



ECA100-11



ECA500-11



# ECA100-11

The ECA100-11 are electronic three-phase relay specially designed for protection of air conditioning and refrigeration compressors and ventilation motors from the causes of the current, voltage and power failures, all enhanced reliability and with connectivity.



Voltage Protector

Overload Relay



# ECA100-11

## Measurement of:

- Phase Current.
- Phase to phase voltage.

## Adjustment of:

- FLA Full Load Amperage (Amperage trip)
- Connection Timed Start delay (TC), after Voltage Failure.
- Reset mode (AUTO / MANUAL).

## Protection against:

- Overload (OL).
- Under Voltage (UV) / Over Voltage (OV).
- Unbalance (UB).
- Phase Loss (SP).
- Phase Reversed (PR).

**Communication:** IO Port (MODBUS RTU 9600 baud protocol). Remote On/Off.

## Reports (through Modbus):

- Voltage and Current Report.
- Set Parameters Report. Reset Mode Status.
- Last 20 Faults Report.
- Frequency Report.



<b>VOLTAGE FAILURES</b>	Over Voltage	✓
	Low Voltage	✓
	Unbalance	✓
	Phase Loss	✓
	Inverted Phase	✓

<b>CURRENT FAILURES</b>	Overload	✓
	Unbalance	✓
	3 Successive Failures	✓
	PHASE LOSS	✓

<b>ADVANTAGE</b>	2 ways of mounting	✓
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Models:

## ECA100-11

Model	Voltage	Amperage Range
ECA100-11-208012	208/220 VAC	3.5 – 12.5 A
ECA100-11-208032	208/220 VAC	10 – 32 A
ECA100-11-208080	208/220 VAC	25 -80 A
ECA100-11-480032	440/480 VAC	10 – 32 A
ECA100-11-480080	440/480 VAC	25 -80 A

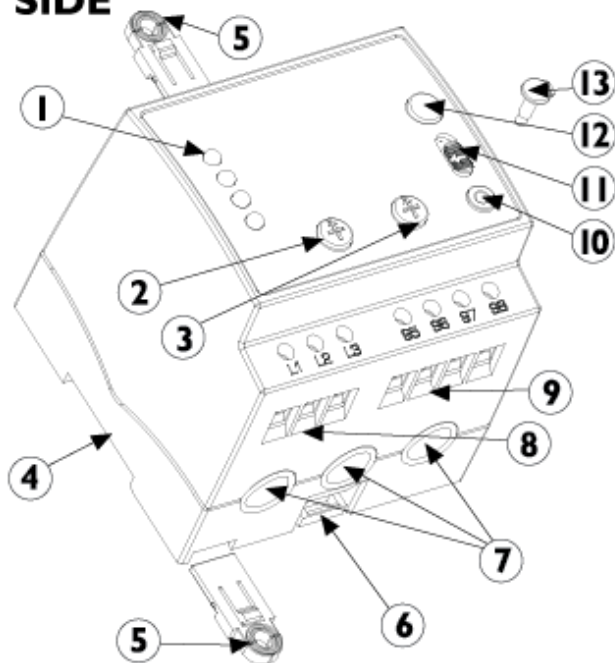


## Parts Description:

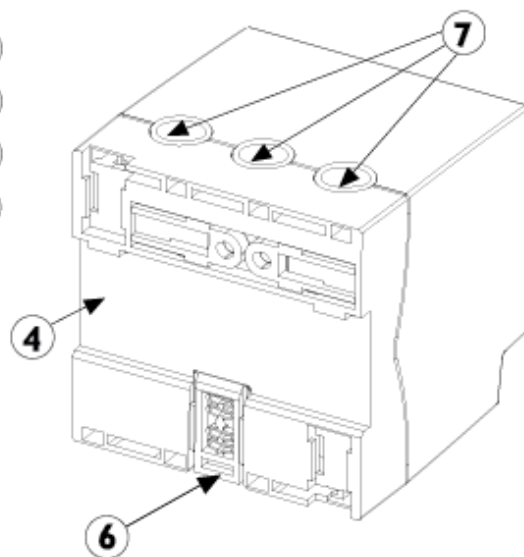
# ECA100-11



### FRONT SIDE VIEW



### BACK SIDE VIEW



#### 1. Indicator Lights (LED's)

- Normal **(ON)** - Continuous Green.
- Start Delay **(TC)** - Blinking Green.
- Overload **(OL)** - Continuous Red.
- Phase Reversal **(PR)** - Blinking Red.
- Unbalance **(UB)** - Continuous Red.
- Single Phasing **(SP)** - Blinking Red.
- Overvoltage **(OV)** - Continuous Red.
- Undervoltage **(UV)** - Blinking Red.

