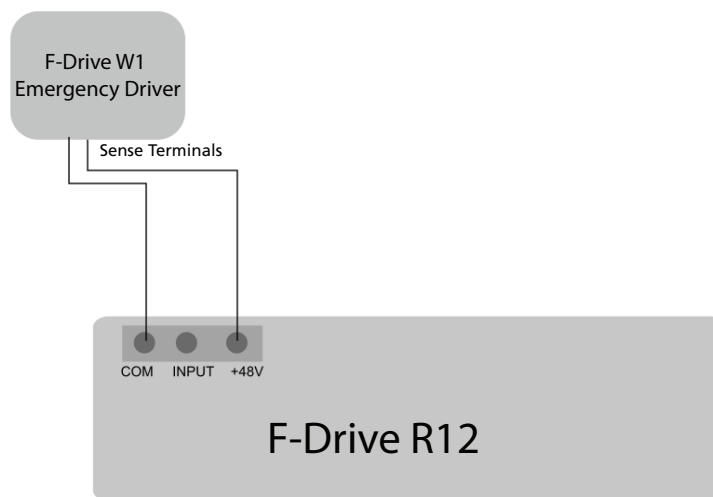
Additional Non-Isolated (Dry) Contact

The "PANIC" output of the F-DriveR12 can be used simultaneously with the 48 VDC output for a non-isolated (dry) normally closed or normally open external contact closure. Set the bottom panic switch on the F-DriveR12 to NC, OFF, or NO as needed and follow the wiring instructions for *Non-Isolated (Dry) Contact on the previous page*.

Chapter 7

Power Up and Control

Power Up Procedure

1. Check that the power switch on the back of all F-Drive R12 drivers is on.
2. If applicable, check that all third-party load power switches are on.
3. Check the DMX control source to ensure proper installation and termination per the manufacturer's instructions.
4. Check that all wires are terminated properly and secure in the terminals, if applicable.
5. Apply power at the equipment rack providing power to the external power supplies.
6. Verify that the external power supplies are powered on.
7. Verify LED status on the front of the R12. See *Troubleshooting on page 38*.
8. If desired, test the output by using the Panic switches to drive all outputs to full. See *Panic Connector on page 29*.
9. Allocate DMX addresses in ETC Concert software with RDM. See *DMX System Control below* and *RDM Parameters on page 34*.

Identify

Fixtures connected to an F-Drive Series driver will respond to an RDM identify command by blinking on and off: 500 ms on, 500 ms off until the identify command is ended. See *RDM Parameters on page 34*.

DMX System Control

You can control the R12 over wired DMX from a lighting console or ETC Concert software. Concert is available for free download at etcconnect.com/Concert.

- F-Drive Series products are compliant with DMX 512-A (ANSI E1.11-2008 (R2013)).
- DMX loss behavior is configurable via RDM with three optons: Go to off, Hold last look, and Go to full.

ArcSystem Navis Luminaire DMX Personalities

ArcSystem Navis RGBW luminaires have two personality options: direct (IRGBW) and IRGB. All other ArcSystem Navis luminaires have a single personality: intensity. The personality is set per output card.

The IRGB DMX personality provides a means for matching the output from RGBW luminaires to 3000 K White and Fade to Warm luminaires. When all four IRGB channels are set to 100%, the output from the RGBW luminaire is 3000 K white light

DMX Channel	Navis RGBW Luminaires		Navis White and Fade to Warm Luminaires
	Direct (IRGBW)	IRGB (default)	Intensity
1	Intensity	Intensity	Intensity
2	Red	Red	
3	Green	Green	
4	Blue	Blue	
5	White		

Edit and Save Configuration Files

You can edit and save configuration files using ETC Concert software. Download Concert software from the ETC website at etcconnect.com. For more information on Concert, see the help files within the Concert application.

