



**GROUND-FAULT PROTECTION**



**GROUND-CONDUCTOR MONITORING**



**RESISTANCE GROUNDING/NGR MONITORING**



**FEEDER PROTECTION**



**ARC-FLASH PROTECTION**



**SWITCHING RELAYS & CONTROLS**



**MOTOR & PUMP PROTECTION**



**PUMP CONTROLLERS**



**AC SYSTEM MONITORS/LOAD SENSORS**



**TIMERS**



**FLASHERS, TOWER &  
OBSTRUCTION LIGHTING CONTROL**



**INDUSTRIAL PRODUCT SELECTION GUIDE**

# Over 225 Relay Product Series are contained in this handy guide.

## Product Selection as Easy as 1-2-3

### STEP 1:

#### Select the product category

*example*

 **ARC-FLASH PROTECTION**

#### ARC-FLASH DETECTION

Rapidly detect an arc flash to reduce damage to equipment and risk to personnel

### STEP 2:

#### Use the decision tree to determine what features you need for your application

*example*

Sensor Health Monitoring

Y

N

Overcurrent Detection

Y

N

### STEP 3:

Leads you to the product series that is the best fit.

*example*



**PGR-8800 SERIES**



**AF0500 SERIES**



**D0920**

# PRODUCT SELECTION GUIDE

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Ground-Fault Protection .....	2
Ground-Conductor Monitoring .....	3
Resistance Grounding / NGR Monitoring .....	3
Feeder Protection .....	4
Arc-Flash Protection .....	4
Switching Relays & Controls .....	5
Motor & Pump Protection .....	6
Pump Controllers .....	8
AC System Monitors / Load Sensors .....	12
Timers .....	16
Flashers, Tower and Obstruction Lighting Control .....	29

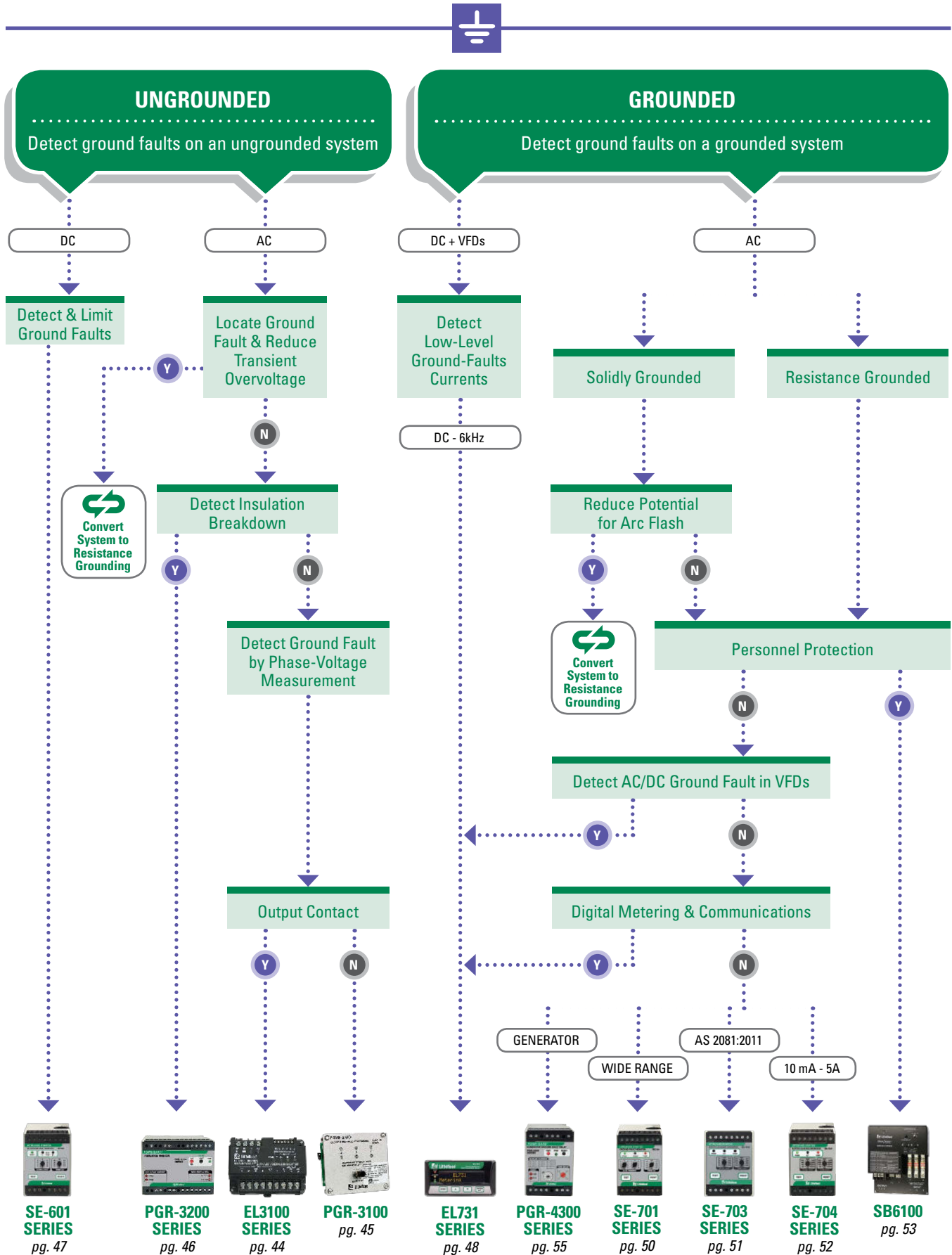
# GROUND-FAULT PROTECTION



STEP 1 Select product category

STEP 2 Select the needed features in each category

STEP 3 Find the recommended product for your application



Ground-Fault Protection Relays

Page numbers beneath products refer to our Protection Relay & Controls Catalog available in print or online at [www.littelfuse.com/relayscontrols/catalog](http://www.littelfuse.com/relayscontrols/catalog)

## GROUND-CONDUCTOR MONITORING



### GROUND-FAULT & GROUND-CHECK

Ensure ground- conductor continuity for portable equipment and submersible pumps, and detect ground faults

Cable Voltage

<5kV

>5kV



**SE-105, SE-107  
SERIES**  
pg. 58



**SE-134C, SE-135  
SERIES**  
pg. 59

## RESISTANCE GROUNDING/NGR MONITORING



### RESISTANCE-GROUNDED AC

Solve problems commonly associated with ungrounded and solidly grounded systems and monitor the neutral-to-ground connection

Neutral-Grounding  
Resistance (NGR)  
Continuity Monitoring

Implement  
Resistance  
Grounding

Pulsing, Digital Filtering,  
Communications, or Software

Y

N

Identify Faulted Feeder

Y

N



**SE-330 & SE-701  
SERIES**  
(use in combination)  
pg. 63 pg. 50



**SE-330  
SERIES**  
pg. 63



**SE-325  
SERIES**  
pg. 62



**NGR  
SERIES**  
pg. 66

Ground-Conductor Monitoring Relays

Resistance Grounding Systems & NGR Monitors

Page numbers beneath products refer to our Protection Relay & Controls Catalog available in print or online at [www.littelfuse.com/relayscontrols/catalog](http://www.littelfuse.com/relayscontrols/catalog)

## FEEDER PROTECTION



### STANDARD

Protect distribution feeders in processing, manufacturing, petroleum, chemical, and wastewater treatment facilities

### ADVANCED

Monitor voltage and current using a modular system with integrated protection, breaker control, metering, and data-logging functions

Current Protection & Metering IEEE/IEC Overcurrent

Current Protection, Voltage Protection, & Metering IEEE/IEC Overcurrent



**FPU-32  
SERIES**  
pg. 70



**FPS  
SERIES**  
pg. 70

## ARC-FLASH PROTECTION



### ARC-FLASH DETECTION

Rapidly detect an arc flash to reduce damage to equipment and risk to personnel

Sensor Health Monitoring

Overcurrent Detection

Multiple Zones, Communications, & Data Logging



**PGR-8800  
SERIES**  
pg. 75



**AF0500  
SERIES**  
pg. 77



**AF0100  
SERIES**  
pg. 79



**D0920**  
pg. 74

Feeder Protection Relays

Arc-Flash Relays



SOLID-STATE RELAYS

Designed for industrial applications requiring rugged, reliable operation

PHASE CONTROL

Designed for changing lamp intensity, varying the speed of a fan, or controlling the temperature of a heater

TEMPERATURE CONTROL

A single set point controller with high current, solid state output for resistive loads

Optical Isolation Between the Control Voltage Input and the Solid-State Output

Y

N

Random Switching for Inductive Loads

Random Switching for Inductive Loads

Y

N

Zero Voltage Switching for Resistive and Incandescent Loads



**SIR1  
SERIES**  
pg. 86



**SIR2  
SERIES**  
pg. 86



**SLR  
SERIES**  
pg. 88



**PHS  
SERIES**  
pg. 84



**TCR9C**  
pg. 90

Solid-State Switching Relays

Phase Control Switching Relays

Temperature Control Relays

# MOTOR & PUMP PROTECTION



## SUPPLEMENTAL PROTECTION (MOTOR)

Protection for motors against insulation degradation, overheating, or ventilation failure

## BASIC (PUMP)

Protection of single-phase pumps against dry-well, dead-head, jammed impeller, rapid-cycling and over/under voltage

Ground-Fault Protection & Insulation Monitoring

Temperature Monitoring Using RTDs

Mounting Options

SURFACE MOUNT

OPEN BOARD

Hand-Held Diagnostic Tool Helpful for Troubleshooting

Voltage

Voltage

115V

230V

115V

230V

HP

HP

<3HP

>5HP

1/3 - 1HP

1/3 - 3HP

Control Box Type

FRANKLIN™, PENTEK®, CENTRIPRO™

GRUNDFOS®

FOR ALL BASIC SINGLE-PHASE UNITS ON THIS PAGE



**PGR-6100 SERIES**  
pg. 94



**SIO-RTD-02-00 SERIES**  
pg. 128



**111P**  
pg. 106



**233P SERIES**  
pg. 106



**235P**  
pg. 110



**111-INSIDER-P**  
pg. 101



**231-INSIDER-P**  
pg. 101



**232-INSIDER**  
pg. 104



**234-P**  
pg. 108



**INFORMER**  
pg. 250

Basic Motor & Pump Protection

Page numbers beneath products refer to our Protection Relay & Controls Catalog available in print or online at [www.littelfuse.com/relayscontrols/catalog](http://www.littelfuse.com/relayscontrols/catalog)





