The FS500 Series flash rate is adjustable from 10 to 100 FPM. A locknut is provided to hold selected flash rate. The long-life electronic circuit combined with a quality electromechanical relay provides flexibility and reliability in most applications.

Operation

Upon application of input voltage, the output relay is energized and the ON time begins. At the end of the ON time, the output relay de-energizes and the OFF time begins. At the end of the OFF time, the output is energized and the cycle repeats as long as input voltage is applied. Reset: Removing input voltage resets the output and the sequence.

For more information see:
Appendix A, page 164 for Flasher (ON First-DPDT) function.
Appendix B, page 165, Figure 9 for dimensional drawing.
Appendix C, page 168, Figure 8 for connection diagram.

Features:

- Solid-state circuitry - relay output
- Industrial standard octal plug-in
- Adjustable flash rate 10 - 100 FPM
- 10A, DPDT output contacts

Approvals: (some models)

Auxiliary Products:

- **Panel mount kit:** P/N: BZ1
- **Octal 8-pin socket:** P/N: NDS-8
- **Hold-down clips (sold in pairs):** P/N: PSC8 (NDS-8)
- **DIN rail:** P/N: C103PM (Al)

Order Table:

Input Voltage	Part Number
12VDC	FS512
24VAC/DC	FS524
120VAC/DC	FS590
230VAC	FS599

Available Models:

FS512
FS524
FS590

If desired part number is not listed, please call us to see if it is technically possible to build.

Specifications

Technical Data
Operation . . . . . ON/OFF recycling flasher with adjustable flash rate
Flash Rate . . . . . Adjustable from 10 - 100 operations per minute (guaranteed range)
ON/OFF Ratio . . . . . ≅ 50%

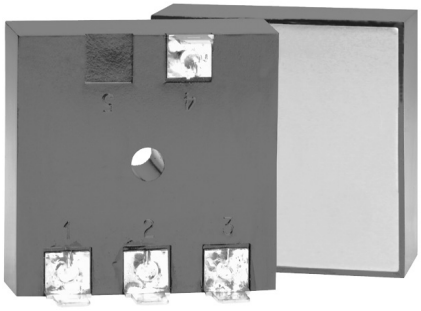
Input
Input Voltage 12VDC, 24VAC/DC, 120VAC/DC, 230VAC
Tolerance 12VDC & 24VDC/AC . . . . -15% - 20%
120 - 230VAC/DC . . . . -20% - 10%
AC Line Frequency 50/60Hz

Output
Load Type . . . . . Electromechanical relay
Form . . . . . DPDT
Rating . . . . . 10A resistive @ 120/240VAC & 28VDC; 1/3 hp @ 120/ 240VAC

Mechanical
Mounting . . . . . Plug-in socket
Dimensions . . . . . 3.62 x 2.39 x 1.78 in. (91.6 x 60.7 x 45.2 mm)
Termination . . . . . Octal 8-pin plug-in

Protection
Isolation Voltage . . . . . ≥ 1500V RMS input to output
Polarity . . . . . DC units are reverse polarity protected

Environmental
Operating / Storage Temperature . . . . . -20° to 60°C / -30° to 85°C
Weight . . . . . ≅ 5.8 oz (164 g)



The AF Series offers a high inrush capacity of up to 200A. These devices exceed mechanical type relays in both performance and lifespan. The AF Series is constructed with no moving parts to arc, wear, and eventually fail; 100 million operations are typical. Circuitry is encapsulated to provide protection against vibration and moisture, making the AF Series ideal for outdoor applications.

Operation

Upon application of input voltage T1 begins, Load 1 is ON and Load 2 is OFF. At the end of T1, T2 begins and Load 2 is now ON and Load 1 is OFF. At the end of T2, T1 repeats and this sequence continues until input voltage is removed. The duration of T1 and T2 is approximately equal.
Reset: Removing input voltage resets the flasher.

For more information see:
Appendix A, page 164 for Flasher (Alternating) function.
Appendix B, page 166, Figure 13 for dimensional drawing.
Appendix C, page 168, Figure 7 for connection diagram.