1. Edit a configuration file you have saved or edit the default F-Drive configuration file in Concert.
2. Save the file with filename rackConfig.cfg to a microSD card.
3. Remove the F-Drive control card and install the microSD card on your control card.
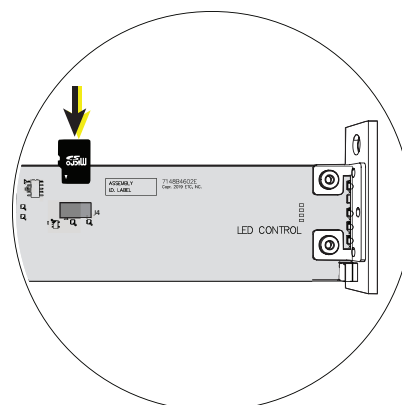
Detail of Control Card and microSD Card

Note: *F-Drive configuration files must be named* ***rackConfig.cfg***.

RDM Parameters

Note: *F-Drive Chroma Card RDM communication may not function properly if Navis RGBW luminaires are not set to unique channels using the channel rotary switch on the side of the Navis RGBW luminaire. See the* ArcSystem Navis 100 Installation Guide *for details on Navis RGBW luminaire installation.*

Parameter	RDM PID	Value	Notes
Status Messages	0x0030	See RDM E1.20-2006	Errors will be in the format: "Error type: [data value 1][data value 2] Control Card: • Board overtemp E120_STS_OVERTEMP[0000][Temp degrees C] • Fan 1/2 Error E120_STS_FEEDBACK_ERROR[fan number][not used] • Emergency Error E120_STS_DIM_PANIC[0000][0000] Chroma Card: • Board overtemp E120_STS_OVERTEMP[Sensor Number][Temp degrees C] • Fixture overtemp E120_STS_OVERTEMP[Sensor Number][Temp degrees C] • Fixture calibration error E120_STS_CAL_FAIL [E120_SD_UNDEFINED][not used] • Fixture no serial number E120_STS_NOT_READY [E120_SD_UNDEFINED][not used] • Fixture overcurrent/short circuit E120_STS_ OVERCURRENT[0][0] Other Driver Cards: • Board overtemp E120_STS_OVERTEMP[Sensor Number][Temp degrees C] • Board overcurrent/short circuit E120_STS_ OVERCURRENT[0][0]
Device Info	0x0060	See RDM E1.20-2006	• Root (control card): reports a footprint of 0 and a start address of 0xFFFF. • Subdevices (driver card channels): in patched or straight mode, all driver card channels report their current addresses and a footprint of 1. There are 48 driver card channels. • Chroma Card will report a footprint of 4 in IRGB mode or 5 in Direct mode. See *DMX Personality on the facing page*.

Device Model Description	0x0080	ASCII string for model description	• Root Device: "F-Drive R12"
			• Subdevices (driver card channels): the installed card type that contains the channel.
			  - Chroma Card: "Chroma"
			  - FTW-150 Card: "FTW-150"
			  - CV-150 Card: "CV-150
			  - ArcLamp 150 Card: "ArcLamp-150"
			  - CC-150 Card: "CC-150"

Manufacturer Label	0x0081	ASCII string for manufacturer label	Get returns "ETC" from the root (control card) only.
Device Label	0x0082	ASCII string for device label	Get or Set • root device (control card): "F-Drive R12" • subdevices (driver cards) : "[channel] %d" where %d is the channel number 1–48.