## STANDARD

Multi-function protection for low and medium voltage motors

## STANDARD WITH BLUETOOTH®

Multi-function protection for single-phase and three-phase low and medium voltage motors and pumps with real-time data, programming and troubleshooting via iPhone® or Android™ app

Single-Phase

Three-Phase

Under Power Protection for Pump Applications

Under Power Protection for Pump Applications

Y

N

Y

N

4-20mA Output Power

Temperature Protection & Reduced Overcurrent

Y

N

Y

N



**77C-KW/HP SERIES**  
pg. 125



**77C SERIES**  
pg. 118



**777-ACCUPower & COM 4-20**  
(use in combination)  
pg. 123 pg. 261



**777-KW/HP-P2 SERIES**  
pg. 120



**MPU-32 SERIES**  
pg. 96



**777-P2 SERIES**  
pg. 114



**MP8000 SERIES**  
pg. 112

Standard Motor & Pump Protection

Standard Motor & Pump Protection with Bluetooth®

## MOTOR & PUMP PROTECTION



### ADVANCED

Comprehensive voltage protection and starter control for medium voltage motors and pumps

### RETROFITS

Pre-wired plug & play replacement for obsolete and competitors' relays



**MPS SERIES**  
pg. 98



**MPU-32-X69X SERIES**  
pg. 100



**MPS-469X SERIES**  
pg. 100

## PUMP CONTROLLERS



### SEAL LEAK DETECTORS

Detect pump seal leaks & motor overheating on submersible pumps

#### Controller Functionality

SINGLE-CHANNEL

DUAL-CHANNEL

#### Mounting Option

8-PIN SOCKET

DIN RAIL

#### Seal Leak & Over Temperature

Y

N

Dual Seal Leak



**201-100-SLD**  
pg. 136



**460-15-100-SLD**  
pg. 139



**PC-102CICI-LT**  
pg. 132



**PC-102CICI-DL**  
pg. 132

Advanced Motor & Pump Protection

Retrofits

Seal Leak Detection

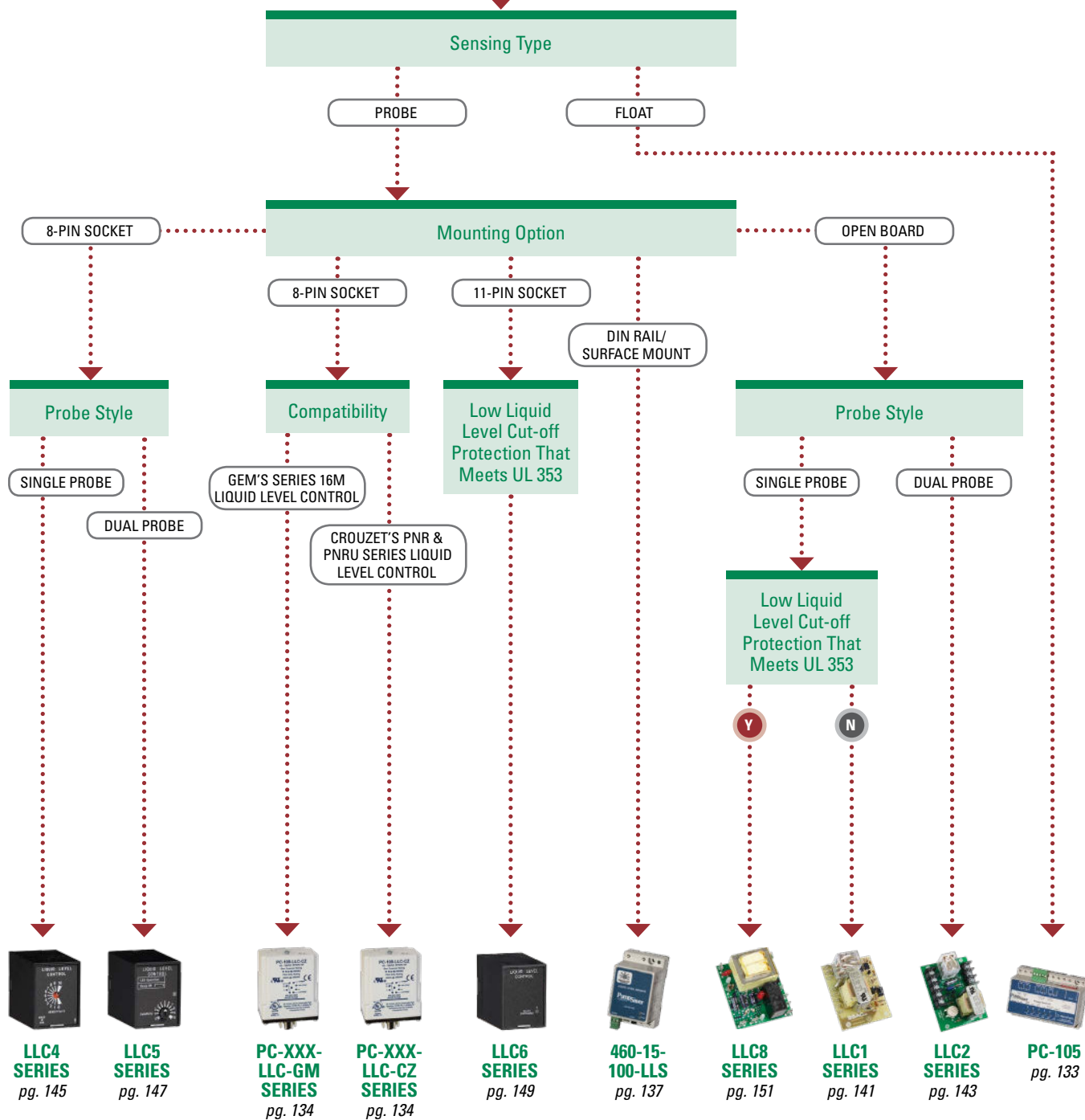
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# PUMP CONTROLLERS



## LIQUID LEVEL CONTROLS

Control liquid pumping operations in a pump-up or pump-down application



Liquid Level Controls

Page numbers beneath products refer to our Protection Relay & Controls Catalog available in print or online at [www.littelfuse.com/relayscontrols/catalog](http://www.littelfuse.com/relayscontrols/catalog)

# PUMP CONTROLLERS



## ALTERNATING RELAYS

Used in duplex pumping applications to balance the run time of both pumps

### Float Switch Configuration

SINGLE

DUAL

DUAL PLUS  
STOP FLOAT

Mode Selector Switch

Mode Selector Switch

Mode Selector Switch

Debounce Delay

Debounce Delay

Debounce  
Delay

Debounce  
Delay

Debounce  
Delay

8-Pin, SPDT

8-Pin, SPDT

600VAC Rated  
Contacts

11-PIN, DPDT

11-PIN, DPDT



**ALTXXX-S-SW  
SERIES**  
pg. 133



**ALT-XXX-1-SW  
SERIES**  
pg. 155



**ARPX1S  
SERIES**  
pg. 157



**ARPX2S  
SERIES**  
pg. 157



**50R-400-ALT**  
pg. 159



**ALTXXX-S  
SERIES**  
pg. 133



**ARP41**  
pg. 157



**ALTXXX-X-SW  
SERIES**  
pg. 133



**ARPX3S  
SERIES**  
pg. 157



**ALTXXX-X  
SERIES**  
pg. 133



**ARP43**  
pg. 157



**ALT-XXX-3-SW  
SERIES**  
pg. 155

Alternating Relays

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# PUMP CONTROLLERS



## ALARM CONTROLS/ BATTERY CHARGERS

Dual-purpose alarm control/battery charger for pump control panels

## INTRINSICALLY SAFE RELAYS

Used to interface between hazardous and non-hazardous areas

## INTRINSICALLY SAFE PUMP CONTROLLER

Programmable to control/equalize run time of 2, 3, or 4 pumps, with the ability to interface between hazardous and non-hazardous areas

