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PROTECTION RELAYS & CONTROLS CATALOG

MOTOR & PUMP PROTECTION GROUND-FAULT PROTECTION FEEDER PROTECTION
ARC-FLASH PROTECTION SWITCHING RELAYS & CONTROLS GROUND-CONDUCTOR MONITORING
RESISTANCE GROUNDING/NGR MONITORING AC SYSTEM MONITORS/LOAD SENSORS
PUMP CONTROLLERS TOWER AND OBSTRUCTION LIGHTING CONTROL TIMERS FLASHERS

Over 1000 Littelfuse MotorSaver®, PumpSaver®, and SSAC parts added!



New Arc-Flash Relays

AF0500 with zone protection and AF0100 with compact, cost-effective design



AF0500
Arc-Flash Relay



AF0100
Arc-Flash Relay

New Smart Motor Protection Relay MP8000 with Bluetooth® capabilities



MP8000
Motor Protection Relay



MP8000
Motor Protection
Smartphone Application

Your questions answered, any way you ask them.

Choose *your preferred* product-selection method from the examples below.

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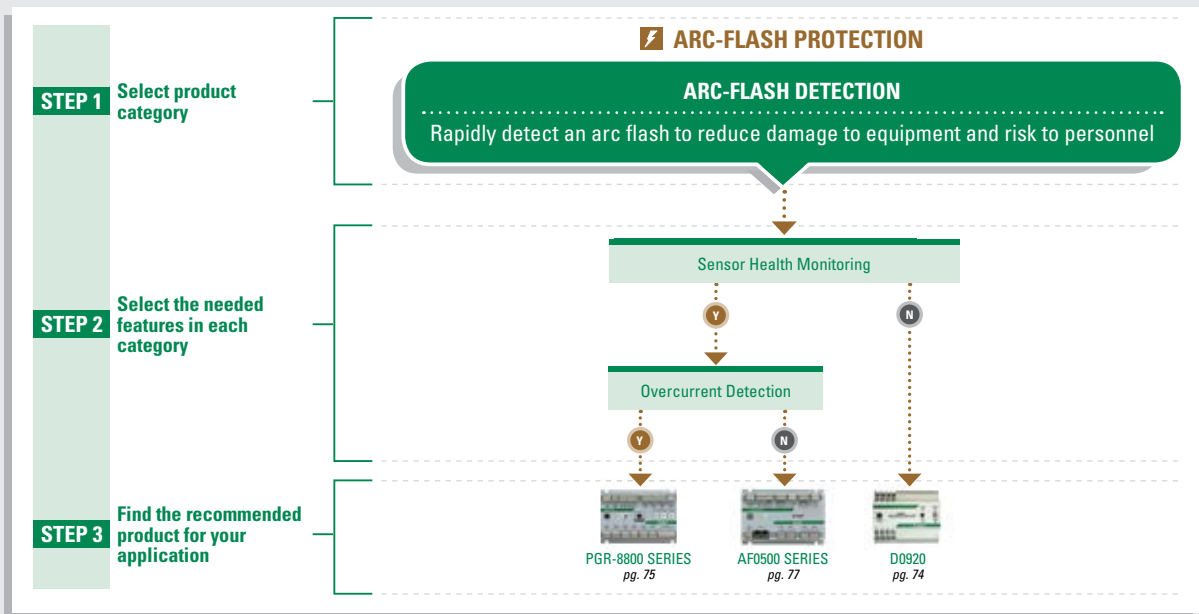
APPLICATION	COMMON PROBLEMS	PRODUCT PROTECTION CATEGORY (PG NO.)
GENERATORS	- Insulation breakdown due to vibration and corrosion - Ground-fault currents often exceed short-circuit current - Arc-flash hazard from local and paralleled generators	Ground Fault (pg 43) Resistance Grounding (pg 61) Arc Flash (pg 73)
TRANSFORMERS	- Overloading and overvoltage	Resistance Grounding (pg 61) Feeder (pg 69)

➔ By **Feature Set**Pg 7-10

⚡ Arc-Flash Relays

FEATURE	PGR-8800	AF0100	AF0500
Current detection	✓		
Point sensors	✓	✓	✓
Fiber optic sensors	✓	-	✓

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TYPICAL PRODUCT APPLICATIONS