#### 2. Current **(FLA)** Setting Knob.

#### 3. Start Delay **(TC)** Setting Knob.

#### 4. Back Groove for DIN Rail mounting.

#### 5. Attachable Mounting Ear for Flat Surface mounting.

#### 6. Supporting Brackets for DIN Rail mounting.

#### 7. Current Sensing Holes for motor wiring.

#### 8. Power Supply Voltage Input (L1 L2 L3).

#### 9. Contacts for Relay (95-96) and (97-98).

Tripped	$\left\{ \begin{array}{l} 95-96 \text{ closed} \\ 97-98 \text{ open} \end{array} \right.$		Normal	$\left\{ \begin{array}{l} 95-96 \text{ open} \\ 97-98 \text{ closed} \end{array} \right.$

#### 10. IO Port. (for Serial Communication).

#### 11. AUTO / MANUAL Start Mode Slide-Switch.

#### 12. START Push Button.

#### 13. IO PORT cover.



# ECA100-11

## Parts Description:





# ECA100-11

Measurement of:  
• Current

Model	Current Measurement range	Amperage Range
ECA100-11-208012	0.35 → 125 A	3.5 – 12.5 A
ECA100-11-208032	1 → 32 A	10 – 32 A
ECA100-11-208080	2.5 → 800 A	25 -80 A
ECA100-11-480032	1 → 32 A	10 – 32 A
ECA100-11-480080	2.5 → 800 A	25 -80 A







# ECA100-11

Measurement of:  
• Phase to phase voltage :

Voltage Model	Current Measurement range	Voltage
208	145 → 285 V	208/220 VAC
480	300 → 625 A	440/480 VAC





## Overload (OL)

### I motor > FLA setting

An overload is present when an increase in the motor load causes an excess current greater than the set FLA value, producing overheating effects in the windings.



### **The cause of such an increase in load may be, among others:**

- Motor blocking
- Mechanical coupling failure
- Frequently starting cycles
- Poor ventilation
- Abnormal increase of the associated load.



# Overload (OL)

$I_{motor} > FLA$  setting

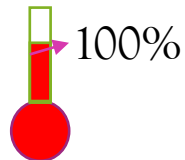
## Thermal protection algorithm

➤ Motor operating in normal condition:

Thermal class is dynamically adjusted.

➤ Motor operating:  $I_{motor} > FLA$

Thermal protection is activated and when heat is 100% it will disconnect the motor.



## Overload failure indication

During Failure	Green LED	ON	
	Red LED 1	ON	
	Red LED 2	OFF	
	Red LED 3	OFF	
During Cooling	Green LED	Blinking	
	Red LED 1	ON	
	Red LED 2	OFF	
	Red LED 3	OFF	



# Overload (OL)

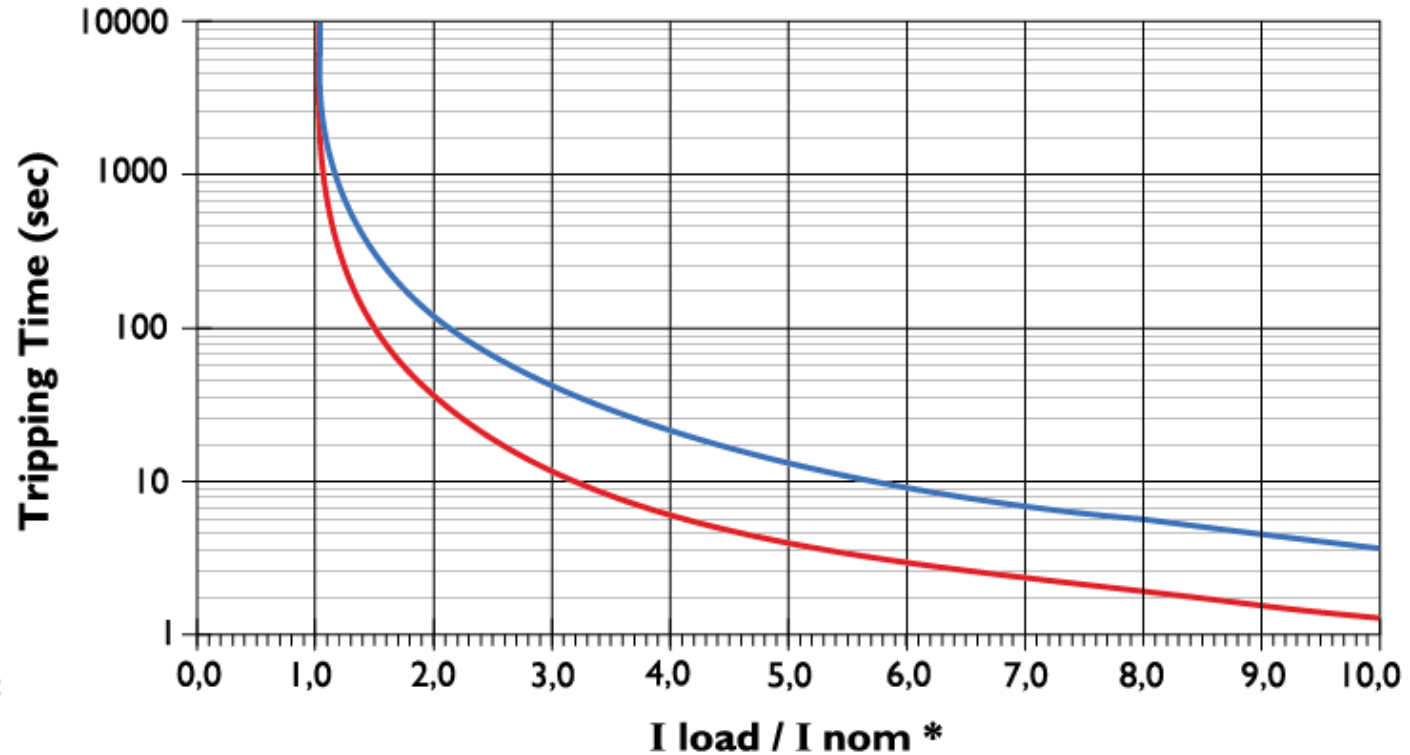
## ECA100-II Motor protector COLD-HOT CURVES (Class 10)