12-Pin Socket Included

Y

N

Number of Channels

SINGLE-  
CHANNEL

TWO  
CHANNELS

THREE  
CHANNELS

FOUR  
CHANNELS

FIVE  
CHANNELS

Mounting Option

DIN RAIL/  
SURFACE MOUNT

8-PIN SOCKET



**ACBC-120-SD**  
pg. 130



**ACBC-120**  
pg. 130



**ISS-100**  
pg. 160



**ISS-101**  
pg. 161



**ISS-102  
SERIES**  
pg. 163



**ISS-105-  
ISO-3**  
pg. 165



**ISS-105-  
ISO-4**  
pg. 165



**ISS-105-  
ISO**  
pg. 165



**ISS-105**  
pg. 165

Alarm Control/Battery Charger

Intrinsically Safe Relays

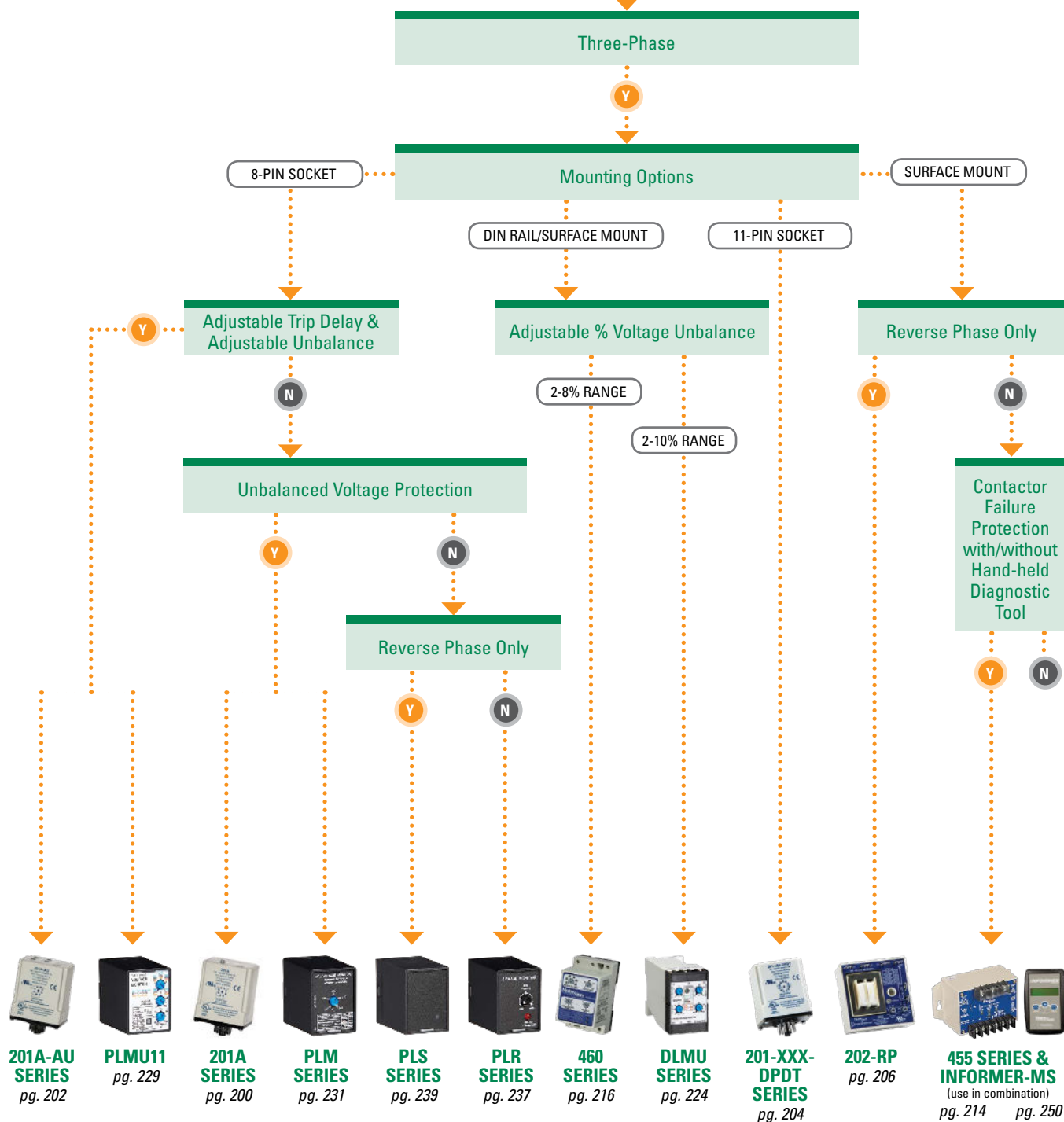
Intrinsically Safe Pump Controller

Page numbers beneath products refer to our Protection Relay & Controls Catalog available in print or online at [www.littelfuse.com/relayscontrols/catalog](http://www.littelfuse.com/relayscontrols/catalog)



## VOLTAGE MONITORS (1 of 2)

Highly accurate and precise voltage measurements to provide high sensitivity while minimizing nuisance tripping



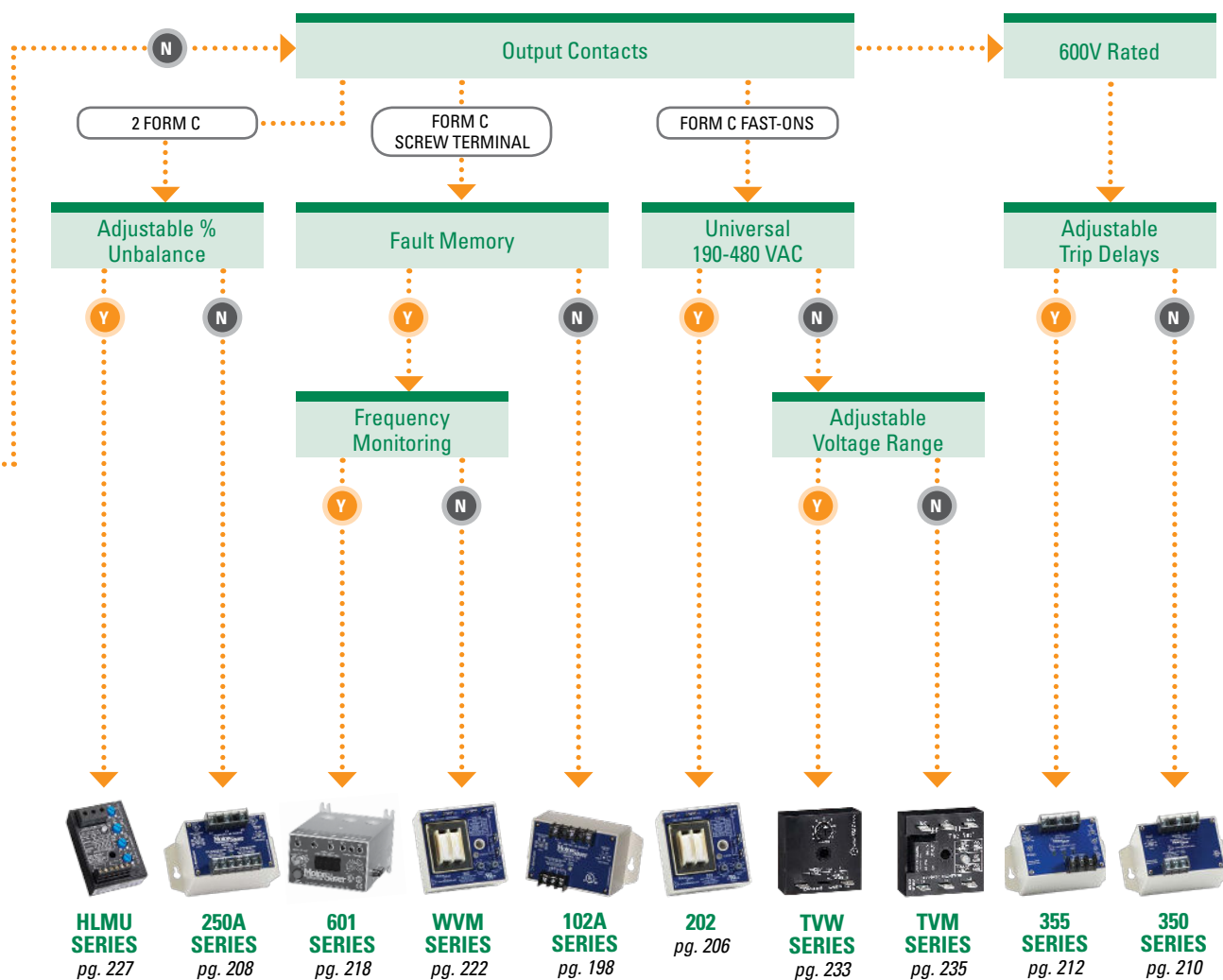
Voltage Monitoring Relays

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## VOLTAGE MONITORS (1 of 2)

(Continued from previous page)



Voltage Monitoring Relays

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## AC SYSTEM MONITORS/LOAD SENSORS

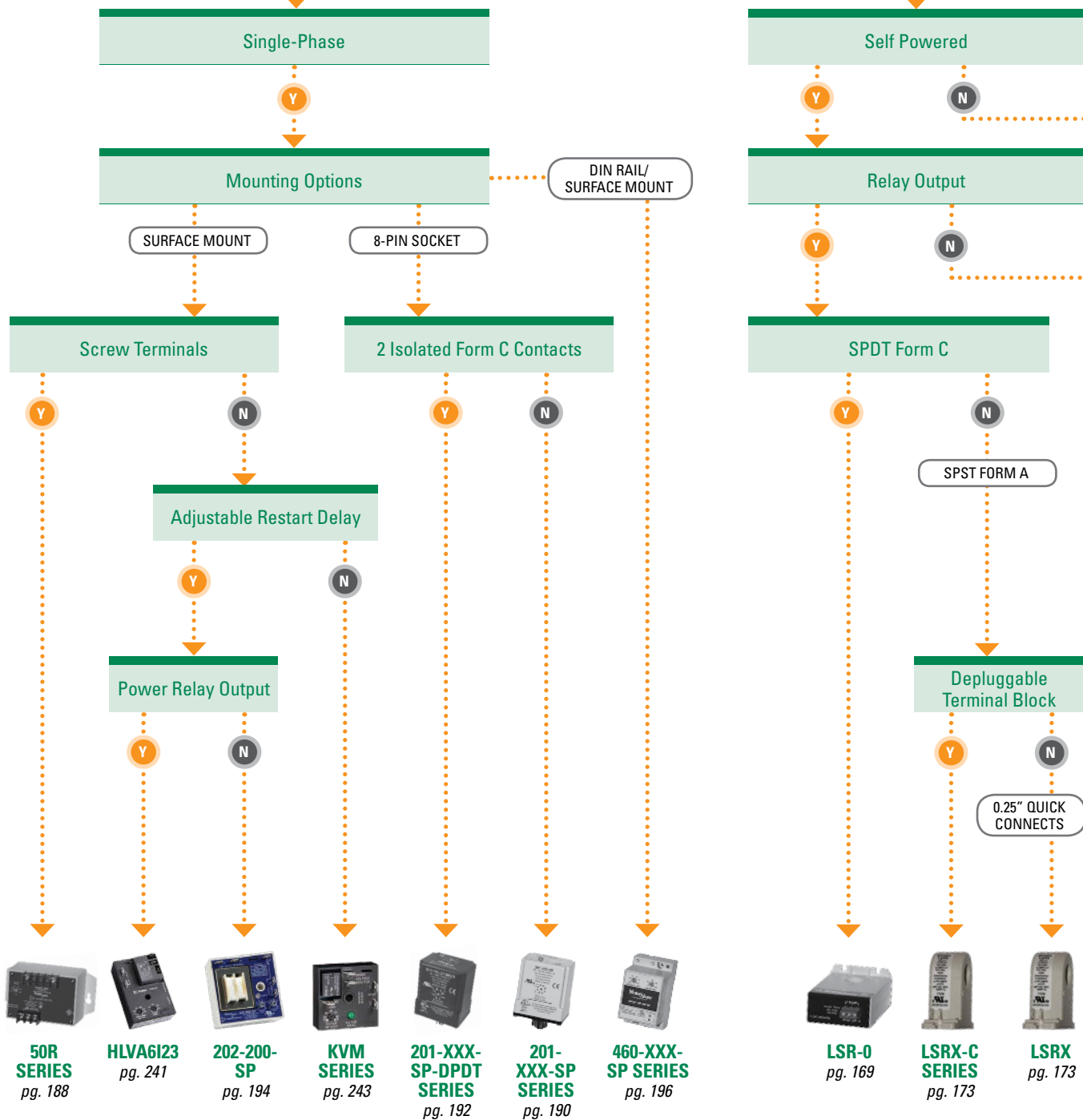


### VOLTAGE MONITORS (2 of 2)

(Continued from previous page)

### CURRENT MONITORS/LOAD SENSORS (1 of 2)

Multi-purpose controls used for pump and motor protection, to provide closed-loop feedback in a system, as a proof relay to indicate a load is energized, and more...