APPLICATION	COMMON PROBLEMS	PRODUCT PROTECTION CATEGORY (PG NO.)
GENERATORS	<ul style="list-style-type: none"> - Insulation breakdown due to vibration and corrosion - Ground-fault currents often exceed short-circuit current - Arc-flash hazard from local and paralleled generators 	Ground Fault (pg 43) Resistance Grounding (pg 61) Arc Flash (pg 73)
TRANSFORMERS	<ul style="list-style-type: none"> - Overloading and overvoltage 	Resistance Grounding (pg 61) Feeder (pg 69)
SWITCHGEAR & MCCs	<ul style="list-style-type: none"> - Highest average downtime (IEEE 493-1997) - Arc-flash risk to personnel maintaining and working on live equipment - A fault on one load or feeder trips the entire lineup 	Ground Fault (pg 43) Resistance Grounding (pg 61) Motor (pg 93) Feeder (pg 69) Arc Flash (pg 73) Pump Control (pg 129)
SWITCHBOARDS & PANELBOARDS	<ul style="list-style-type: none"> - Low-level leakage current undetected by typical OCPDs 	Ground Fault (pg 43)
DRIVES	<ul style="list-style-type: none"> - Switching frequencies cause nuisance tripping - Resistance grounded drives require sensitive, wide-frequency ground-fault protection 	Ground Fault (pg 43) Motor (pg 93) Arc Flash (pg 73)
MOTORS & PUMPS	<ul style="list-style-type: none"> - Winding faults due to overloading, water, dust and vibration - Pump damage due to dry running, deadheading, rapid cycling, seal failure (submersible pumps), over heating, plugged intake, jammed impeller, or voltage fault conditions. 	Ground Fault (pg 43) Motor (pg 93) Voltage Monitoring (pg 167) Pump Control (pg 129)
FEEDER CIRCUITS	<ul style="list-style-type: none"> - Temperature and mechanical stress lead to severe damage - Older electromechanical protection is difficult to maintain - Uncoordinated feeders causing unnecessary downtime 	Ground Fault (pg 43) Feeder (pg 69)
PORTABLE EQUIPMENT	<ul style="list-style-type: none"> - Movement causing broken conductors and failed insulation - Requirement to keep low ground-fault potential - Loss of ground or high ground resistance due to cable faults 	Ground Fault (pg 43) Feeder (pg 69) Arc Flash (pg 73) Ground-Conductor Monitoring (pg 57) Resistance Grounding/NGR Monitoring (pg 61)
GROUNDING RESISTORS	<ul style="list-style-type: none"> - Open-circuit resistors due to corrosion or loose connections 	Resistance Grounding (pg 61)
WATER/WASTEWATER	<ul style="list-style-type: none"> - Electrocutation hazard due to personnel working on submersible pumps or in vicinity of water and electricity - Pump damage due to dry running, deadheading, rapid cycling, seal failure (submersible pumps), over heating, plugged intake, jammed impeller, or voltage fault conditions. - Higher risk of arc flash and steam blast due to moisture - Electrical conductors can cause explosions in explosive methane atmosphere - H2S causing premature electronics failure 	Ground Fault (pg 43) Motor (pg 93) Arc Flash (pg 73) Pump Control (pg 129) Time Delay (pg 262) Resistance Grounding (pg 61)
HVACR	<ul style="list-style-type: none"> - Voltage issues causing premature failure - Short cycling increasing wear and tear on compressors - Worn contactor causing voltage fault on compressor motor - Rapid cycling - Low voltage/brownout condition - Contactor chatter - Reverse phase in a 3-phase system - Overload 	Motor (pg 93) Time Delay (pg 262)

FEATURE COMPARISONS

Use the feature tables below and the Product Selection Guide on pages 11-41 to choose the appropriate protection relay or monitor for your application.

Ground-Fault Protection Relays

FEATURE	SE-601	EL731	PGR-3100	PGR-3200	SE-502	SE-701 SE-703 SE-704	SE-105 SE-107	SE-134C SE-135	SE-325	SE-330 SE-330HV SE-330AU
Detects GF via Voltage			✓	✓	✓				✓	✓
Detects GF via Current	✓	✓			✓	✓	✓	✓	✓	✓
Detects DC GF	✓	✓								
Adjustable GF Pickup	✓	✓				✓	✓	✓	✓	✓
Adjustable Time Delay	✓	✓				✓	✓	✓	✓	✓
Remote Reset	✓	✓		✓	✓	✓	✓	✓	✓	✓
Analog Output	✓	✓		✓		✓				✓
Fail-Safe Option	✓	✓			✓	✓	✓	✓	✓	✓
Harmonic Filtering		✓		✓		✓	✓	✓	✓	✓
CT-Loop Monitoring		✓				✓		✓		
Insulation Monitoring				✓						
Ground-Check Monitoring							✓	✓		
Grounding-Resistor Monitoring									✓	✓
PTC/RTD Overtemperature		✓								
Communications		✓								✓
Conformal Coating	‡	✓	✓	‡	‡	‡	✓	✓	✓	✓

Arc-Flash Relays

FEATURE	PGR-8800	AF0100	AF0500
Current Detection	✓		
Point Sensors	✓	✓	✓
Fiber Optic Sensors	✓	-	✓
Cable Monitoring on Sensor Inputs	✓	✓	✓
USB	✓	✓	✓
DC Supply	✓	✓	✓
AC Supply	✓	✓	✓
Data Logging	✓		✓
Multi-Zone			✓
Communications	✓		✓

NOTE: Tables are for reference only and include standard and optional configurations. Please see the respective catalog page for exact product specifications.