(\*)  $I_{nom}$  = Current value on ECA100-II adjusted previously by the user

$I_{nom}$  term is referred to FLA (Full Load Amperage) adjustable on the product

■ Hot Curve    ■ Cold Curve

After the first stall/trip of the motor due to a fault condition, the protective relay will disconnect sooner, according to the hot curve.



# Overload (OL)



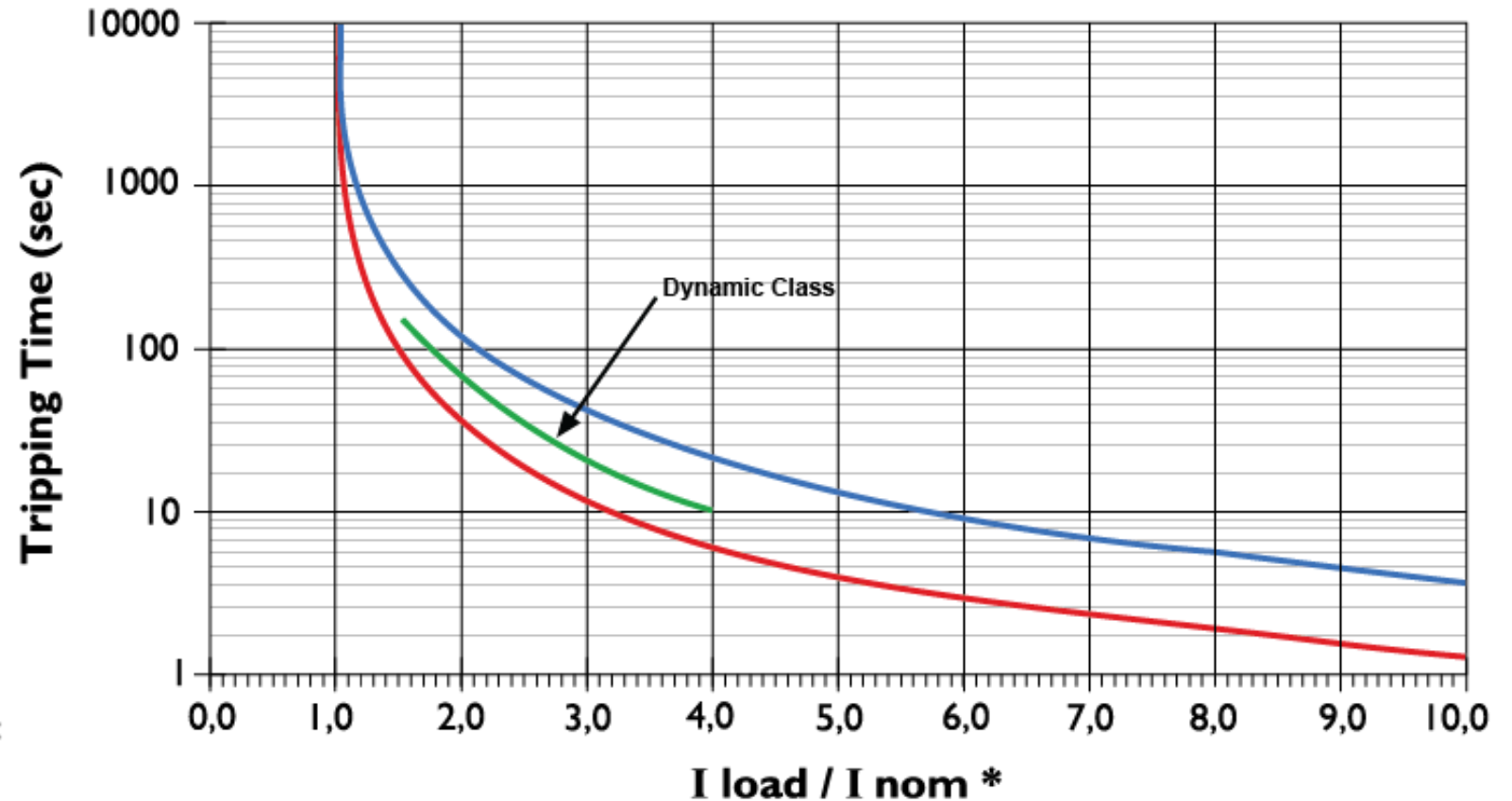
## ECA100-II Motor protector COLD-HOT CURVES (Class IO)