Features:

- Alternately flashes two high current loads
- High surge capacity - up to 200A
- Small size - 2 x 2 x 1.30 in. (50.8 x 50.8 x 33 mm)
- Totally solid state & encapsulated

Auxiliary Products:

- **Female quick connect:**
  P/N: P1015-13 (AWG 10/12)
  P/N: P1015-64 (AWG 14/16)
  P/N: P1015-14 (AWG 18/22)
- **Quick connect to screw adaptor:**
  P/N: P1015-18

Order Table:

AF X X X

Input Voltage
- **1** - 24VAC
- **2** - 120VAC
- **3** - 230VAC

Output Rating
- **1** - 6A
- **2** - 10A
- **3** - 20A

Flash Rate (flashes per min.)
- **1** - 10
- **2** - 30
- **3** - 60
- **4** - 90
- **5** - 120
- **6** - 140
- **Blank** - Custom Flash Rate

Available Models:

AF213
AF223
AF232
AF233

If desired part number is not listed, please call us to see if it is technically possible to build.

Specifications

Technical Data
Operation. . . . . Alternating solid-state flasher rated (continuous duty)
Flash Rate . . . . . Factory fixed at 10, 30, 60, 90, 120, or 140 flashes per min. ±10%.
Custom Flash Rate . . . . . 10 - 140 FPM
Ratio . . . . . ≅ 50%

Input
Input Voltage/Frequency . . . . . 24, 120, or 230VAC ±15% / 50/60Hz

Output
Load Type . . . . . Incandescent or resistive
Maximum Load Rating . . . . . 6, 10, & 20A steady state
Inrush . . . . . 10 times steady state current

Mechanical
Mounting * . . . . . Surface mount with one #10 (M5 x 0.8) screw
Dimensions . . . . . 2 x 2 x 1.30 in. (50.8 x 50.8 x 33 mm)

Protection
Circuitry . . . . . Encapsulated

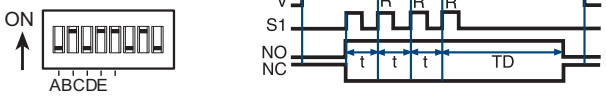
Environmental
Operating / Storage Temperature . . . . . -20° to 60°C / -40° to 85°C
Humidity . . . . . 95% relative, non-condensing
Weight . . . . . ≅ 2.9 oz (82 g)

*Must be bolted to metal surface using the included heat sink compound. The maxim mounting surface temperature is 90°C.

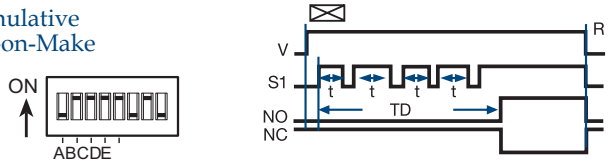
Appendix A - Timer/Flasher Functions

Single Functions

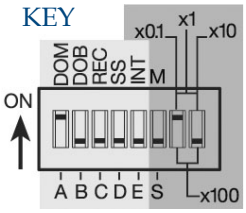
Retriggerable Single Shot



Accumulative Delay-on-Make



KEY



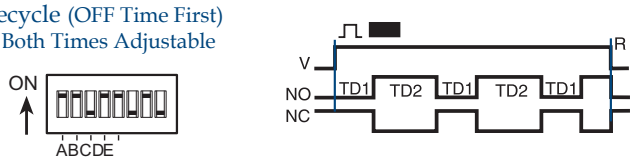
V=Voltage, R=Reset, S1=Initiate Switch, NO=Normally Open Contact, NC=Normally Closed Contact, TD,TD1,TD2=Complete Time Delay, t=Partial Time Delay, DOM=Delay-on-Make, DOB=Delay-on-Break, REC=Recycle, SS=Single Shot, INT=Interval, M=Minutes, S=Seconds, ≡⟨⟩≡ Undefined time

5 Switches for Function Selection
3 Switches for Time Delay Range

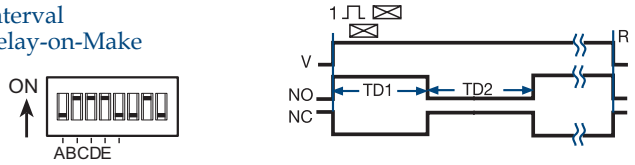
NOTE: The time delay range is the same for both functions when dual functions are selected.