‡ Optional

FEATURE COMPARISONS

Pump Controllers

FUNCTION	MP8000	777-KW	77C-KW	MPU-32	MPS
Supply Voltage	Single-Phase or 3-Phase 90–690 VAC	3-Phase 200-480 VAC*	Single-Phase 100-240 VAC*	65-265 VAC, 80-275 VDC	
Monitored Current	0.5-1,000A (>100A w/external CTs)	2-800A (>90 A w/external CTs)*		Accepts broad range of external CTs	
HP Rating	Any	871		Any	
Control Box Compatibility	-	-	-	-	-
Overload	✓			✓	✓
Underload/Dry-well/Dead-head	✓	✓	✓		✓
Undercurrent/Dry-well/Dead-head	✓			✓	✓
Overcurrent/Jam	✓	✓	✓	✓	✓
Reduced Overcurrent Mode				✓	✓
Current Unbalance, Phase Loss/ Reversal	✓	✓		✓	✓
Over/Undervoltage	✓	✓	✓		✓
Voltage Unbalance	✓	✓			✓
Ground Fault	Calculated	Calculated	Calculated	✓	✓
Overtemperature				✓	✓
Dynamic Thermal Model				✓	✓
Over/Underfrequency				✓	✓
Failure to Accelerate/Underspeed				✓	✓
Power Factor					✓
Rapid Cycling/Jog	✓	✓	✓	✓	✓
Starter Control					✓
Differential				✓	✓
Output Contact Rating	10 A at 240 VAC	10 A at 240 VAC*		8 A at 250 VAC	
Internal CT's	✓ (up to 100 A)*	✓ (up to 90 A)*			
On-unit Metering		3 Digit display		4 line x 20 characters	
Remote Display	Via smartphone	✓	✓	✓	✓
Remote Reset Button		✓	✓	✓	✓
Datalogging	Last 1,000 faults	Last fault	Last fault	100 events	64 events
Local Communications		RS-485	RS-485	RS-232	RS-485
Bluetooth® Communication to Smartphone App**	✓				
NETWORK COMS. (Optional)	Modbus TCP	✓		✓	✓
	Modbus RTU	✓	✓	✓	✓
	DeviceNet		✓		✓
	Profibus		✓		✓
	Ethernet/IP		✓		✓
	Allen-Bradley DF1				
Analog Output				✓	✓
Analog Input (Prog.)					✓
Digital Input (Prog.)				✓	✓
Conformal Coating				✓	✓
Operating Temp Degree C	-40 to 70	-20 to 70	-20 to 70	-40 to 60	-40 to 60
Warranty		5 year		10 year	
Certifications		UL, CSA, CE		UL Recognized, CSA, CE, RCM	

*Other versions exist with different voltage ranges, current monitoring ranges, output contact ratings, and temperature monitoring. Consult specific series datasheets for more details.

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FEATURE COMPARISONS

Pump Controllers

FUNCTION	111P	111-INSIDER-P, 231-INSIDER-P	232-INSIDER	233P	234-P	235P
Supply Voltage	Single-Phase 115 VAC	Single-Phase 115 VAC or 230 VAC	Single-Phase 230 VAC	Single-Phase 230 VAC	Single-Phase 230 VAC	Single-Phase 230 VAC
Monitored Current	-	-	-	-	-	-
HP Rating	1/3 – 1hp	1/3 – 1/2hp or 1/3 – 1hp	1/3 – 1hp	1/3 – 1.5hp or 1/3 – 3hp	1/3 – 3hp	5 – 15hp (external CT required)
Control Box Compatibility	-	Franklin™, Pentek®, CentriPro™, Flint & Walling™, Grundfos® (mid-2014 or later)	Grundfos® (prior to mid-2014)	-	Grundfos®	-
Overload						
Underload/Dry-well/Dead-head	✓	✓	✓	✓	✓	✓
Undercurrent/Dry-well/Dead-head						
Overcurrent/Jam	✓	✓	✓	✓	✓	✓
Reduced Overcurrent Mode						
Current Unbalance, Phase Loss/ Reversal						
Over/Undervoltage	✓	✓	✓	✓	✓	✓
Voltage Unbalance						
Ground Fault						
Overtemperature						
Dynamic Thermal Model						
Over/Underfrequency						
Failure to Accelerate/Underspeed						
Power Factor						
Rapid Cycling/Jog	✓	✓	✓	✓	✓	✓
Starter Control						
Differential						
Output Contact Rating						
Internal CT's						
On-unit Metering						
Remote Display	Remote display capability when using the Informer via IR					
Remote Reset Button						
Datalogging	Remote display capability when using the Informer via IR					
Local Communications						
Bluetooth® Communication to Smartphone App**						
NETWORK COMS. (Optional)	Modbus TCP					
	Modbus RTU					
	DeviceNet					
	Profibus					
	Ethernet/IP					
	Allen-Bradley DF1					
Analog Output						
Analog Input (Prog.)						
Digital Input (Prog.)						
Conformal Coating						
Operating Temp Degree C	-40 to 60	-40 to 60	-40 to 60	-40 to 60	-40 to 60	-40 to 60
Warranty	5 year					
Certifications	cULus	cURus	cCSAus, cURus	cULus		cULus

*Other versions exist with different voltage ranges, current monitoring ranges, output contact ratings, and temperature monitoring. Consult specific series datasheets for more details.