Parameter	RDM PID	Value	Notes
DMX Personality	0x00E0	1, 2	Chroma Card: • 1=Direct (IRGBW) • 2=IRGB (default) All other driver cardshave a single DMX personality: Intensity
DMX Personality Description	0x00E1		
DMX Start Address	0x00F0	Range = 001 to 512	
Block Address	0x0140	Range = 001 to 512	Sending "set" to root (control card) will set the start address of all outputs sequentially.
Identify Device	0x1000	**0** = stop identify **1** = start identify	Sending "set" with value 1 to a subdevice (driver card channel) causes connected loads to flash in a one second on, one second off pattern. Set to 1 sent to the root (control card) will cause all LEDs on the control card to blink in a 500 ms on, 500 ms off pattern.
Minimum Level	0x0341	0 to 254	Bottom trim. Minimum Level must be lower than the Maximum Level. Default is 0. Chroma Card ignores this setting.
Maximum Level	0x0342	1 to 255	Top trim. Maximum Level must be higher than the Minimum Level. Default is 255. Chroma Card ignores this setting.
Curve	0x0343	1 or 2	• Set to 1 is the Default • Set to 2 is the ArcSystem , to match the dimming curve of ArcSystem Pro Fade to Warm luminaires and ArcSystem Fade to Warm ArcLamps
Curve Description	0x0344		
Output Response Time	0x0345	• **1** is 0 ms • **2** is 50 ms • **3** is 100 ms • **4** is 200 ms • **5** is 250 ms • **6** is 300 ms • **7** is 400 ms • **8** is 500 ms • **9** is 600 ms • **10** is 700 ms • **11** is 800 ms • **12** is 900 ms • **13** is 1000 ms	Set the speed of response/slewing for driver cards. Default is 300 ms.
Output Response Time Description	0x0346	See Output Response Time above.	"Get" returns an ASCII text string.
DMX Loss Behavior	0x810A	**0** = Hold Last Look **1** = Go to Full **2** = Go to Off	Sending "set" to the root (control card) determines the behavior if DMX is lost. Scenes and Hold Time are not supported.
DMX Loss Behavior Description	0x810B		Sending "get" to the root (control card) returns an ASCII text string.

Parameter	RDM PID	Value	Notes
FTW Temperature Scaling	0x8052	The structure of data includes: • enabled (unin8_t): 0 = disabled, 1 = enabled • Max CT (uint16_t): 2700K–3000K • Int for max CT (unint8_t): 128–255	This parameter is used to set or get the fade to warm temperature scaling on a FTW-150 Card. This feature allows you to set a maximum color temperature (2700 K–3000 K) that an ArcSystem Navis Fade to Warm luminaire will achieve at an associated "set point" intensity (128–255). Default Max CT is 300 K. Default set point is 255.
Output Current	0x8053	• **0** is 200 mA • **1** is 250 mA • **2** is 300 mA • **3** is 350 mA • **4** is 400 mA • **5** is 450 mA • **6** is 500 mA • **7** is 550 mA • **8** is 600 mA • **9** is 650 mA • **10** is 700 mA	Gets or sets the output current for a CC-150 Card. Default is 600 mA. • ArcSystem Navis 100 White requires 600 mA • ArcSystem Pro One-Cell and Pro One-Cell Small require 600 mA • ArcSystem Pro One-Cell Micro requires 200 mA
Output Current Description	0x8054	See Output Current values above.	Get returns enumerated string describing the output current of a CC-150 Card.
Red Shift	0x8106	0, 1	Sets if red shift is enabled on a Chroma Card 0 = disabled 1 = enabled
Red Shift Description	0x8114	"disabled" or "enabled"	"Get" returns an ASCII text string.
Color Fixture White Point	0x8107	• **0** is 2700K • **1** is 3000K • **2** is 3500K • **3** is 4000K • **4** is 5000K	"Set" shifts the white point of the Chroma Card. The default is 3000 K. This feature is only available in IRGB mode (see *DMX Personality on the previous page*).
Color Fixture White Point Description	0x8108	See Color Fixture White Point above.	"Get" returns an ASCII text string.
ArcLamp Dimming Steps	0x8031	0–254	Controls how many steps the ArcLamp 150 Card makes while dimming. The default is 17.
ArcLamp Enable Fade to Warm Support	0x8032	**0** = disabled **1** = enabled	Set disables or enables fade to warm for an ArcLamp 150 Card. Default is enabled.
Get Slot Info	0x0120	Chroma Card in Direct personality: Intensity, Red, Green Blue White	
Get Slot Description	0x0122	Chroma Card in RGBW personality: Intensity, Red, Green, Blue	
Default Slot Value	0x0122	All other driver cards: Intensity See *DMX System Control on page 32*.	
Factory Defaults	0x0090		Set resets the configurations of the control card and all driver cards to defaults.
Software Version Label	0x00C0		Get returns current software version as an ASCII text string.

Update Firmware

ETC recommends using UpdaterAtor software to download software updates. For more information on UpdaterAtor, download the *UpdaterAtor Software Quick Guide* for free from *etcconnect.com*.

R12 Control and Driver Card Firmware

R12 firmware can be updated by microSD card by a qualified ETC Technician. Updated firmware can be downloaded through ETC UpdaterAtor software. See *Edit and Save Configuration Files on page 33* for an illustration of the location of the microSD card on the control card.