Voltage Monitoring Relays

Current Monitoring/Load Sensing Relays

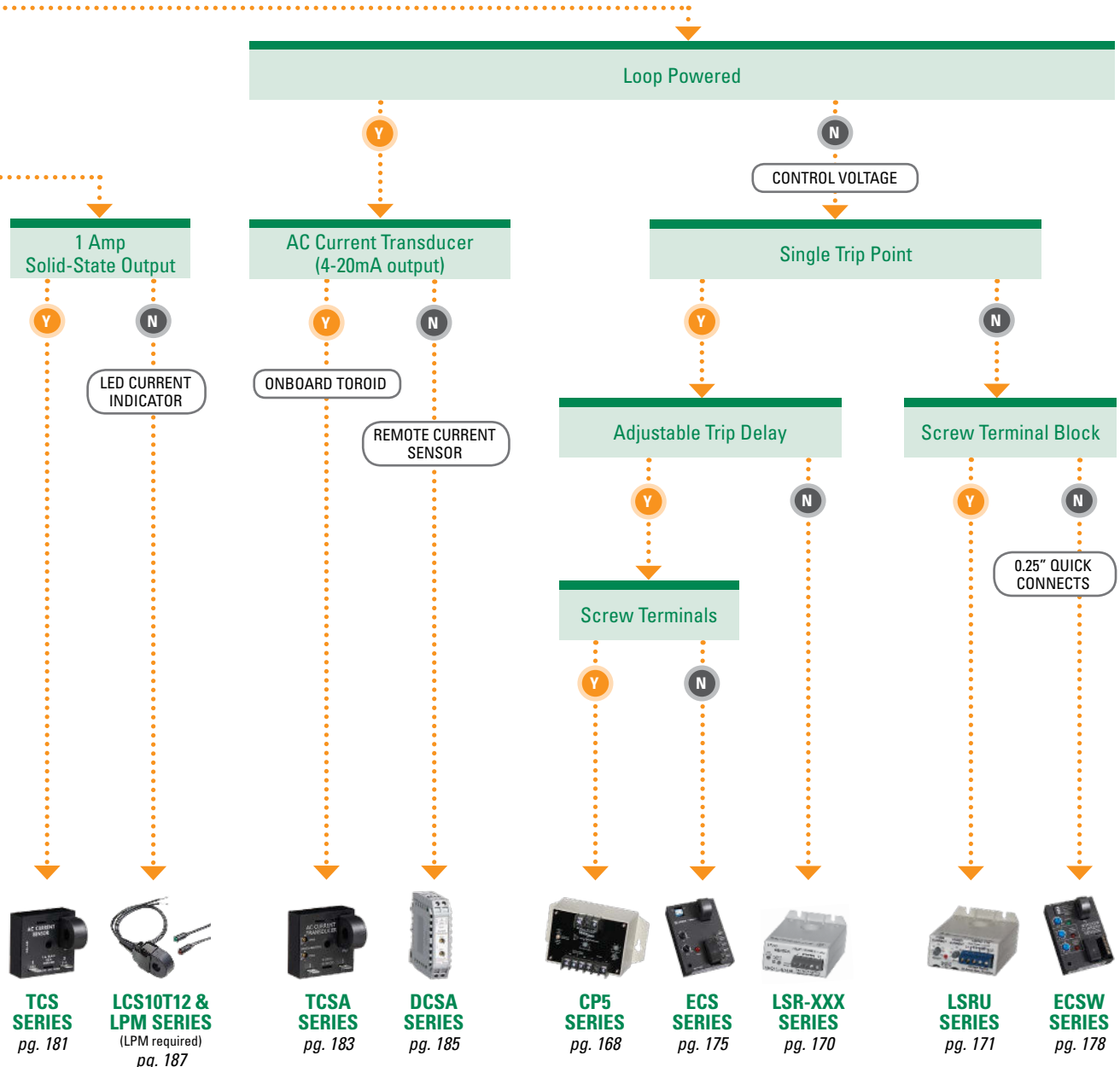
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## CURRENT MONITORS/LOAD SENSORS (2 of 2)

(Continued from previous page)