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FEATURE COMPARISONS

Motor & Feeder Protection Relays

FUNCTION/FEATURE (IEEE#)	MP8000	777	77C	MPU-32	MPS	FPU-32	FPS
Supply Voltage	Single or 3-Phase 90-690 VAC	3-Phase 200-480 VAC*	Single-Phase 100-240 VAC*	65-265 VAC, 80-275 VDC			
Monitored Current	0.5-1,000A (>100A w/ external CTs)	2-800A (>90A w/external CTs)*		Accepts broad range of external CTs			
Overload (49, 51)	✓			✓	✓	✓	✓
Underload	✓				✓		
Overcurrent (50, 51)/Jam	✓	✓	✓	✓	✓	✓	✓
Reduced Overcurrent Mode				✓	✓	✓	✓
Undercurrent (37)	✓	✓	✓	✓	✓		
Current Unbalance, Phase Loss/Reversal (37)	✓	✓		✓	✓	✓	✓
Over (59)/Undervoltage (27)	✓	✓	✓		✓		✓
Voltage Unbalance (47)	✓	✓			✓		✓
Ground Fault (50G/N, 51G/N)	Calculated	Calculated	Calculated	✓	✓	✓	✓
Overtemperature (49)		*		✓	✓	✓	✓
Dynamic Thermal Model				✓	✓	✓	✓
Over/Underfrequency (81)				✓	✓	✓	✓
Failure to Accelerate/Underspeed				✓	✓		
Power Factor (55)					✓		✓
Rapid Cycling/Jog	✓	✓	✓	✓	✓		
Starter Control					✓		
Breaker Control							✓
Differential (87)				✓	✓		
Feeder Protection						✓	✓
Definite-time Overcurrent						✓	✓
Inverse-time Overcurrent						✓	
Output Contact Rating	10A at 240 VAC	10A at 240 VAC*		8A at 250 VAC			
Internal CT's	✓ (up to 100 A)	✓ (up to 90 A)*					
On-unit Metering		3 Digit display		4 line x 20 characters			
Remote Display	Via smartphone	✓	✓	✓	✓	✓	✓
Remote Reset Button		✓	✓	✓	✓	✓	✓
Datalogging	Last 1,000 faults	Last fault	Last fault	100 events	64 events	100 events	64 events
Local Communications		RS-485	RS-485	RS-232	RS-485	RS-232	RS-485
Bluetooth® Communication to Smartphone App**	✓						
NETWORK COMS. (Optional)	Modbus TCP	✓		✓	✓	✓	✓
	Modbus RTU	✓	✓	✓	✓	✓	✓
	DeviceNet		✓		✓	✓	✓
	Profibus		✓		✓	✓	✓
	Ethernet/IP		✓		✓	✓	✓
	Allen-Bradley DF1				✓	✓	✓
Analog Output				✓	✓	✓	✓
Analog Input (Prog.)					✓		✓
Digital Input (Prog.)				✓	✓	✓	✓
Conformal Coating				✓	✓	✓	✓
Operating Temp Deg C	-40 to +70	-20 to +70	-20 to +70	-40 to +60	-40 to +60	-40 to +60	-40 to +60
Warranty	5 year	5 year	5 year	10 year	10 year	10 year	10 year
Certifications	UL, CSA, CE			UL Recognized, CSA, CE, RCM			

*Other versions exist with different voltage ranges, current monitoring ranges, output contact ratings, and temperature monitoring. Consult specific series datasheets for more details.

** iPhone® and select Android™ smartphones and tablets are supported via Littelfuse app

NOTE: IEEE Device Numbers are shown in parenthesis after the applicable features.