(\*)  $I_{nom}$  = Current value on ECA100-II adjusted previously by the user

$I_{nom}$  term is referred to FLA (Full Load Amperage) adjustable on the product

■ Hot Curve      ■ Cold Curve

After the first stall/trip of the motor due to a fault condition, the protective relay will disconnect sooner, according to the hot curve.





# Overload (OL)

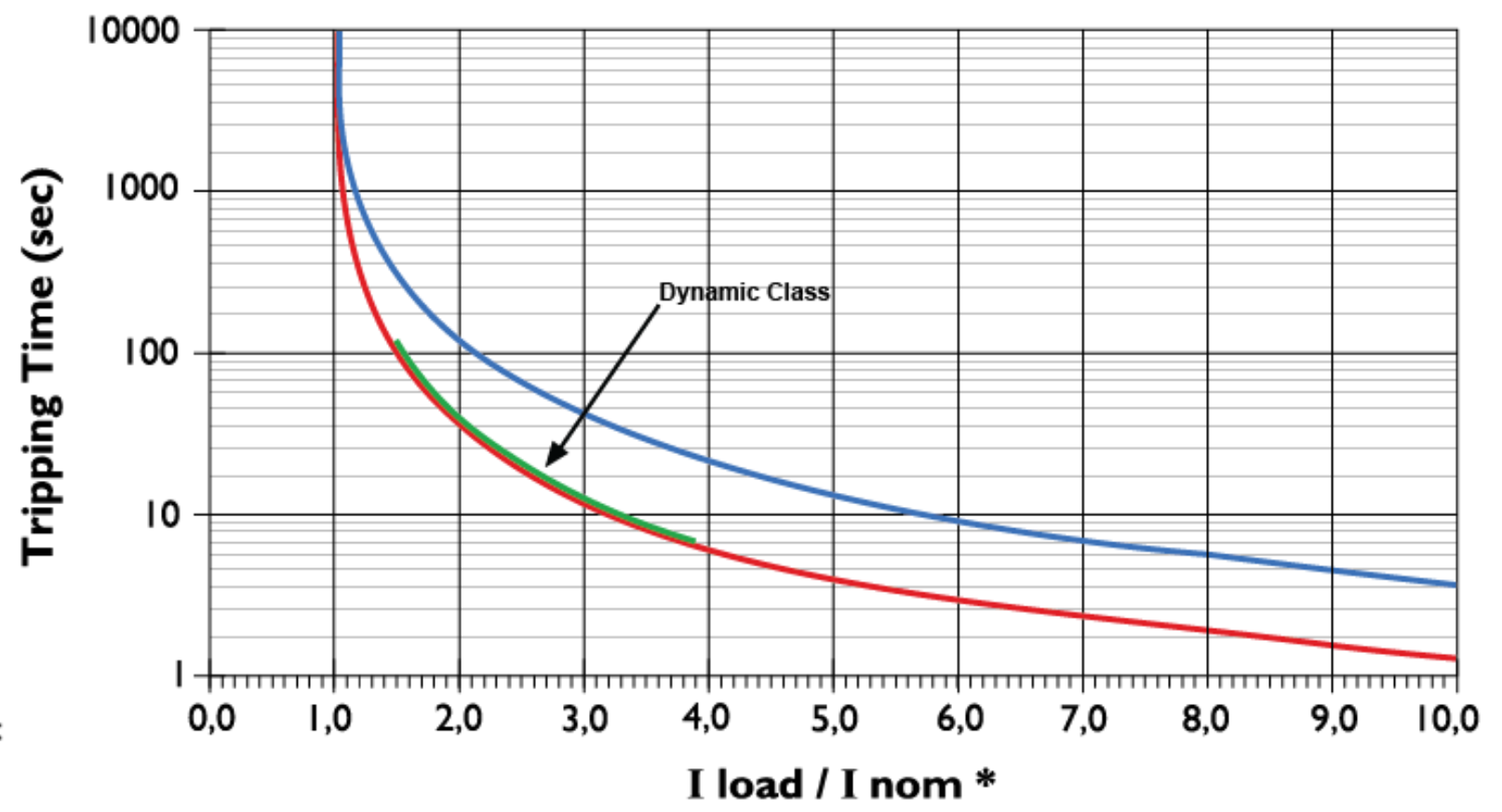
## ECA100-II Motor protector COLD-HOT CURVES (Class 10)