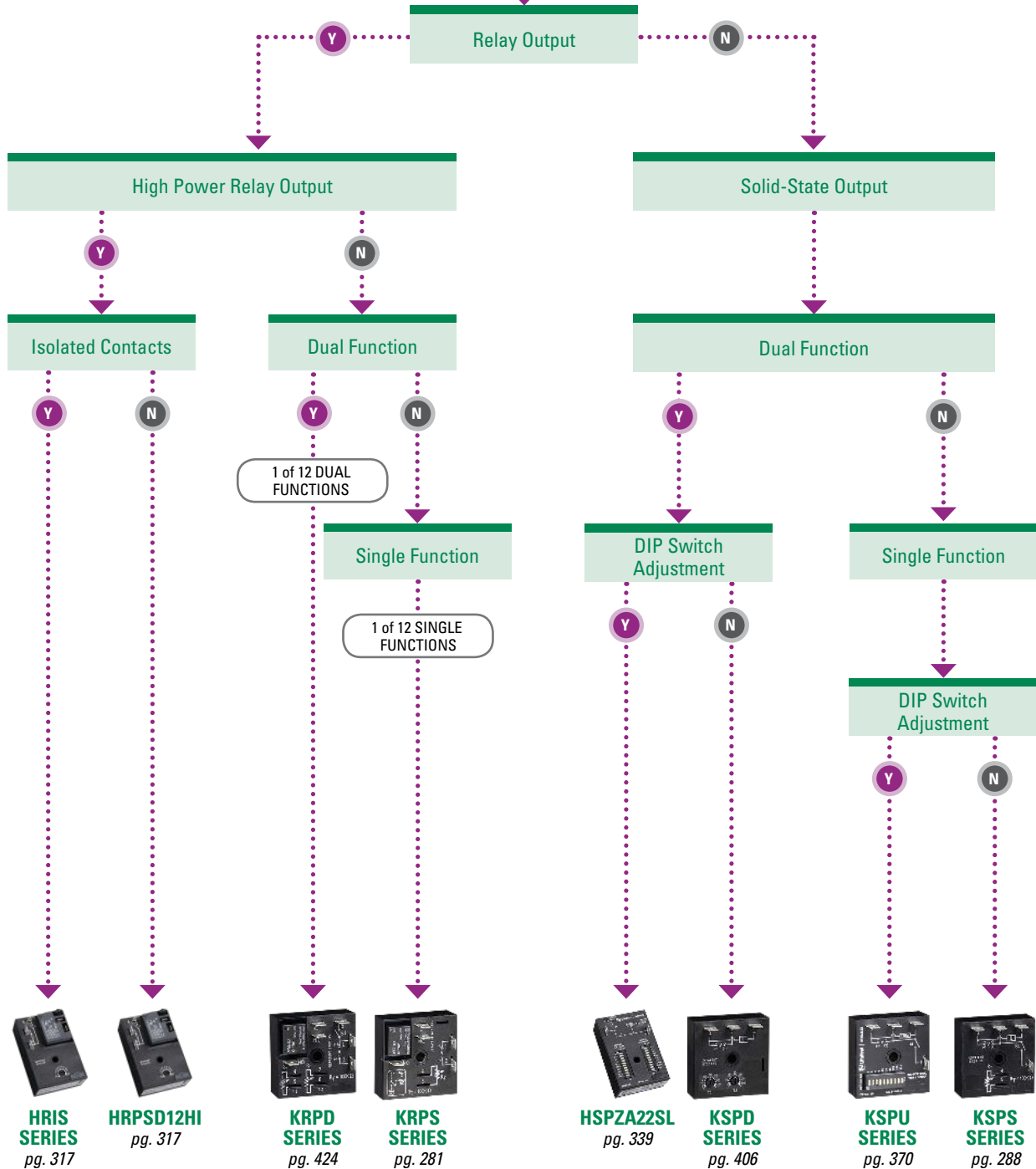
Current Monitoring/Load Sensing Relays

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## FACTORY PROGRAMMABLE

Microprocessor based circuitry provides excellent repeat accuracy and stability



Factory Programmable Timers

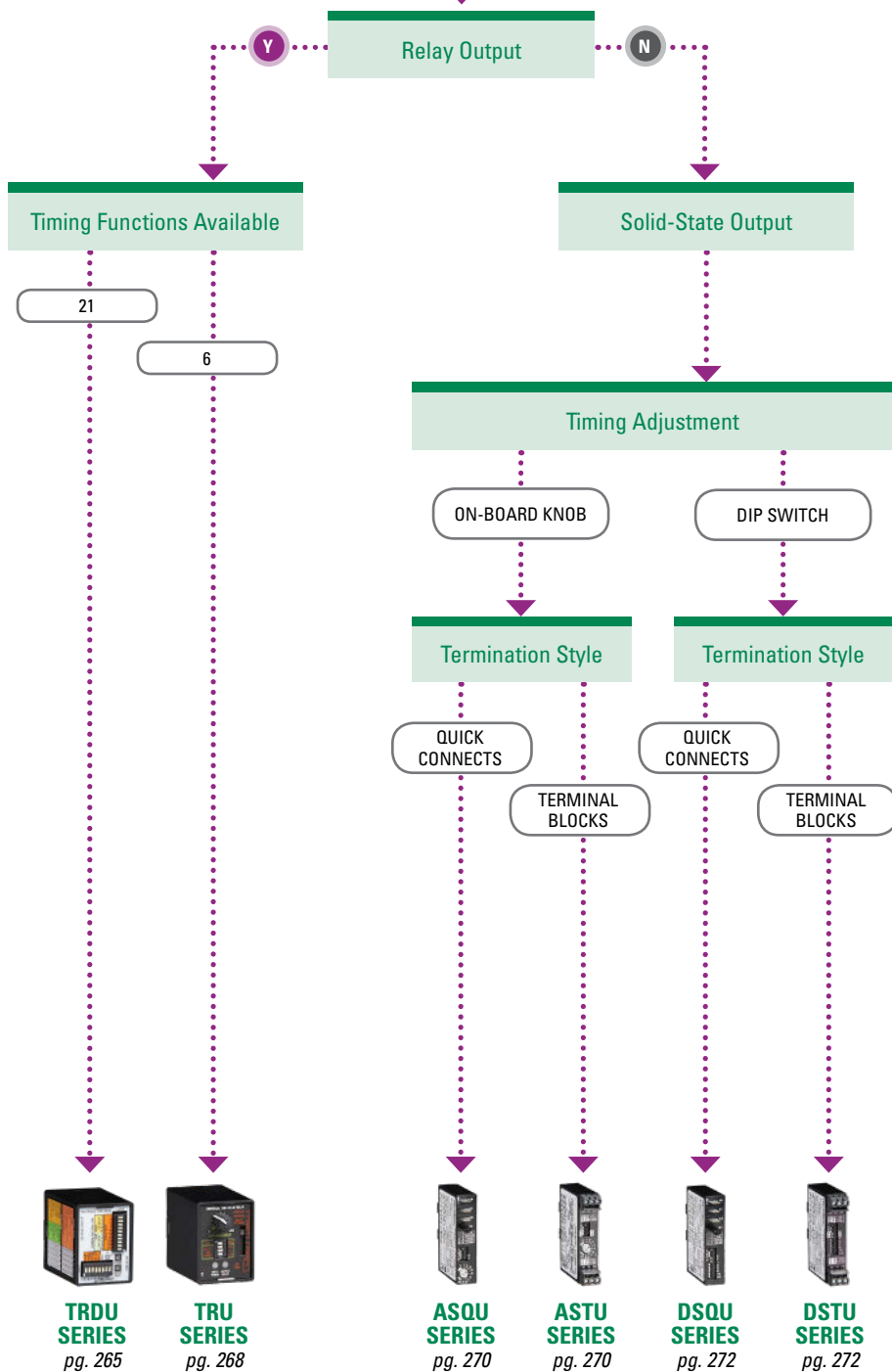
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# TIMERS



## MULTIFUNCTION

Universal and fully programmable timing relays



Multifunction Timers

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# TIMERS



## DEDICATED — SINGLE FUNCTION

Wide product offering to meet OEM and industrial requirements

### DELAY-ON-MAKE

#### Package Style

8-PIN PLUG-IN

8-PIN OR 11-PIN  
PLUG-IN

PC MOUNT/  
STRANDED WIRE  
LEADS TO  
REPLACE BIMETAL  
TYPE TIMERS

SURFACE MOUNT

#### DIP Switch Adjustment

#### Relay Output

#### Timing Ranges

#### Isolated

1-1023 s  
in increments  
of 1 s

0.1-102.3 s  
in increments  
of 0.1 s

10-10,230 s  
in increments  
of 10 s

Relay with  
Isolated  
DPDT or  
SPDT

Isolated  
DPDT  
Relay

#### Contact Type

DPDT

SPDT

#### 480/600V Contacts



**TDM  
SERIES**  
pg. 297



**TDMH  
SERIES**  
pg. 297



**TDML  
SERIES**  
pg. 297



**PRLM  
SERIES**  
pg. 295



**TRM  
SERIES**  
pg. 307



**ORM  
SERIES**  
pg. 293



**MSM  
SERIES**  
pg. 291



**ERDM  
SERIES**  
pg. 275



**T10**  
pg. 274



**KRDM  
SERIES**  
pg. 279



**HRDM  
SERIES**  
pg. 277

Delay-on-Make Timers

Page numbers beneath products refer to our Protection Relay & Controls Catalog available in print or online at [www.littelfuse.com/relayscontrols/catalog](http://www.littelfuse.com/relayscontrols/catalog)

**Selecting a Timing Relay**

- Solid-State with Normally Open Contacts** (Y)
  - High Current (6, 10, or 20A)** (Y)
    - Timing Ranges**
      - 0.1 s – 1000 m in 6 ranges → **THD1B410.5S** (pg. 303)
      - 0.1 s – 600 m in 4 ranges → **TH1 SERIES** (pg. 301)
  - Normally Closed** (N)
    - Low Current (1A)** (N)
      - Adjustment Style**
        - FIXED → **KSDU SERIES** (pg. 286)
        - ONBOARD KNOB → **TDU SERIES** (pg. 299)
        - EXTERNAL → **TMV8000** (pg. 305) and **TSU2000** (pg. 305)
      - FIXED/EXTERNAL → **Timing Ranges**
        - 0.1 s – 100 h in 7 ranges → **TS1 SERIES** (pg. 309)
        - 0.1 s – 1000 m in 6 ranges → **TSD1 SERIES** (pg. 311)
    - FIXED → **KSD1 SERIES** (pg. 284) and **TS441165** (pg. 313)

19



## DEDICATED — SINGLE FUNCTION

Wide product offering to meet OEM and industrial requirements

### DELAY-ON-BREAK

#### Package Style

8-PIN OR 11-PIN  
PLUG-IN

OPEN PC BOARD

SURFACE MOUNT

#### DIP Switch Adjustment

#### Relay Output

Y

N

Y

N

#### Timing Ranges

#### Isolated

#### Solid-State with Normally Open Contacts

1-1023 s  
in increments  
of 1 s

0.1-102.3 s  
in increments  
of 0.1 s

10-10,230 s  
in increments  
of 10 s

SPDT

#### Isolated

#### Timing Ranges

SPDT/DPDT

0.1 s to 100 m  
in 5 ranges

0.1 s to 1000 m  
in 6 ranges



**TDB  
SERIES**  
pg. 325



**TDBH  
SERIES**  
pg. 325



**TDBL  
SERIES**  
pg. 325



**TRB  
SERIES**  
pg. 331



**ORB  
SERIES**  
pg. 323



**HRDB  
SERIES**  
pg. 315



**KRDB  
SERIES**  
pg. 319

Delay-on-Break Timers

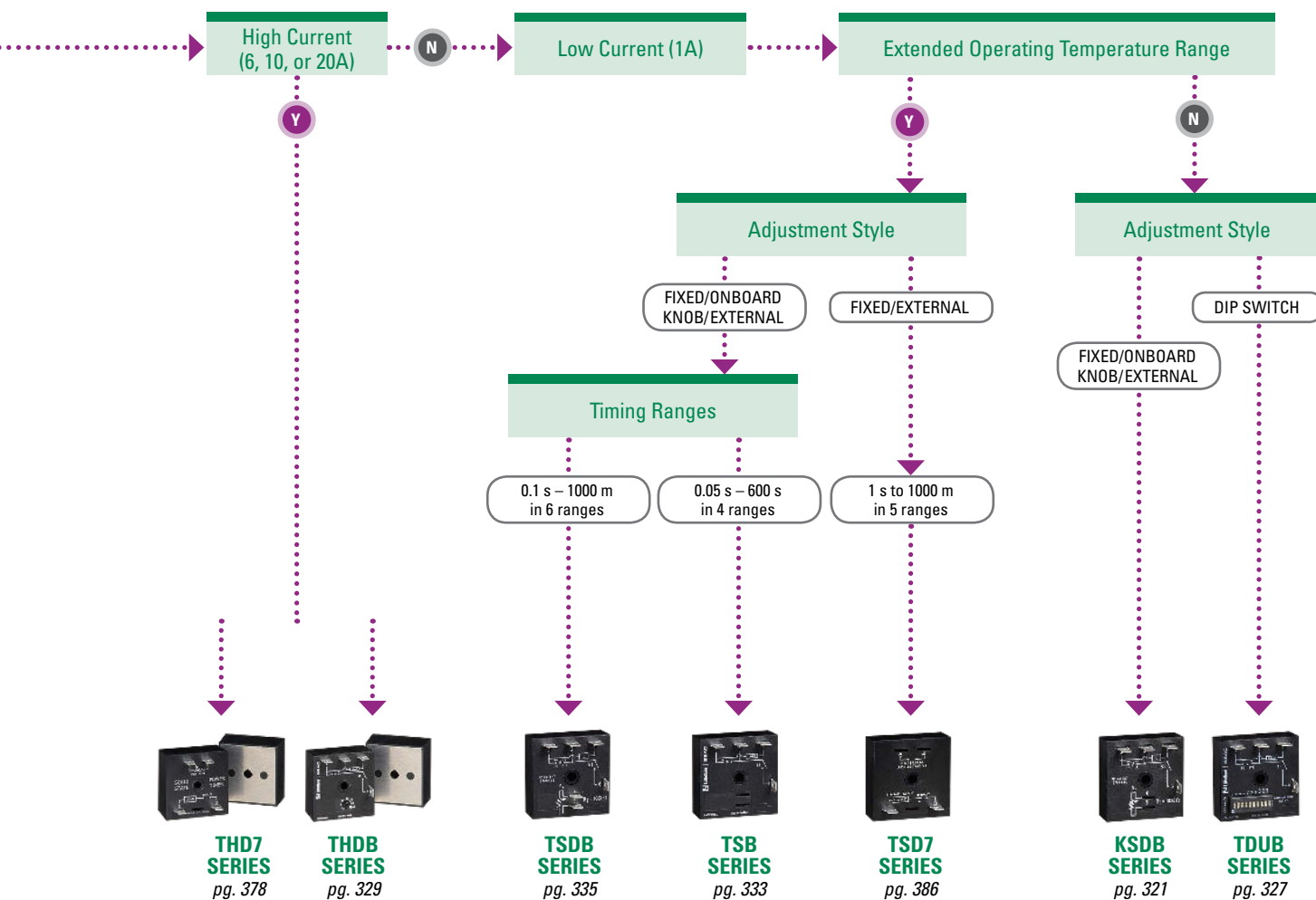
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## TIMERS