PRODUCT SELECTION GUIDE

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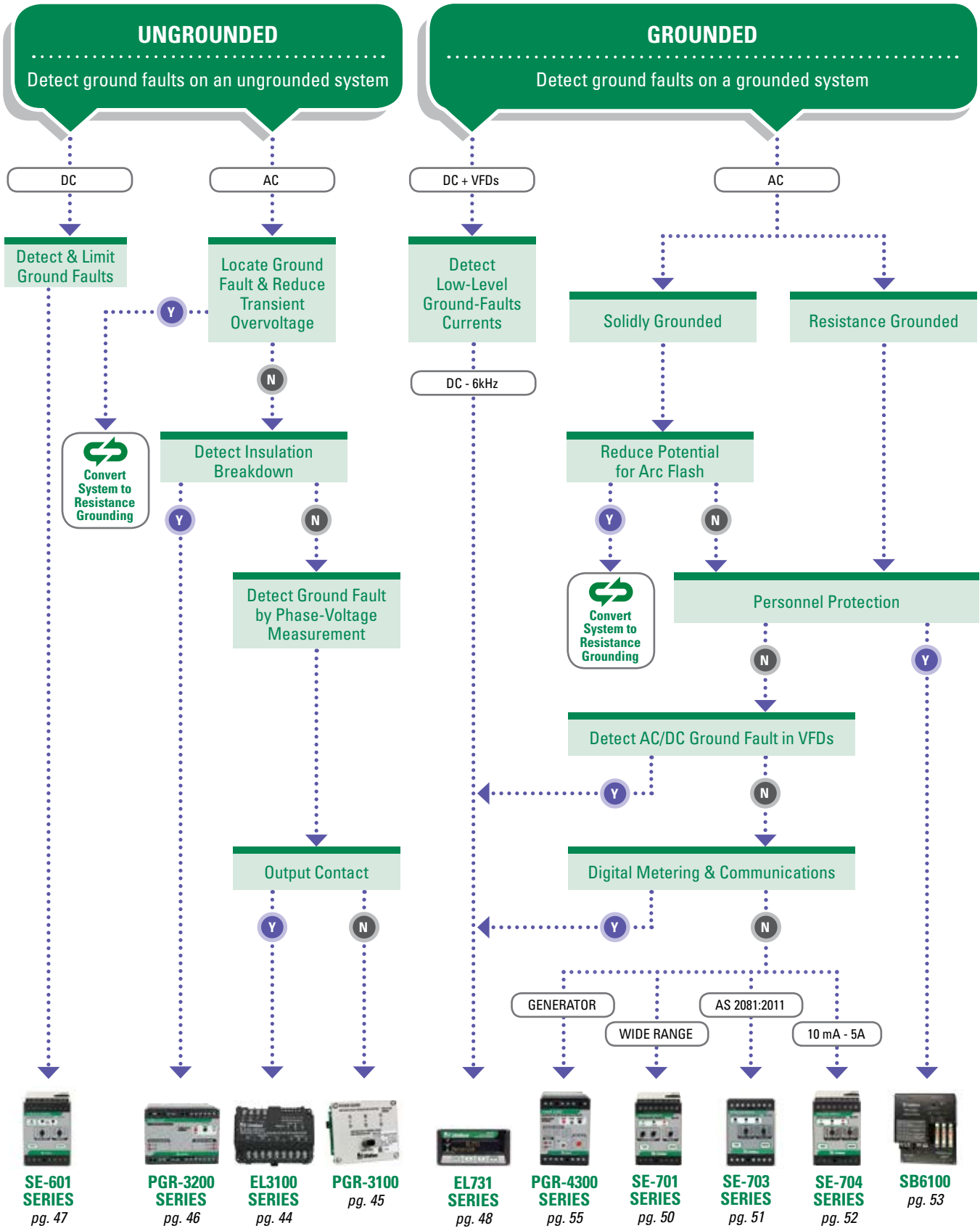
GROUND-FAULT PROTECTION



STEP 1 Select product category

STEP 2 Select the needed features in each category

STEP 3 Find the recommended product for your application



GROUND-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

Ground-Conductor Monitoring Relays

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

Resistance Grounding Systems & NGR Monitors

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

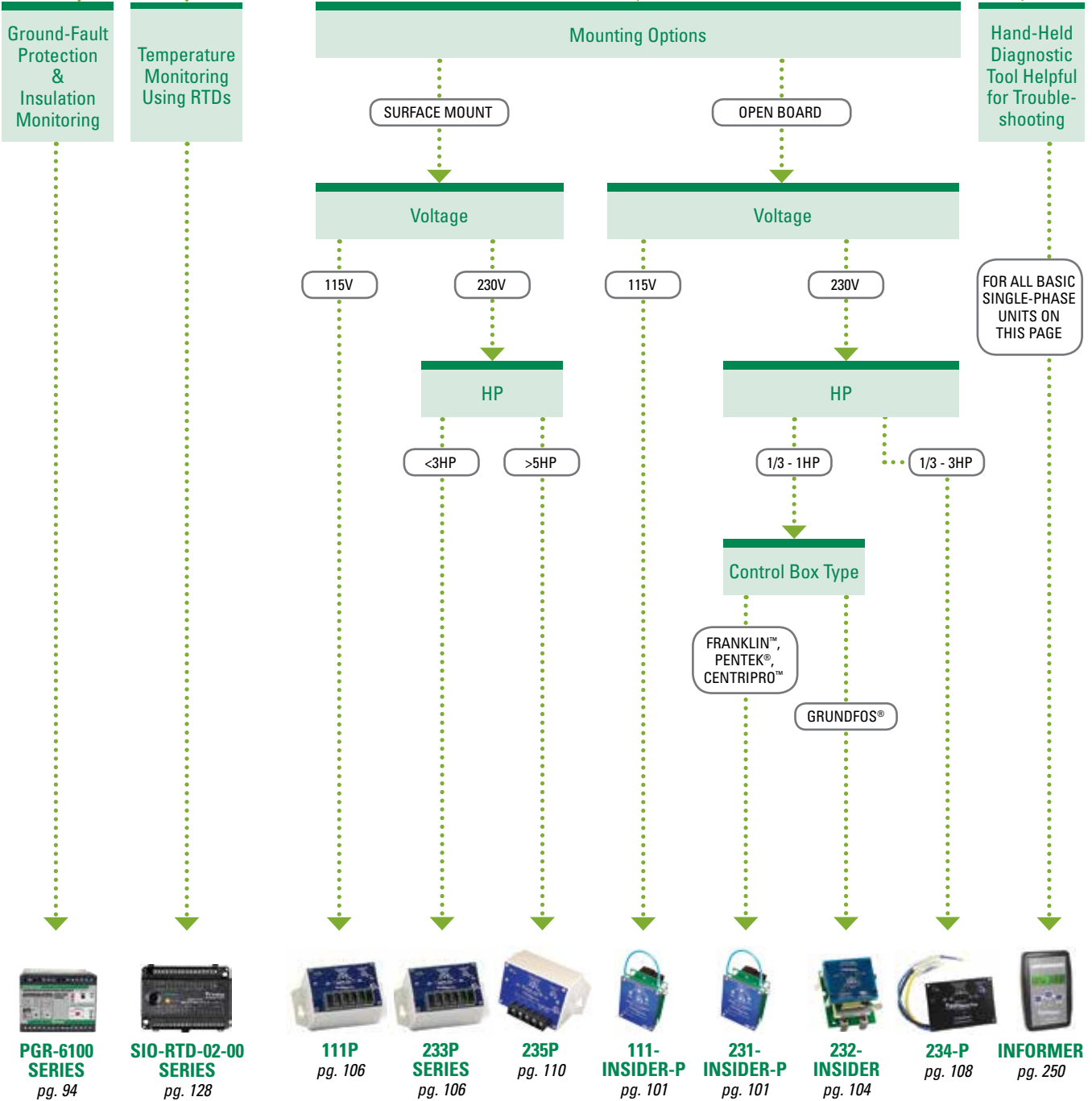
BASIC (PUMP)