(\* )  $I_{nom}$  = Current value on ECA100-II adjusted previously by the user

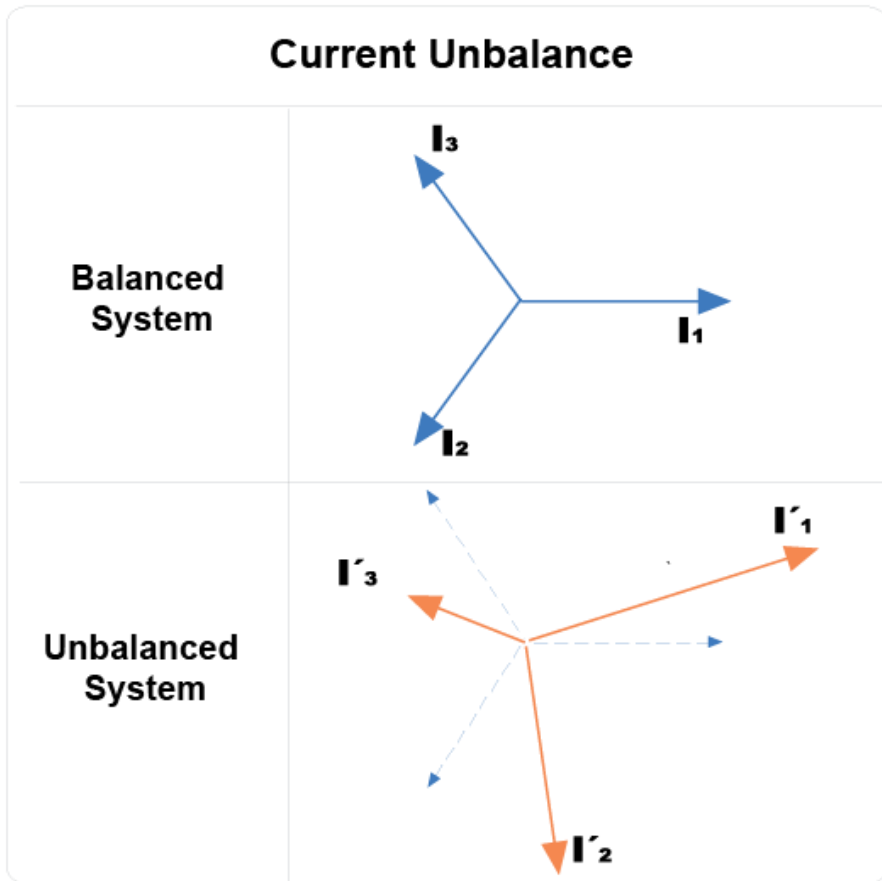
$I_{nom}$  term is referred to FLA (Full Load Amperage) adjustable on the product

■ Hot Curve      ■ Cold Curve

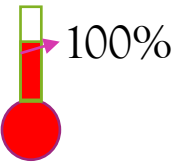
After the first stall/trip of the motor due to a fault condition, the protective relay will disconnect sooner, according to the hot curve.



# Current Unbalance (CUB)



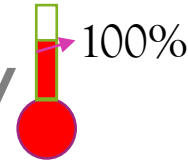
- Condition:  $CUB > 48\%$
- Disconnecting time: 3 sec
- Accumulated heat: 100% immediately





## Current Unbalance (CUB)

- Condition:  $CUB > 48\%$
- Disconnecting time: 3 sec
- Accumulated heat: 100% immediately



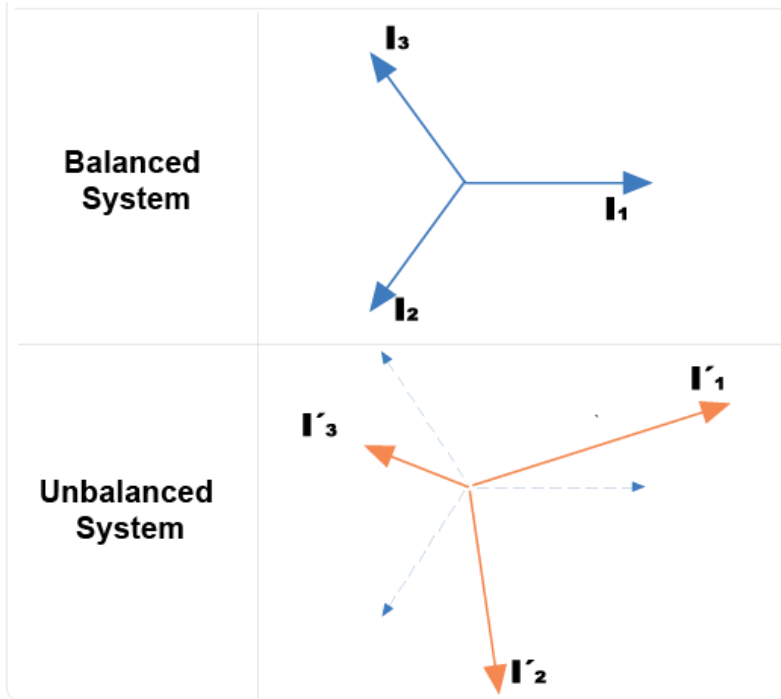
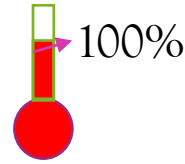
Current Unbalance	
During Failure	Green LED <b>ON</b>
	Red LED 1 <b>ON</b>
	Red LED 2 <b>ON</b>
	Red LED 3 <b>OFF</b>
During Cooling	Green LED <b>Blinking</b>
	Red LED 1 <b>ON</b>
	Red LED 2 <b>ON</b>
	Red LED 3 <b>OFF</b>