# DEDICATED — SINGLE FUNCTION

(Continued from previous page)



Delay-on-Break Timers

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# TIMERS



## DEDICATED — SINGLE FUNCTION

Wide product offering to meet OEM and industrial requirements

### SINGLE SHOT

Package Style

8-PIN OR 11-PIN  
PLUG-IN

OPEN PC BOARD

SURFACE MOUNT

DIP Switch Adjustment

Retriggerable

Relay Output

Timing Ranges

Fixed/Knob/  
External Adjustment

Isolated

Relay Output

Isolated

1-1023 s  
in increments  
of 1 s

0.1-102.3 s  
in increments  
of 0.1 s

10-10,230 s  
in increments  
of 10 s

Knob Adjust Only

Timing Ranges

0.1 s to 1000 m  
in 6 ranges

DPDT

SPDT



**TDS  
SERIES**  
pg. 348



**TDSH  
SERIES**  
pg. 348



**TDSL  
SERIES**  
pg. 348



**TRS  
SERIES**  
pg. 356



**PRS65**  
pg. 347



**ORS  
SERIES**  
pg. 345



**KRD9  
SERIES**  
pg. 388



**TSD94110SB**  
pg. 390



**ERDI  
SERIES**  
pg. 362



**KRDS  
SERIES**  
pg. 341



**HRDS  
SERIES**  
pg. 337

Single Shot Timers

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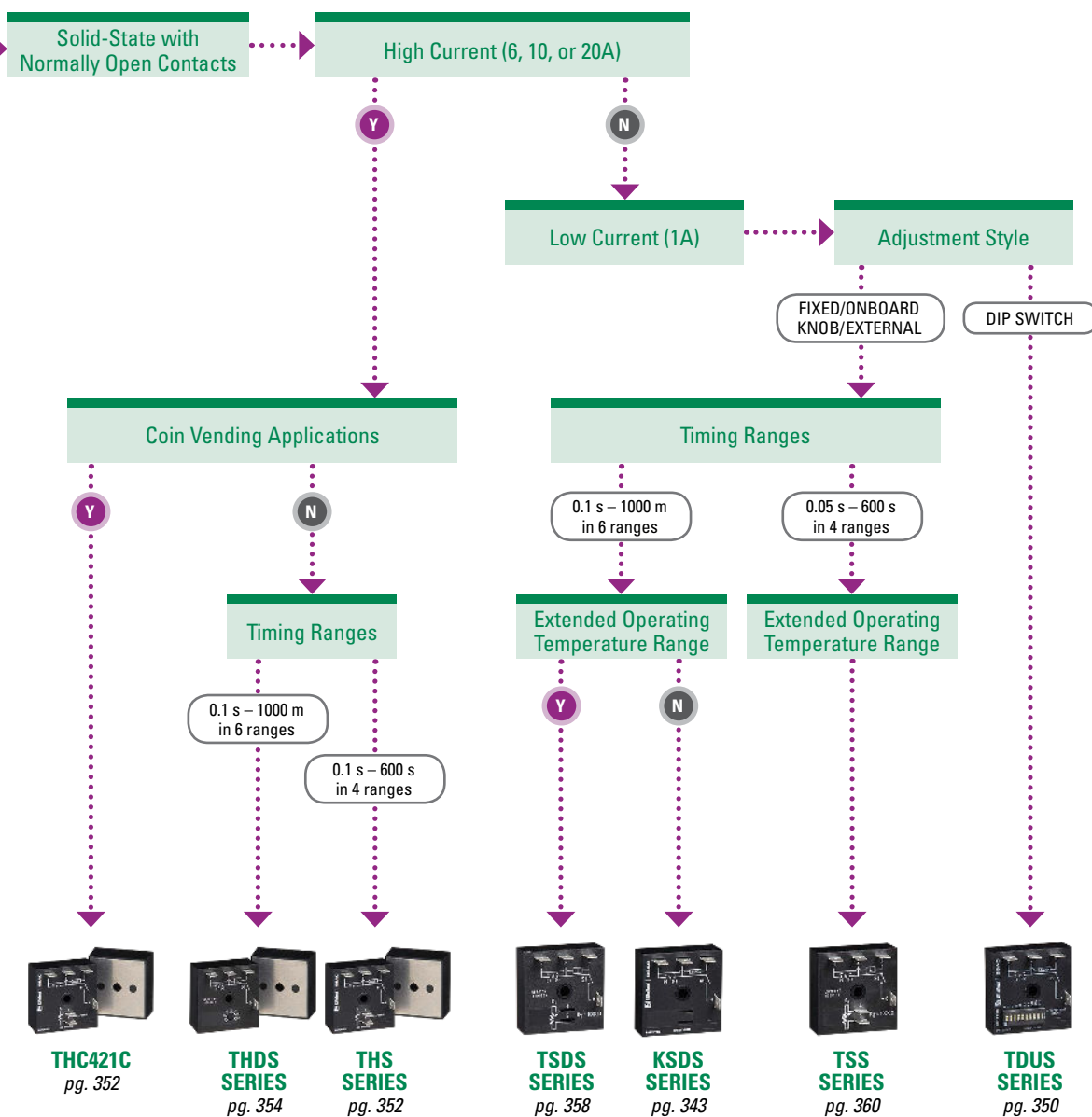


# TIMERS



## DEDICATED — SINGLE FUNCTION

(Continued from previous page)



Single Shot Timers

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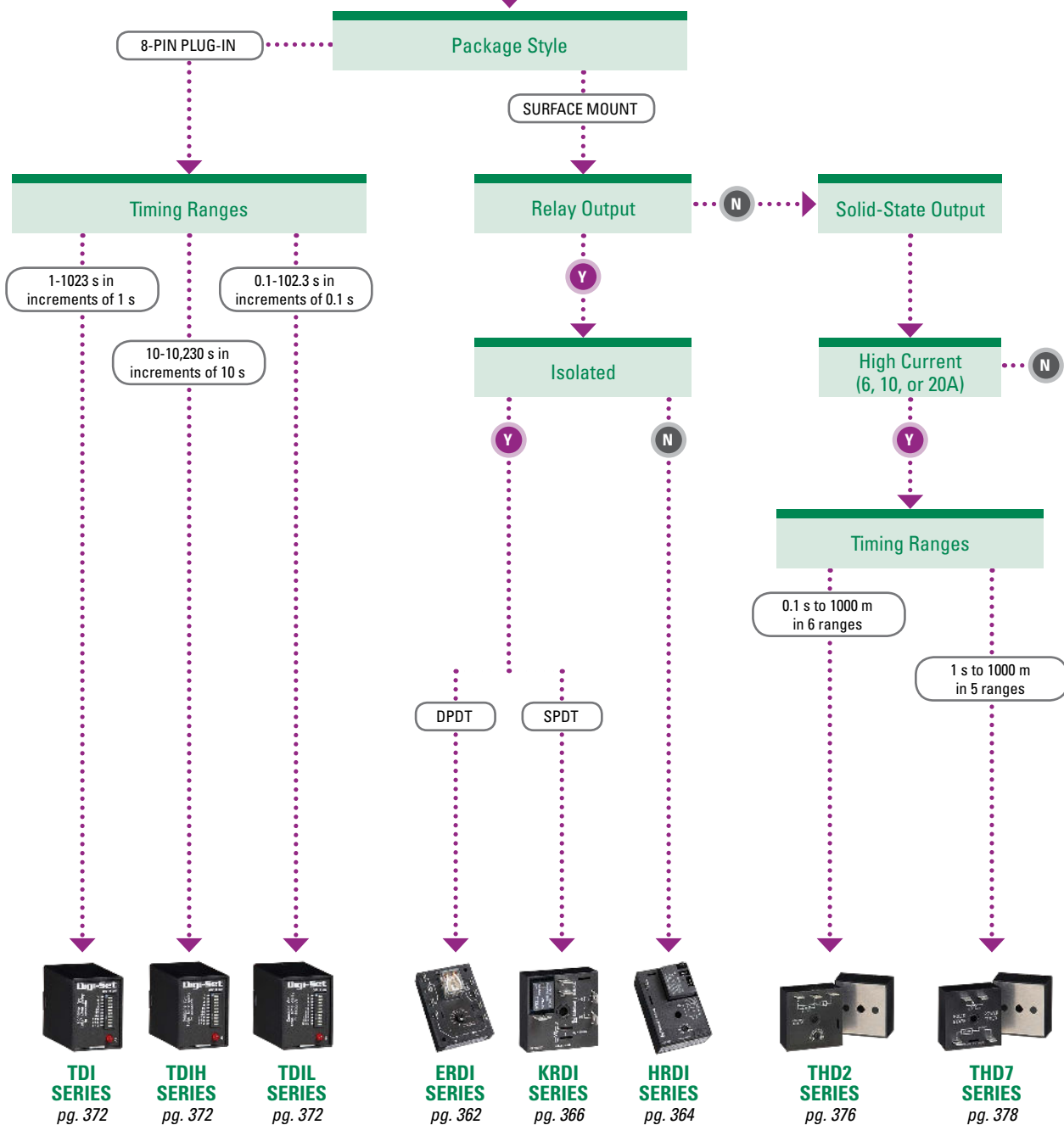
## TIMERS