As the R12 boots, it checks the firmware files on the microSD card and updates the control card or driver cards if required.

- When the microSD card is being read, the control card blue "Power" and yellow "Link" LEDs will perform a slow blink. If the red LED also fast blinks, the RDM ID is invalid.
- When an upgrade is in progress, all control card LEDs (blue, red, yellow, and green) and green driver card LEDs will blink in a "triple blink" pattern: 3 blinks for 500 ms, followed by a pause for 500 ms.

See *Troubleshooting on the next page* for more information on LED indicators.

Firmware packages include these six files with ".s" extensions:

Function	File Name
Control Card firmware	reliantcontrol.s
ArcLamp 150 Card firmware	arclampdriver.s
FTW-150 Card/CC-150 Card firmware	ftwdriver.s
Chroma Card firmware	colorcomm.s
CV-150 Card firmware	cvdriver.s
Navis RGBW luminaire firmware	RGBWFixture.s

Maintenance

WARNING: RISK OF DEATH BY ELECTRIC SHOCK! Failure to disconnect all power to the panel before working inside could result in serious injury or death.

AVERTISSEMENT : RISQUE D'ELECTROCUTION! Travailler à l'intérieur du panneau sans avoir déconnecté le courant peut entrainer des blessures graves, voire mortelles.

De-energize main feed to the panel and follow appropriate Lockout/Tagout procedures as mandated by NFPA 70E. It is important to note that electrical equipment such as breaker panels can present an arc flash hazard if improperly serviced. This is due to the high amounts of short-circuit current available on the electrical supply to this equipment. Any work must comply with OSHA Safe Working Practices.

CAUTION: *Disconnect power before servicing.*

**ATTENTION :** *Couper l'alimentation avant l'entretien.*

The R12 can be removed from the equipment rack using the two aluminum 'U' handles.

Troubleshooting

## F-Drive R12 Control Card LED Indicators

> ℹ️ **Note:** *If you set the RDM Identify parameter for the control card to 1 for "start identify," it will cause all LEDs on the control card to blink in a 500 ms on, 500 ms off pattern until the Identify parameter is set to stop. See .*
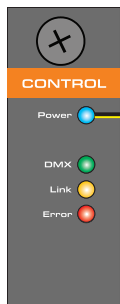
| Blue "Power" LED	
Behavior	**Status or Error**
Solid On	Power is present at the control card.
Off	Power is not present at the control card.
Triple Blink	Firmware download is in progress. The "DMX" (green), "Link" (yellow), and "Error" (red) LEDs and LEDs on the driver cards will also triple blink.
Slow Blink	Bootloader mode: waiting for firmware. The "Link" (yellow) LED will also slow blink.
	Invalid RDM ID. The "Link" (yellow) LED will also slow blink and the "Error" (red) LED will fast blink.
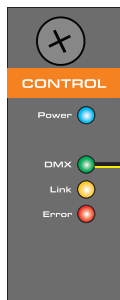
Green "DMX" LED	
Behavior	**Status or Error**
Solid On	DMX data is present.
Slow Blink	DMX data is not present.
Triple Blink	Firmware download is in progress. The Power (blue), Link (yellow), and Error (red) LEDs and LEDs on the driver cards will also triple blink.
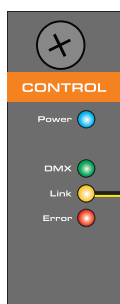
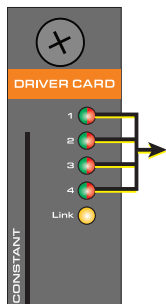| Yellow "Link" LED	
Behavior	**Status or Error**
Random Blink	Communication is active.
Triple Blink	Firmware download is in progress. The "Power" (blue), "DMX" (green), and "Error" (red) LEDs and LEDs on the driver cards will also triple blink.
Off	Communication is inactive.
Slow Blink	Bootloader mode: waiting for firmware. The "Power" (blue) LED will also slow blink.
	Invalid RDM ID. The "Power" (blue) LED will also slow blink and the "Error" (red) LED will fast blink.
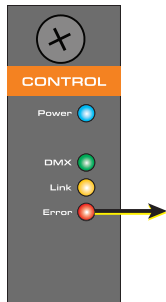
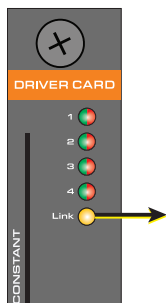| Red "Error" LED	
Behavior	**Status or Error**
Off	Normal operation.
Solid On	There is an active error. See *Errors on the next page*.
Fast Blink	Invalid RDM ID. The "Power" (blue) and "Link" (yellow) LEDs will also slow blink.
Double Blink	SD card error.
Triple Blink	Firmware download is in progress. The "Power" (blue), "DMX" (green), and "Link" (yellow) LEDs and LEDs on the driver cards will also triple blink.