Dual Functions

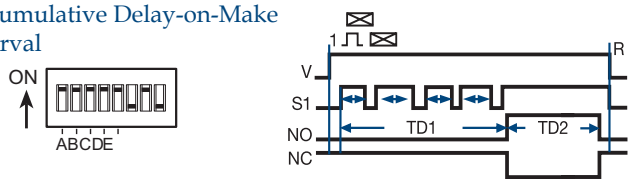
* Recycle (OFF Time First) Both Times Adjustable



* Interval Delay-on-Make



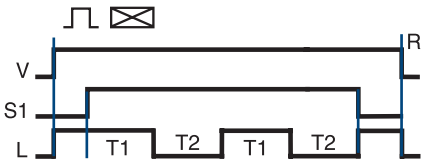
Accumulative Delay-on-Make Interval



* 9 Functions included in the 8 pin DPDT models

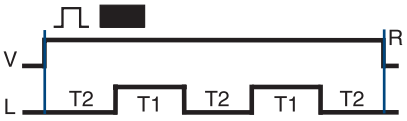
Flasher Function Diagrams

Flasher (NC)



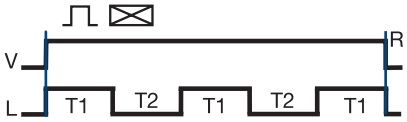
V = Voltage S1 = Initiate Switch L = Load
R = Reset T1 = ON Time T2 = OFF Time
T1 ≅ T2

Flasher (OFF First)



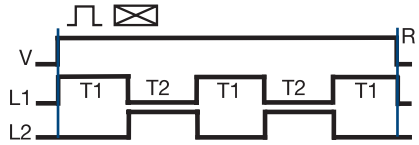
V = Voltage R = Reset L = Load
T1 = ON Time T2 = OFF Time
T1 ≅ T2

Flasher (ON First)



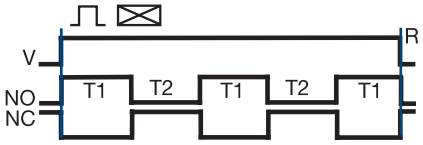
V = Voltage R = Reset L = Load
T1 = ON Time T2 = OFF Time T1 ≅ T2
ON time plus OFF time equals one complete flash.

Flasher (Alternating)



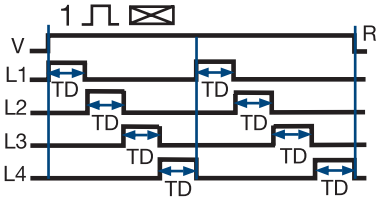
V = Voltage L1 = Load 1 L2 = Load 2
R = Reset T1 = ON Time T2 = OFF Time
T1 ≅ T2

Flasher (ON First-DPDT)



V = Voltage R = Reset
T1 = ON Time T2 = OFF Time
NO = Normally Open NC = Normally Closed

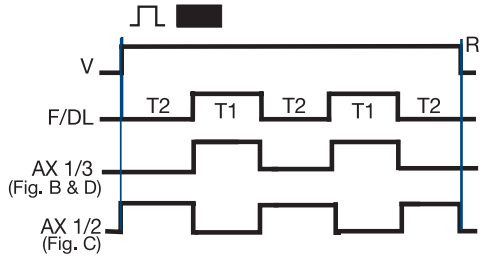
Flasher (Chasing)



SC4 shown; SC3, L4 is eliminated and L1 TD begins as soon as L3 TD is completed.

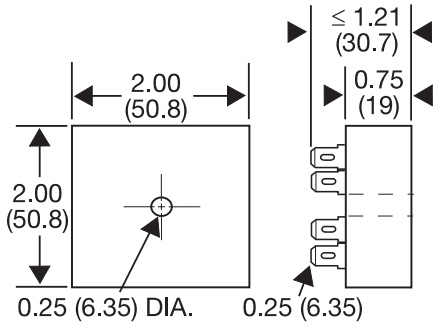
V = Voltage R = Reset L (1...4) = Lamps
TD = Time Delay (all are equal)

Flashers & Aux. Modules



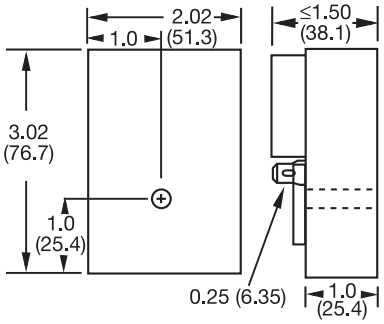
V = Voltage L = Load T1 = ON Time
T2 = OFF Time R = Reset
T1 ≅ T2