### DEDICATED — SINGLE FUNCTION

Wide product offering to meet OEM and industrial requirements

#### INTERVAL



Interval Timers

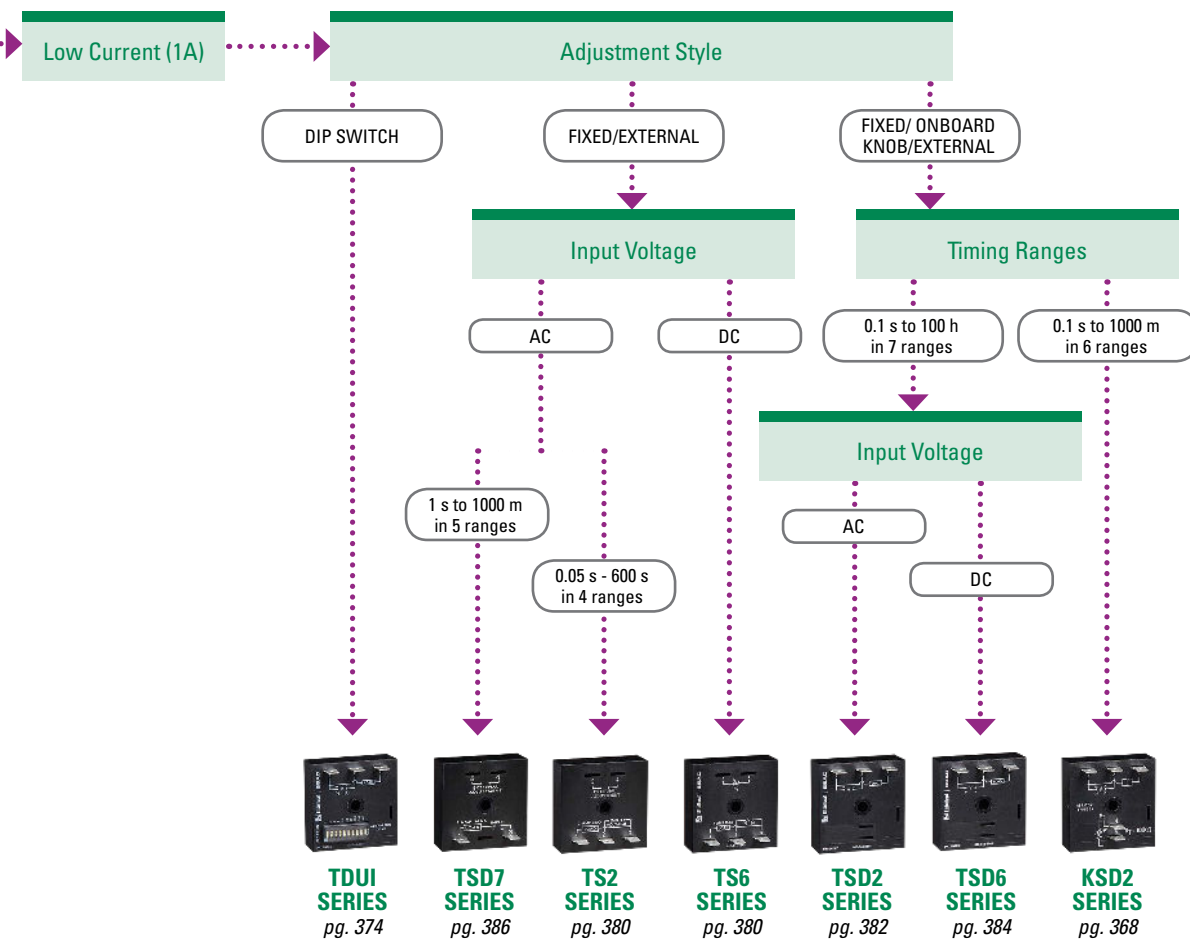
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## TIMERS



### DEDICATED — SINGLE FUNCTION

(Continued from previous page)



Interval Timers

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## DEDICATED — SINGLE FUNCTION

Wide product offering to meet OEM and industrial requirements

### RECYCLING

Package Style

SURFACE MOUNT

8-PIN PLUG-IN

Relay Output

N

Solid-State with Normally Open Contacts

Recycling Flashers

N

Y

Y

Isolated

High Current (6, 10, or 20A)

Y

N

Y

N

Contacts Type

Timing Ranges

SPDT

DPDT

0.1 s to 1000 m in 6 ranges

Adjustment Style

FIXED/ONBOARD KNOB

FIXED/ONBOARD KNOB/EXTERNAL

Extended Operating Temperature Range

FIXED

0.1 s to 1000 m in 6 ranges



**TDR SERIES**  
pg. 410



**KRDR SERIES**  
pg. 400



**KRD3 SERIES**  
pg. 398



**ERD3425A**  
pg. 391



**HRDR SERIES**  
pg. 396



**THD3C42A0**  
pg. 412



**TSD3411S**  
pg. 414



**KSD3 SERIES**  
pg. 402

Recycling Timers

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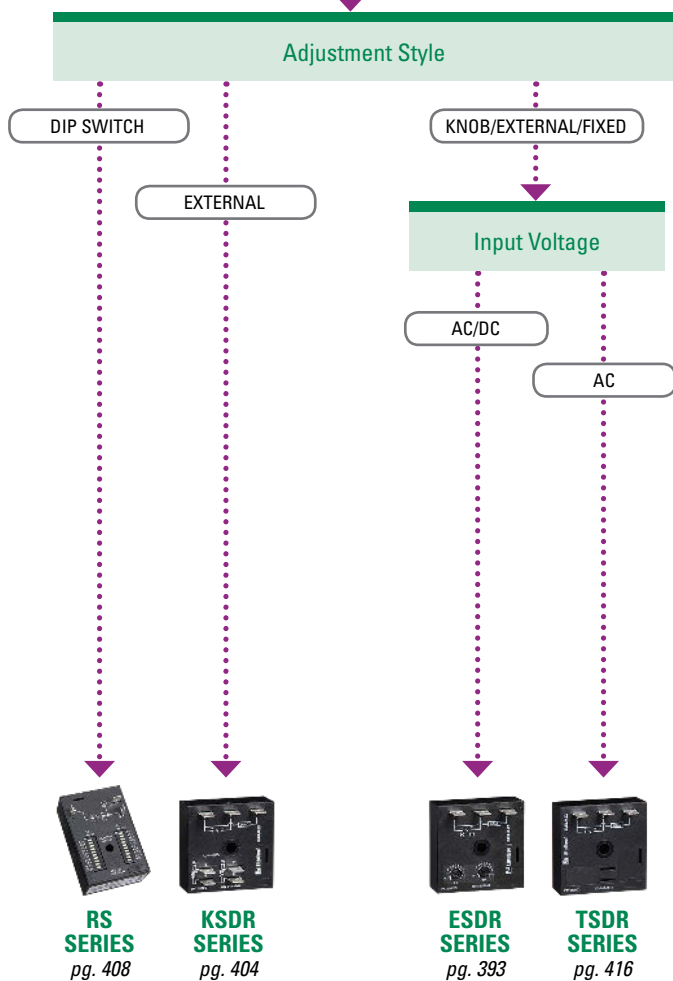
# TIMERS



## DEDICATED — SINGLE FUNCTION

(Continued from previous page)