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

STEP 1 Select product category

STEP 2 Select the needed features in each category

STEP 3 Find the recommended product for your application



MOTOR & PUMP PROTECTION



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

Advanced Motor & Pump Protection

Retrofits

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



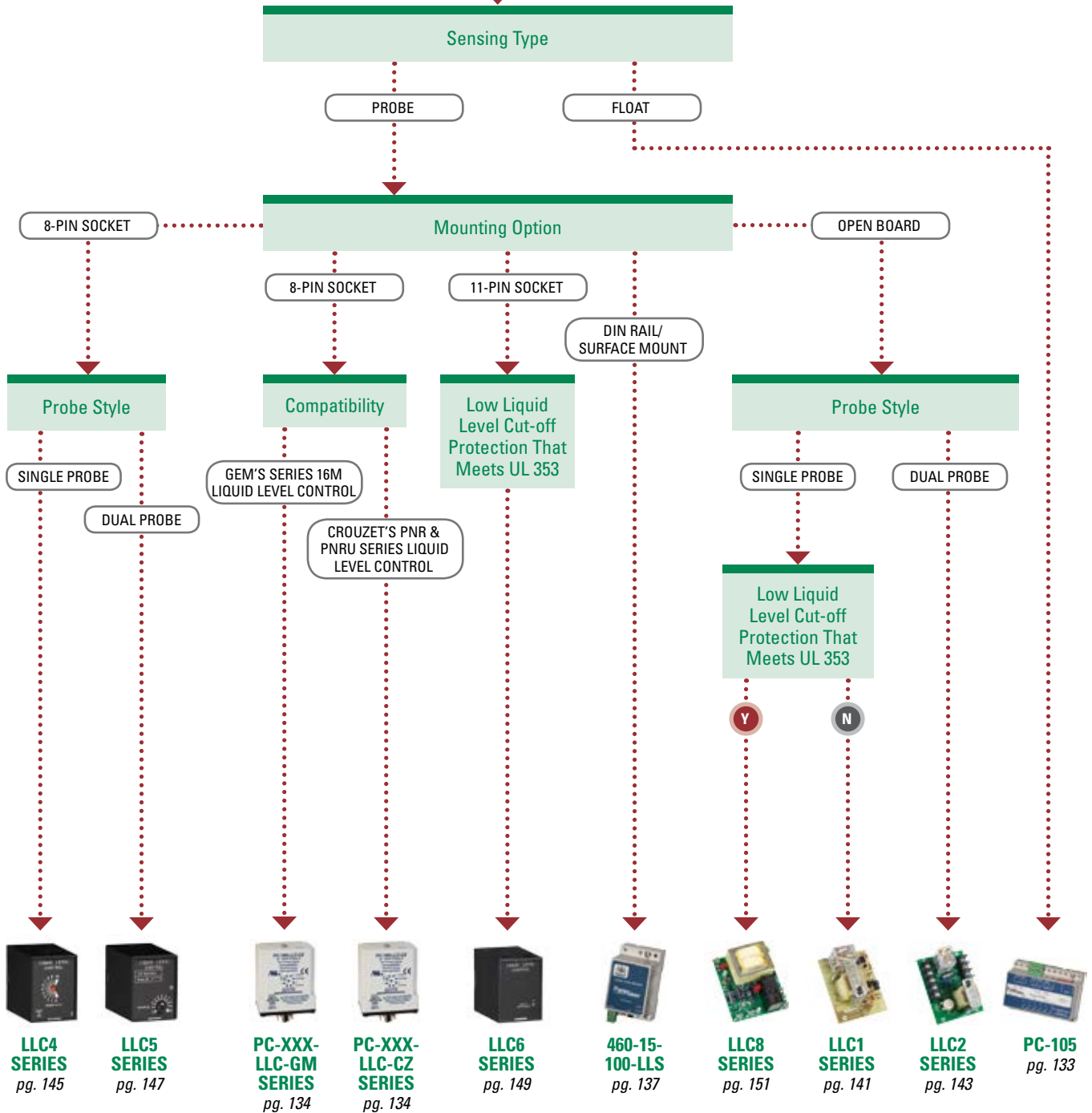
PC-102CICI-DL
pg. 132

Seal Leak Detection



LIQUID LEVEL CONTROLS

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



Liquid Level Controls

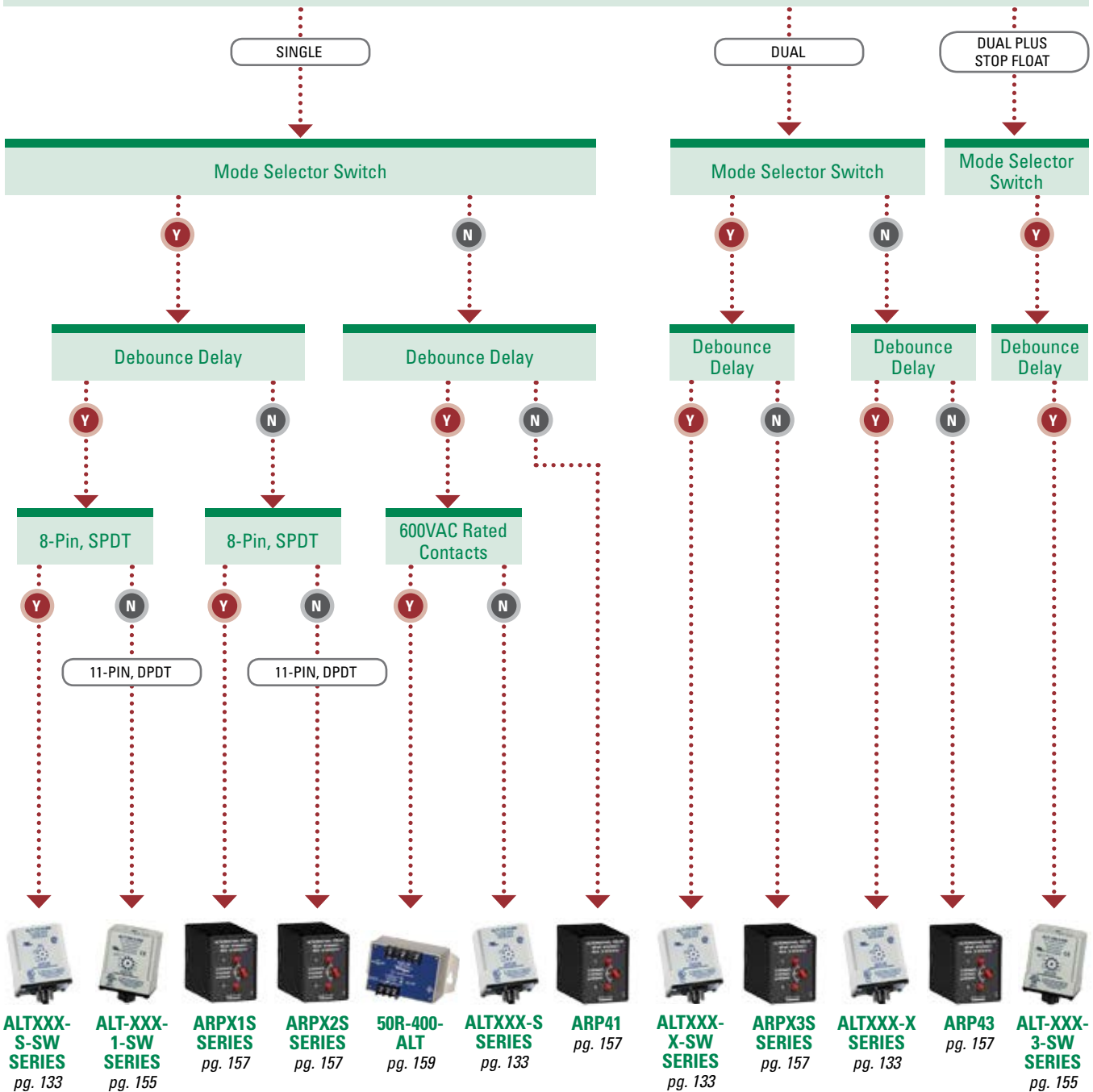
PUMP CONTROLLERS



ALTERNATING RELAYS

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

Float Switch Configuration



Alternating Relays

STEP 1 Select product category

STEP 2 Select the needed features in each category

STEP 3 Find the recommended product for your application

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
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ISS-102 SERIES
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ISS-105-ISO-3
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ISS-105-ISO-4
pg. 165



ISS-105-ISO
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ISS-105
pg. 165

Alarm Control/Battery Charger

Intrinsically Safe Relays

Intrinsically Safe Pump Controller

AC SYSTEM MONITORS/LOAD SENSORS



VOLTAGE MONITORS (1 of 2)