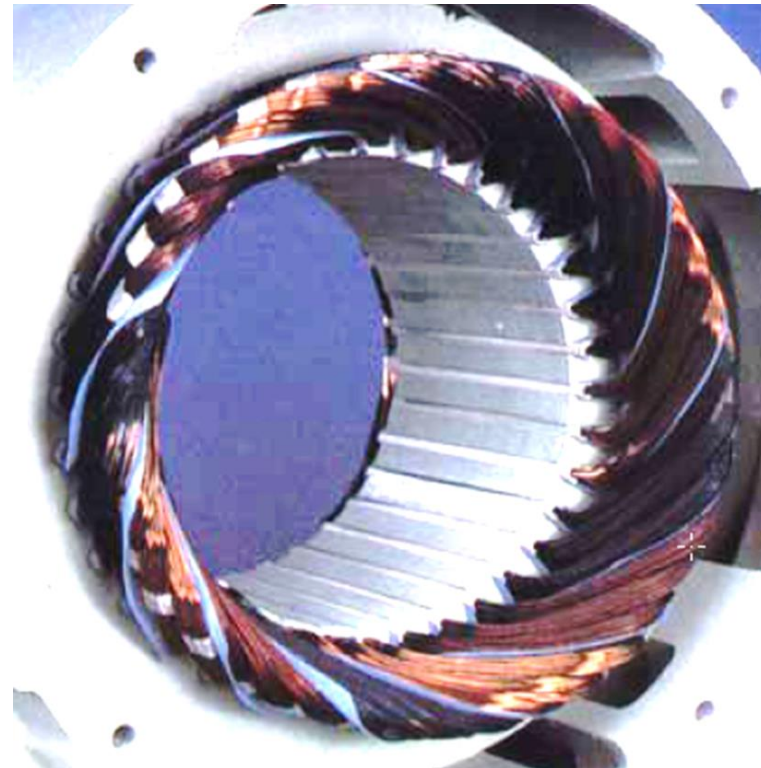
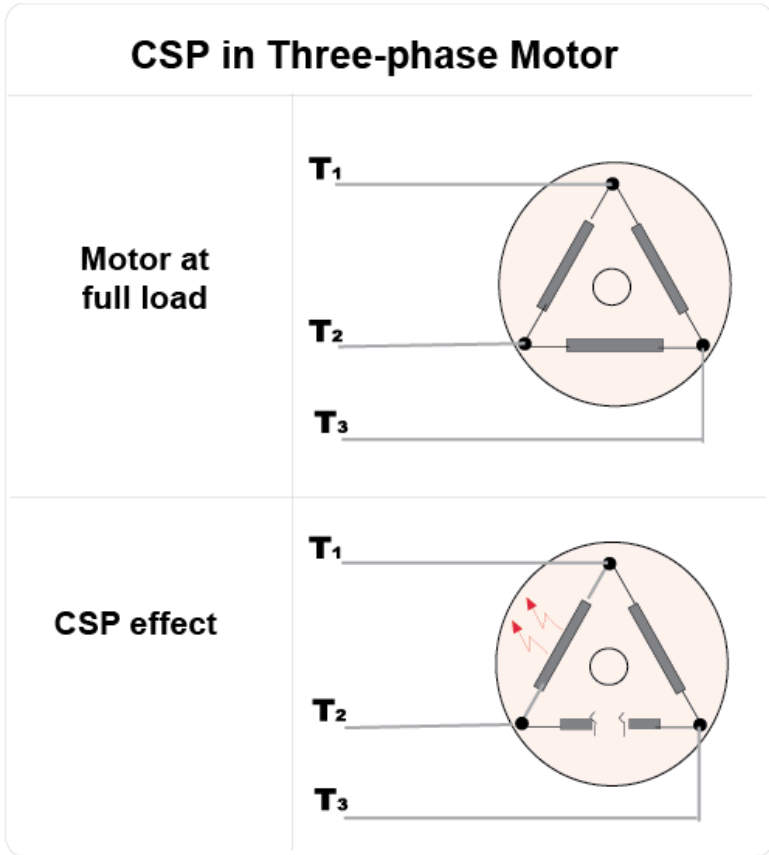
# Current Single Phase (CSP)

- Condition:  $CUB > 60\%$
- Disconnecting time: 3 sec
- Accumulated heat: 100% immediately