PERCENTAGE



Recycling Timers

Percentage Timers

## TIMERS



### DEDICATED

Wide product offering to meet OEM and industrial requirements

#### DUAL FUNCTION

DELAY-ON-MAKE/  
DELAY-ON-BREAK

DELAY-ON-MAKE/  
INTERVAL

#### HVAC

Lockout Delay

Anti-short Cycle with Random Start

Anti-short Cycle with  
Random Start

Low Voltage  
Brownout Protection

Fan Delay



**TDMB  
SERIES**  
pg. 420



**ESD52233  
SERIES**  
pg. 422



**T2D120A15M  
SERIES**  
pg. 428



**TSA141300**  
pg. 436



**TA  
SERIES**  
pg. 430



**TL  
SERIES**  
pg. 434



**TAC1  
SERIES**  
pg. 432



**CT  
SERIES**  
pg. 426



**HRV  
SERIES**  
pg. 437

Dedicated Timers – Dual Function

Dedicated Timers – HVAC

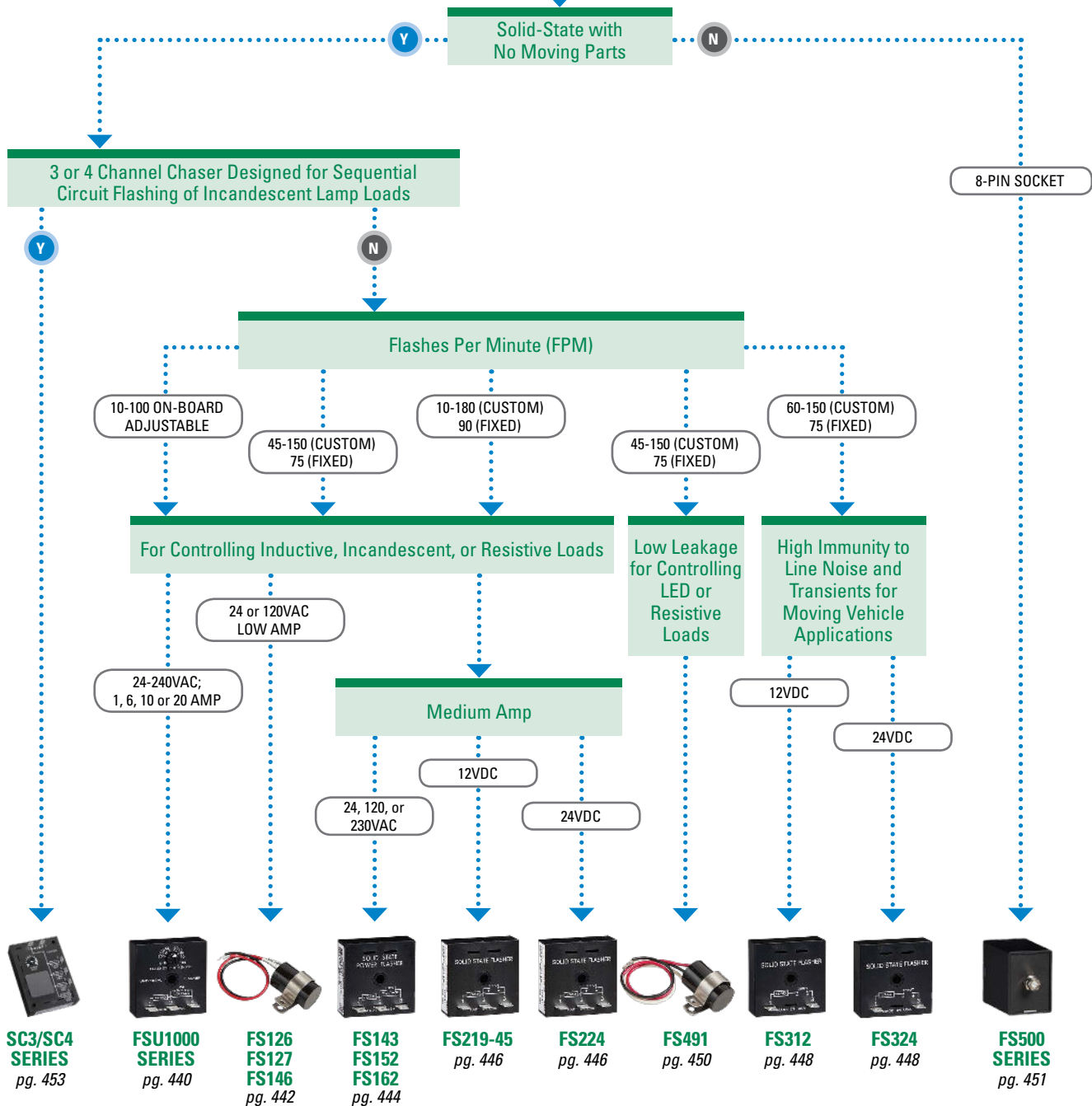
Dedicated Timers – Coin Vending

Page numbers beneath products refer to our Protection Relay & Controls Catalog available in print or online at [www.littelfuse.com/relayscontrols/catalog](http://www.littelfuse.com/relayscontrols/catalog)



## FLASHERS

Designed to cycle power to lamps and LEDs to turn them on and off repeatedly



Flashers



ALARM RELAYS

Monitors any failures in flashers & incandescent beacons, obstruction and universal lamps

FLASHER AND  
INCANDESCENT BEACON

BEACON OR  
OBSTRUCTION LAMP

UNIVERSAL LAMP

Used to Monitor  
the Operation of  
One Two-lamp  
Incandescent  
Beacon and One  
Beacon Flasher

Used to Provide  
Remote Monitoring  
of Steady Burning  
Incandescent  
Marker and  
Obstruction Lighting

Designed to Sense the Failure of Various Kinds of Lamps

FLASHING LED  
BEACON LAMPS

BEACON LAMPS/  
STEADY SIDE LIGHTS

FLASHING/STEADY  
LED BEACON LAMPS/  
OBSTRUCTION LAMPS



**FB  
SERIES**  
pg. 457



**SCR490D**  
pg. 458



**SCR  
SERIES**  
pg. 459



**FB9L**  
pg. 461



**SCR9L**  
pg. 463

Alarm Relays





BEACON TOWER FLASHERS

Designed for use on communication towers, smoke stacks, cooling towers, tall buildings, bridges, and utility towers

FLASHER (OFF FIRST)

AUXILIARY MODULES



**FS  
SERIES**  
pg. 455



**FA  
SERIES**  
pg. 455

Beacon Tower Flashers

PHOTO CONTROL

Designed to meet the demands of the most vigorous requirement tower & obstruction lighting control. Factory calibrated to meet FAA and FCC specifications



**PCR  
SERIES**  
pg. 465

Photo Control

# INDUSTRIAL SUCCESS STORIES



## **HVACR: Climate of Reliability**

A major furnace manufacturer has a reputation for extreme environmental testing of their products before the design makes it to market. They know to trust the reliability of Littelfuse fuse, relay and timer components in their designs to provide the ultimate protection that stands up to rigorous testing. Our OEM customers rely on the Littelfuse reputation for making extreme reliability an everyday practice.



## **Manufacturing: Assembly of Protection**

A brick manufacturing plant in the western United States processes clay into bricks and other building materials for residential and commercial projects. The Littelfuse SB6100 is installed between the MCC and the wet saws on the factory floor as shock protection for their workers. High-speed fuses and the PGR-8800 arc-flash relays are found in their switchgear for advanced circuit protection and improved worker safety from arc-flash incidents.



## **Oil & Gas: Refined Power Protection**

Littelfuse industrial products such as ground-check monitors are used by one of the largest producers of crude oil from oil sands. Our high resistance grounding packages are found on oil and gas drilling rigs to reduce ground-fault troubleshooting time by 90%. Refineries producing 140,000 barrels a day rely on Littelfuse to protect their VFD drives from ground faults. Fracking firms depend on Littelfuse circuit protection for service mains and injection panels. Upstream, midstream, or downstream. No matter where safety is needed, Littelfuse is there to deliver reliable protection.



## **Mining: Power and Protection Run Deep**

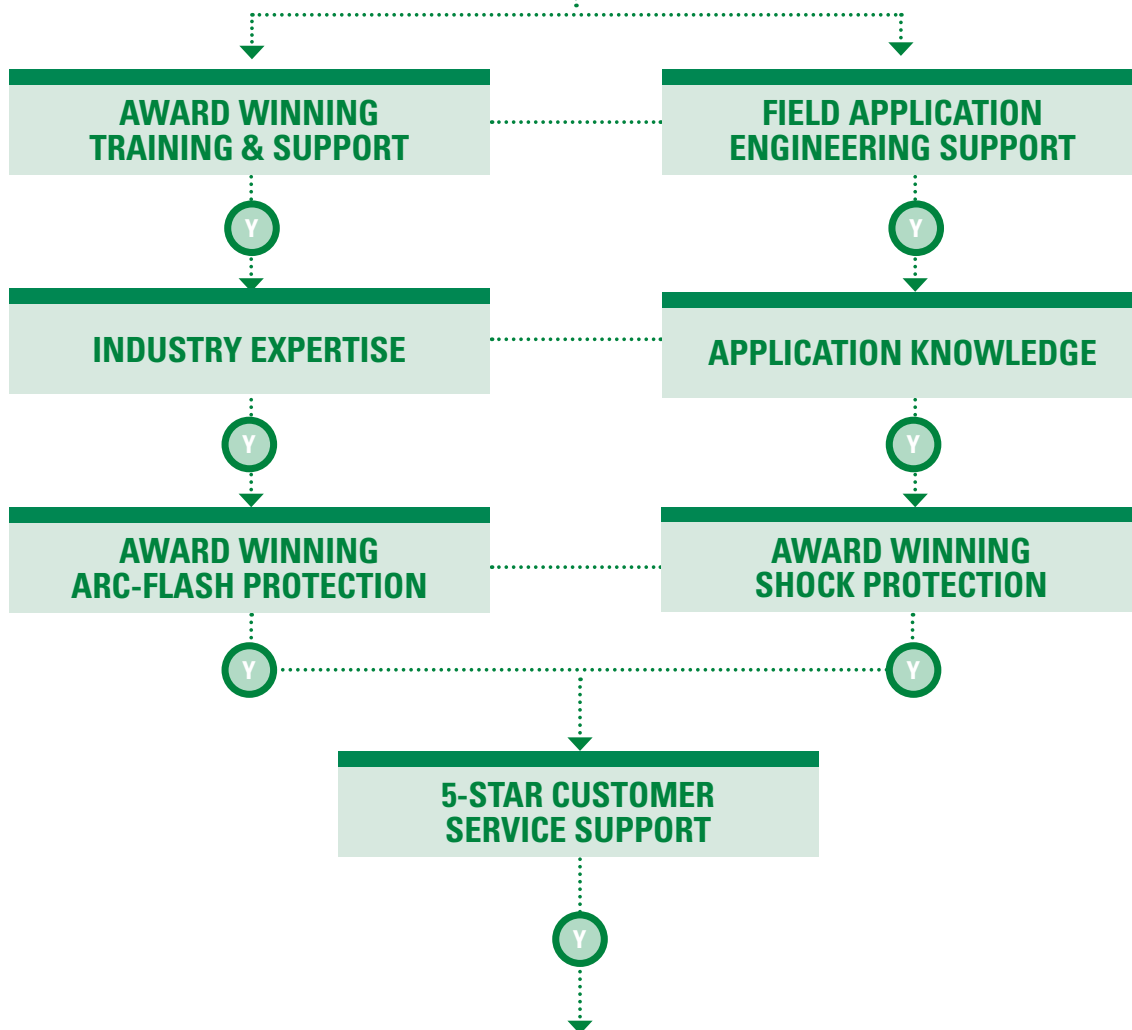
When the world's largest fertilizer company is mining for potash 1000 meters below the surface, they come to Littelfuse because of our reputation for quality and engineering expertise. There is no room for poor quality in mining. Littelfuse products are an integral part of the electrical systems that power and protect critical applications in the harshest underground and above ground mining environments. The world's top mining companies trust Littelfuse for custom power distribution centers, substations, switchgear, mining machine controls and protection relays.



## **Water/Wastewater: Reclaiming Productivity and Protection**

One of the Top 200 Electrical Wholesalers recommends Littelfuse MotorSaver® and PumpSaver relays with confidence because it saved their customer from replacing a 200 hp motor valued at \$30,000. Their customer experienced a phase loss situation and thankfully had a MotorSaver 201A-AU installed on a motor in their treatment plant. The MotorSaver relay was a wise investment that saved the cost of the motor and kept the plant humming.

# PARTNER SELECTION GUIDE



# PROTECTING CRITICAL INDUSTRIAL APPLICATIONS



**CONSTRUCTION**



**CONTRACTOR**



**FOOD & BEVERAGE**



**GENERAL INDUSTRIAL**



**HVAC/R**



**MINING**



**OEM**



**OIL & GAS**



**PANEL SHOP**



**PORTS & MARINA**



**WATER/WASTEWATER**



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Littelfuse products are certified to many standards around the world. To check certifications on specific product please refer to the product datasheet on [Littelfuse.com](http://Littelfuse.com).

Specifications, descriptions and illustrative material in this literature are as accurate as known at the time of publication, but are subject to changes without notice.  
Visit [Littelfuse.com](http://Littelfuse.com) for the most up-to-date technical information.

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**FORM PF615**  
**Rev: 1-A-112916**