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

Three-Phase

Y

8-PIN SOCKET

Mounting Options

SURFACE MOUNT

DIN RAIL/SURFACE MOUNT

11-PIN SOCKET

Adjustable Trip Delay & Adjustable Unbalance

Adjustable % Voltage Unbalance

Reverse Phase Only

Y

N

2-8% RANGE

2-10% RANGE

Y

N

Unbalanced Voltage Protection

Contactor Failure Protection with/without Hand-held Diagnostic Tool

Y

N

Reverse Phase Only

Y

N

Y

N



- 201A-AU SERIES**
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- PLMU11**
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- 201A SERIES**
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- PLM SERIES**
 pg. 231
- PLS SERIES**
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- 460 SERIES**
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- DLMU SERIES**
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- 201-XXX-DPDT SERIES**
 pg. 204
- 202-RP**
 pg. 206
- 455 SERIES & INFORMER-MS**
 (use in combination)
 pg. 214 pg. 250

Voltage Monitoring Relays

STEP 1 Select product category

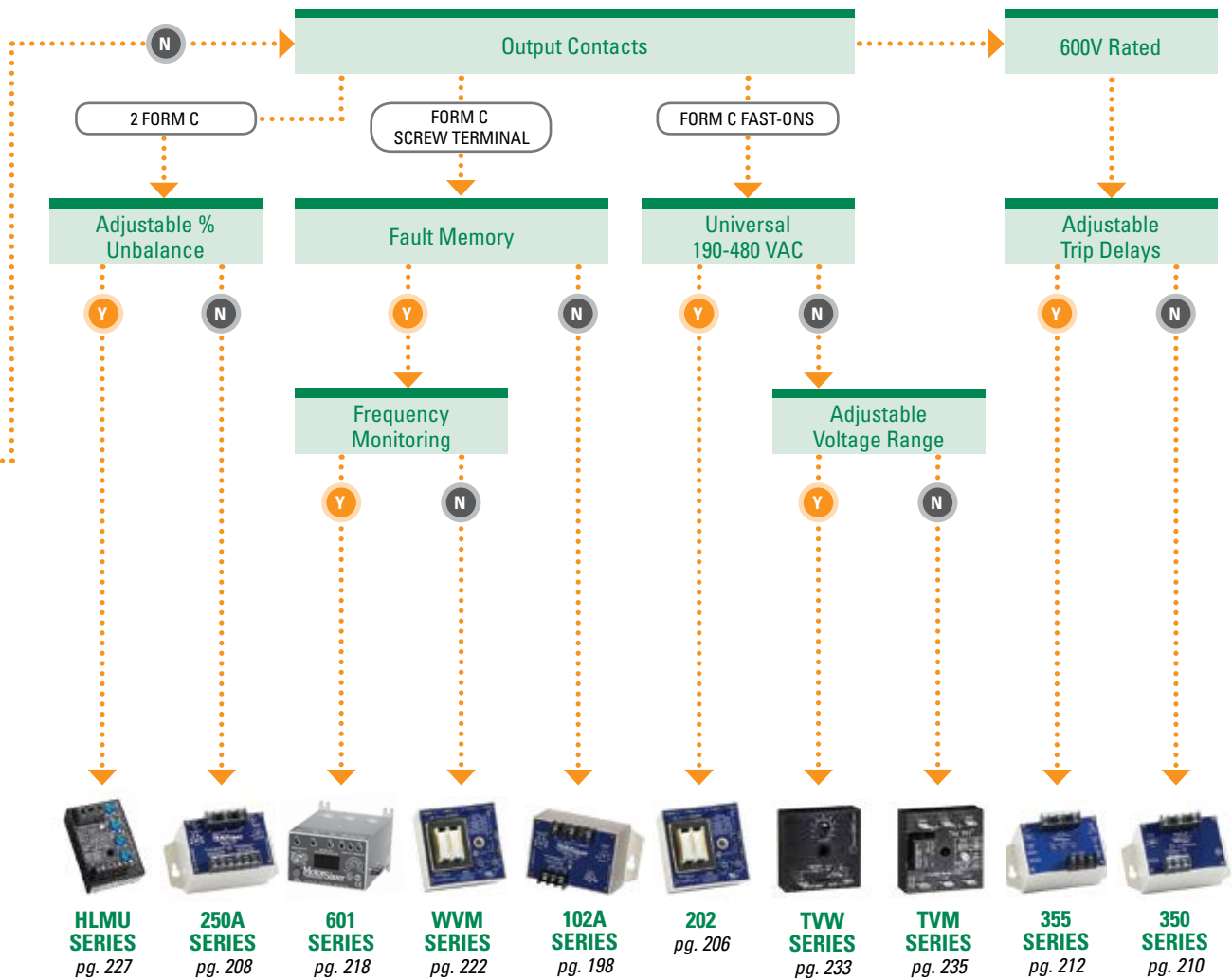
STEP 2 Select the needed features in each category

STEP 3 Find the recommended product for your application



VOLTAGE MONITORS (1 of 2)

(Continued from previous page)



Voltage Monitoring Relays