Current Unbalance			
During Failure	Green LED	ON	
	Red LED 1	ON	
	Red LED 2	ON	
	Red LED 3	OFF	
During Cooling	Green LED	Blinking	
	Red LED 1	ON	
	Red LED 2	ON	
	Red LED 3	OFF	

# Current Unbalance (CUB)



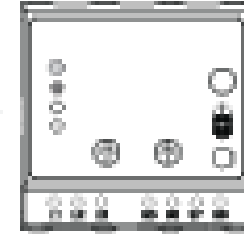
33%

## Three Consecutives Current Failures

- Condition: 3 Failures
- Time range: 30 min
- Change to Manual Restart

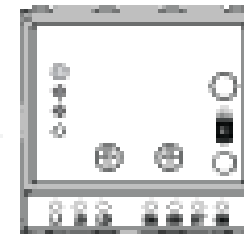
### Third Failure Detection Example

1st Failure  
T = 5 minutes  
Overload (OL)



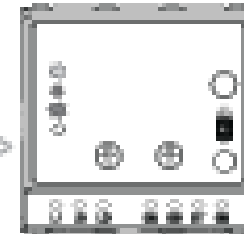
ECA 100 automatically restarts

2nd Failure  
T = 15 minutes  
Current Unbalance



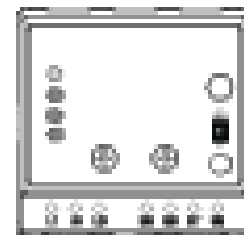
ECA 100 automatically restarts

3rd Failure  
T = 27 minutes  
CSP



ECA 100 is not going to  
reconnect

3 Red LEDs start blinking





**100%**

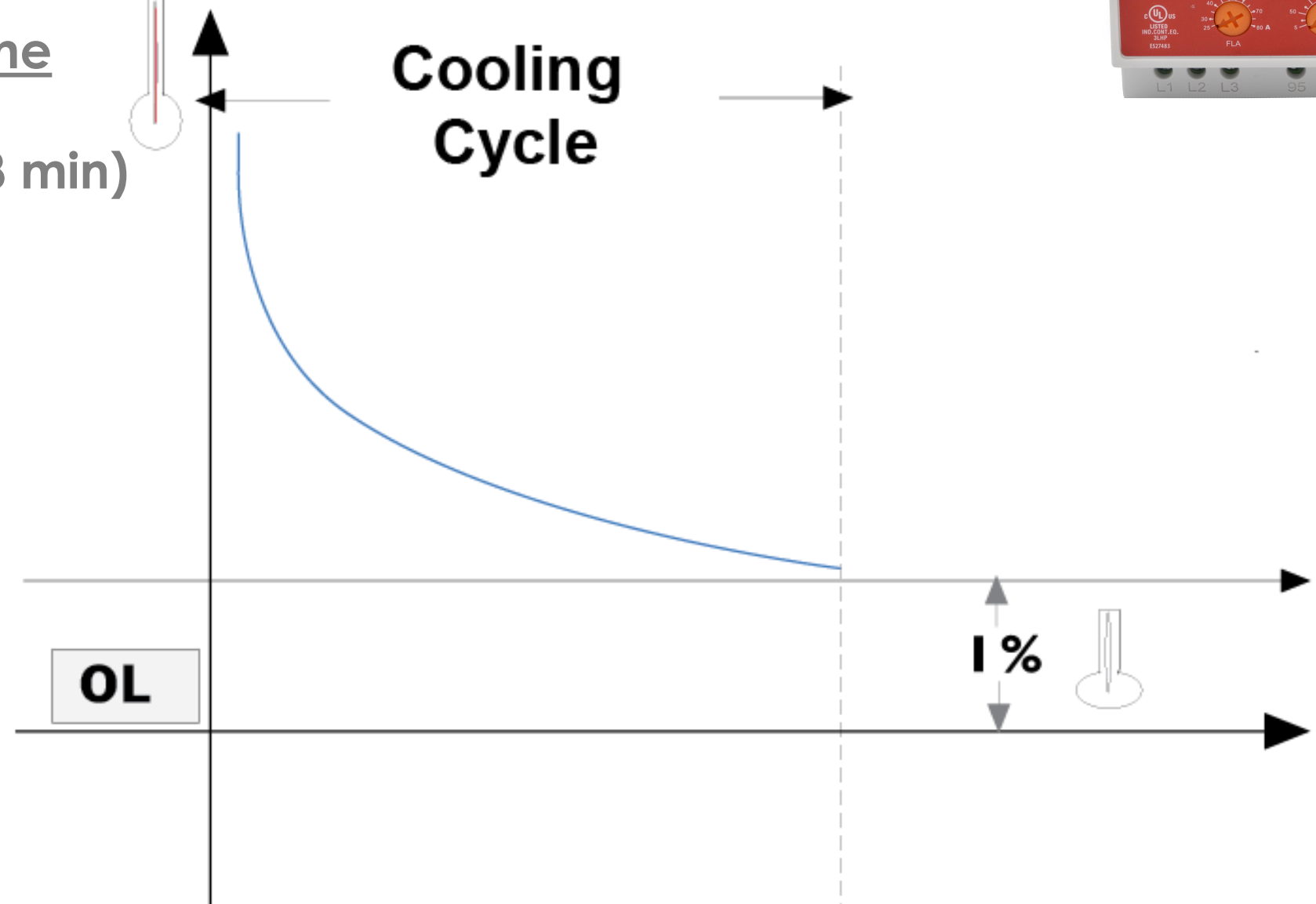


**Cooling Cycle**



Overload Cooling time

Class 10 → 480 sec (8 min)