F-Drive R12 Driver Card LED Indicators

Note: *F-DriveChroma Card LED indicators may not function properly if Navis RGBW luminaires are not set to unique channels using the channel rotary switch on the side of the Navis RGBW luminaire. See the* ArcSystem Navis 100 Installation Guide *for details on Navis RGBW luminaire installation.*

Color	Channel # LED Behavior	Status or Error
Green	Solid On	Output > 0%.
	Off	Output is off.
	Triple Blink	Firmware download is in progress. The "Link" (yellow) LED on the driver card and the LEDs on the control card will also triple blink.
Red	Solid On	There is an active error. See *Errors on the next page*.
	Fast Blink	Fixture firmware upgrade in progress (Chroma Card only).
	Slow Blink	Fixture needs firmware (Chroma Card only).
	Alternating blink in pairs	Bootloader mode: waiting for firmware. Red LEDs blink in pairs "1" and "3" then "2" and "4".

Yellow "Link" LED	
Behavior	**Status or Error**
Random Blink	Communication is active.
Off	Communication is inactive.

Errors

An illuminated red "Error" LED on a control card or an illuminated red LED on a channel of a driver card can be the result of several problems, depending on the type of card.

The errors below are also reported through RDM Status Messages. See *RDM Parameters on page 34*.

Driver Card	Errors
Control Card	Panic/emergency state is active (see *Panic Connector on page 29*), Card over temperature, fan failure, overcurrent/short circuit*
FTW-150 Card	Card over temperature, channel over temperature, over current/short circuit*
CC-150 Card (Constant Current)	Card over temperature, channel over temperature, short circuit*
CV-150 Card (Constant Voltage)	Card over temperature, channel over temperature, over current/short circuit*
Chroma Card	Card over temperature, fixture over temperature, fixture calibration error, invalid fixture ID, over current/short circuit*
ArcLamp 150 Card	Card over temperature, channel over temperature, over current/short circuit*

*To reset a CC-150 Card, CV-150 Card, or FTW-150 Card after an over current/short circuit error, turn channel level to off. To reset an ArcLamp 150 Card or Chroma Card after an over current/short circuit error, remove the card and reinsert it.

MEAN WELL LED Indicators

For information on the LED indicators on the MEAN WELL power supply modules, view the RKP-1UI and RCP-2000 specifications on the MEAN WELL website. See *Technical Information from MEAN WELL on page 12*.

Appendix A

Compliance

For current and complete compliance information, view the product datasheets at
etcconnect.com/Products/Power-Controls/LED-Drivers/F-Drive/Documentation.aspx.

cULus

- Conforms to UL 8750
- Certified to CAN/CSA 22.2 No 250.13

EU

CE Compliant

FCC-Part 15 Class A

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two
conditions : (1) this device may not cause harmful interference, and (2) this device must accept
any interference received; including interference that may cause undesired operation.

Note: *This equipment has been tested and found to comply with the limits for a Class
A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to
provide reasonable protection against harmful interference when the equipment is
operated in a commercial environment. This equipment generates, uses, and can
radiate radio frequency energy and, if not installed and used in accordance with the
instructions, may cause harmful interference to radio communications. Operation of
this equipment in a residential area is likely to cause harmful interference, in which
case the user will be required to correct the interference at his own expense.*

DMX

Conforms to ANSI E1.11 USITT DMX 512-A.