FIGURE 1



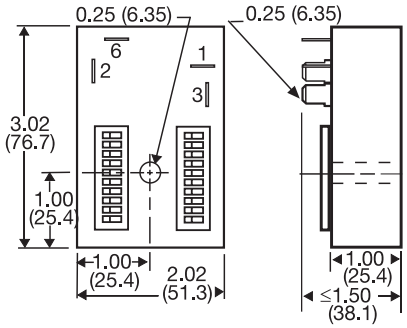
CT; ESD5; ESDR; FS100; FS200; FS300; KRD3; KRD9; KRDB; KRDI; KRDM; KRDR; KRDS; KRPD; KRPS; KSD1; KSD2; KSD3; KSD4; KSDB; KSDR; KSDS; KSDU; KSPD; KSPS; KSPU; KVM; T2D; TA; TAC1; TAC4; TDU; TDUB; TDUI; TDUS; TL; TMV8000; TS1; TS2; TS4; TS6; TSB; TSD1; TSD2; TSD3; TSD4; TSD6; TSD7; TSDB; TSDR; TSDS; TSS; TSU2000

FIGURE 2



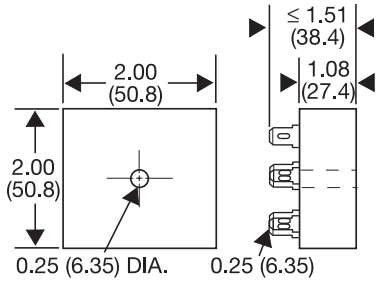
HLV; HRD3; HRD9; HRDB; HRDI; HRDM; HRDR; HRDS; HRID; HRIS; HRIU; HRPD; HRPS; HRPU; HRV; RS

FIGURE 3



HSPZ

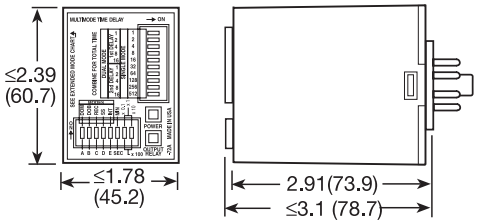
FIGURE 4



FA; FS; FSU1000*; NHPD; NHPS; NHPU; NLF1*; NLF2*; PHS*; PTHF*; SIR1; SIR2; SLR1*; SLR2*; TH1; TH2; THC; THD1; THD2; THD3; THD4; THD7; THDB; THDM; THDS; THS

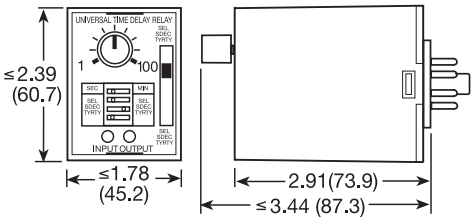
*If unit is rated @ 1A, see Figure 1

FIGURE 5



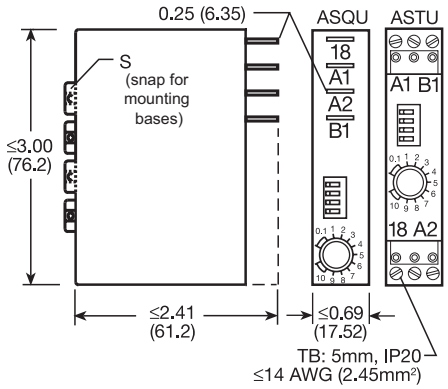
TRDU

FIGURE 6



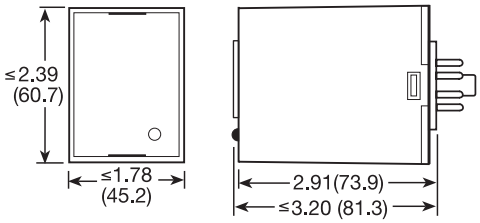
TRU

FIGURE 7



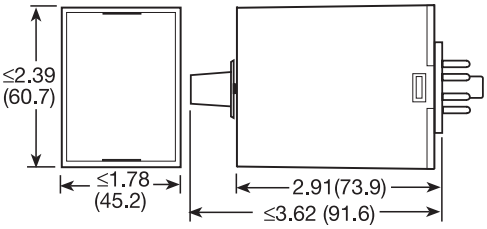
ASQU; ASTU; DSQU; DSTU

FIGURE 8



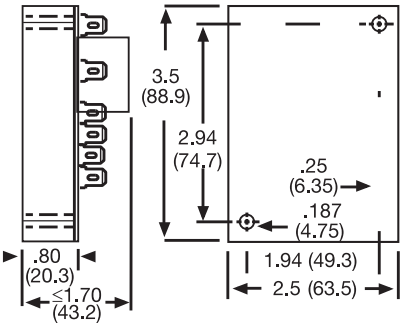
PLM; PLR; TDB; TDBH; TDBL; TDI; TDIH; TDIL; TDM; TDMB; TDMH; TDML; TDR; TDS; TDSH; TDSL

FIGURE 9



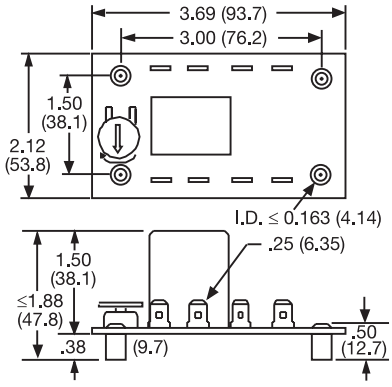
FS500; PRLB; PRLM; PRLS; TRB; TRM; TRS

FIGURE 10



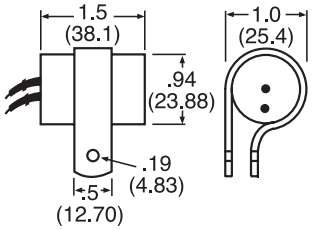
ERD3; ERDI; ERDM

FIGURE 11



ORB; ORM; ORS

FIGURE 12

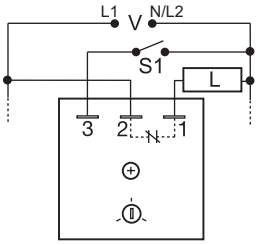


FS100; FS400

inches (millimeters)

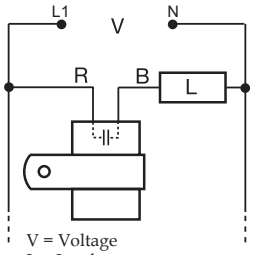
Appendix C - Connection Diagrams

FIGURE 1 - FSU1000 Series



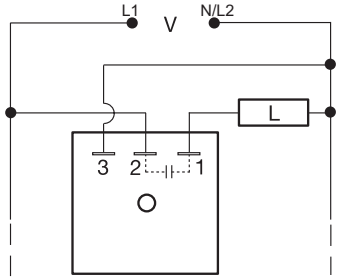
S1 = Optional low current switch
V = Voltage
L = Load

FIGURE 2 - FS100 Series



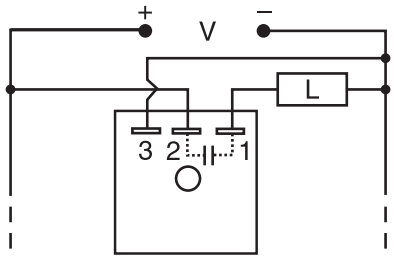
V = Voltage
L = Load
R = Red Wire
B = Black Wire

FIGURE 3 - FS100 Series



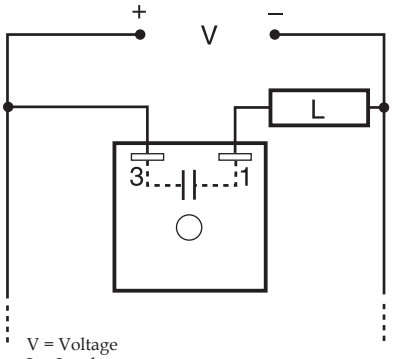
V = Voltage
L = Load

FIGURE 4 - FS200 Series



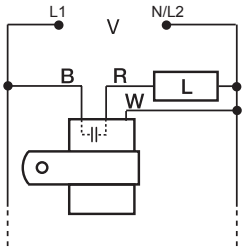
V = Voltage
L = Load

FIGURE 5 - FS300 Series



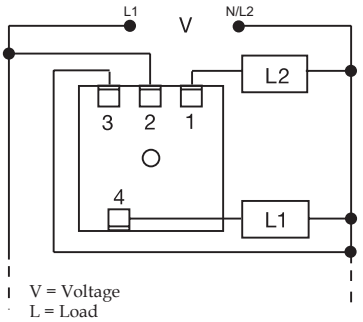
V = Voltage
L = Load
Note: Load may be in positive side.

FIGURE 6 - FS400 Series



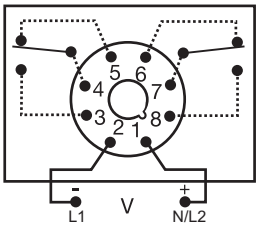
V = Voltage
L = Load
R = Red Wire
B = Black Wire
W= White Wire

FIGURE 7 - AF Series



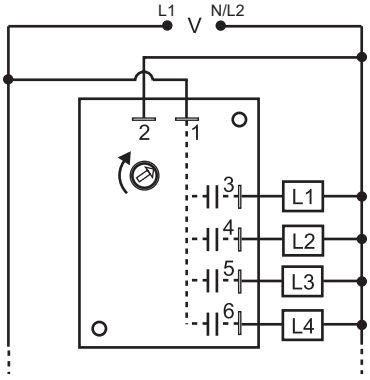
V = Voltage
L = Load

FIGURE 8 - FS500 Series



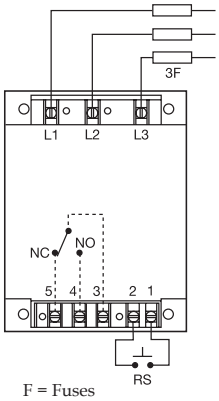
V = Voltage

FIGURE 9 - SC3/SC4 Series



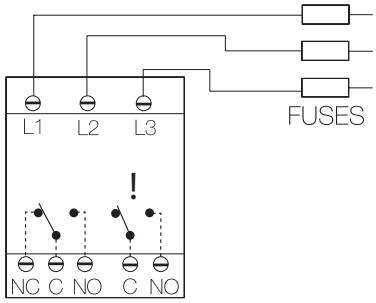
SC4 shown;
for SC3, terminal 6 & load L4 are eliminated.

FIGURE 10 - WVM Series



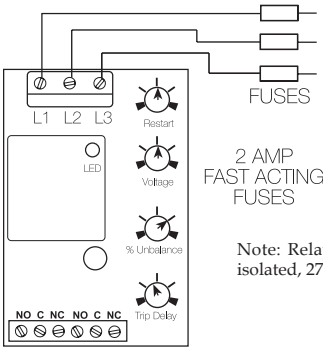
F = Fuses
NO = Normally Open
NC = Normally Closed
RS = Optional Remote Reset Switch
Relay contacts are isolated.
CAUTION:
2 amp max fast acting fuses must be installed externally in series with each input. (3)

FIGURE 11 - DLMU Series



L1, L2, L3 = Line Voltage Input
NO = Normally Open Contact
NC = Normally Closed Contact
C = Common, Transfer Contact
CAUTION: 2 amp max. fast acting fuses are recommended to protect the equipment's wiring. They are not required to protect the DLMU.
! = Select alarm contact connection as N.O. or N.C. when ordering; N.O. Shown.

FIGURE 12 - HLMU Series

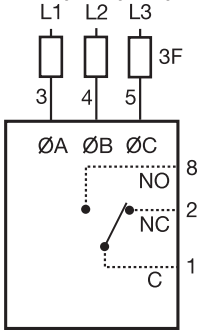


2 AMP
FAST ACTING
FUSES

Note: Relay contacts are isolated, 277VAC max.

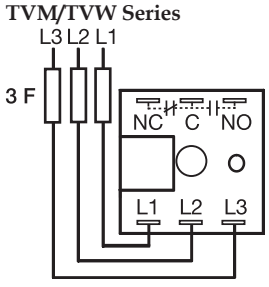
L1, L2, L3 = Line Voltage Input
NO = Normally Open Contact
NC = Normally Closed Contact
C = Common, Transfer Contact
CAUTION: 2 amp max. fast acting fuses are recommended to protect the equipment's wiring. They are not required to protect the HLMU.

FIGURE 13 - PLMU/PLM/PLR/PLS Series



F = Fuses
ØA = Phase A = L1
ØB = Phase B = L2
ØC = Phase C = L3
NO = Normally Open
NC = Normally Closed
2A fast acting fuses recommended for safety (not required)
Relay contacts are isolated.

FIGURE 14 - TVM/TVW Series



L1 = Phase A
L2 = Phase B
L3 = Phase C
NO = Normally Open
NC = Normally Closed
C = Common, Transfer Contact
Relay contacts are isolated.
F = 2A Fast acting fuses are recommended, but not required

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