**OL**

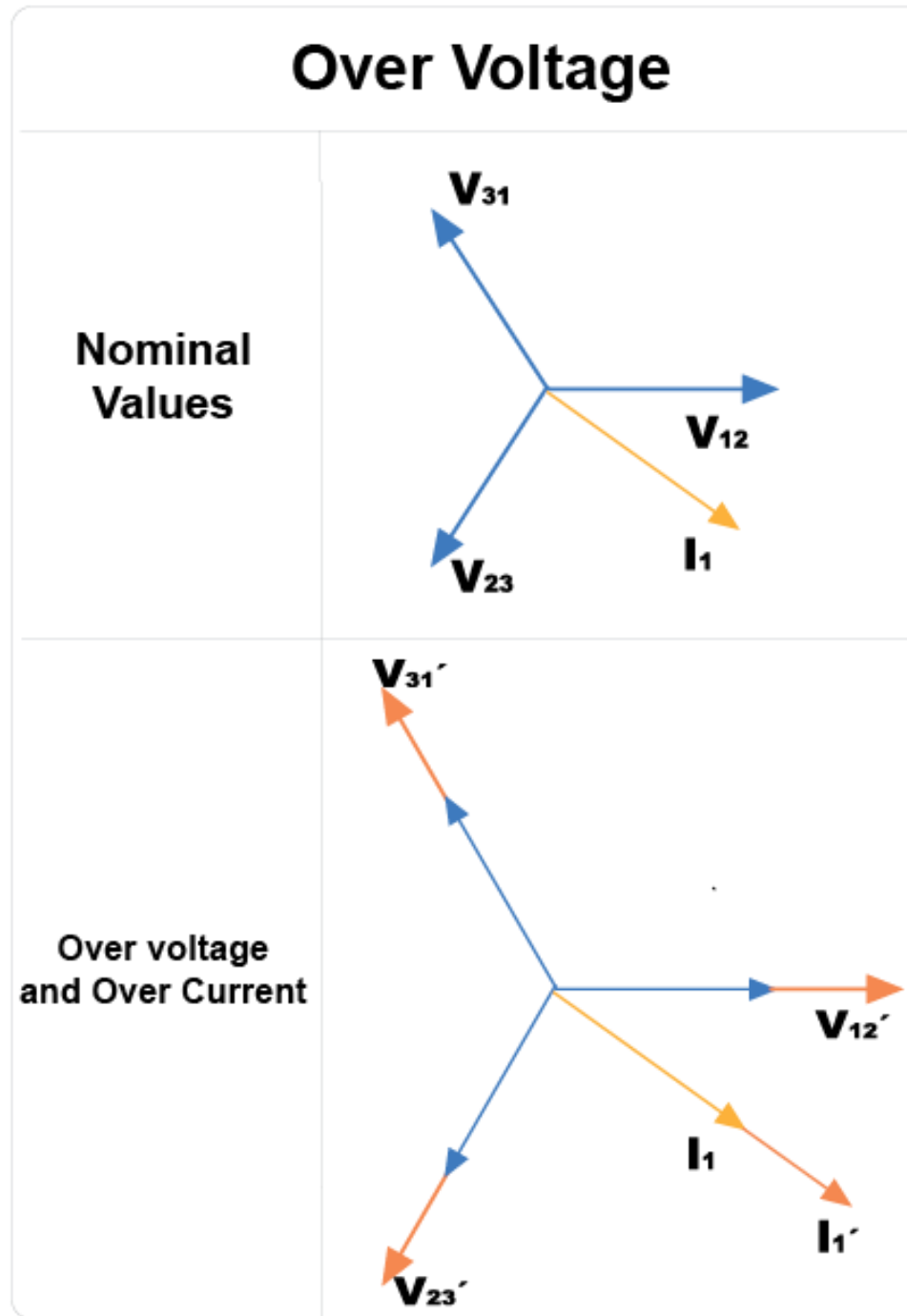
**1%**





## Overvoltage

- With motor stopped
- With the motor running:
  - With Overcurrent
  - Without Overcurrent





# Overvoltage

## With a stopped Motor



### OV with Stopped Motor

Voltage Model	Disconnection	Reconnection	Disconnection Time
208/220 VAC	> 285 VAC	< 248 VAC	3 sec
440/480 VAC	> 528 VAC	< 516 VAC	3 sec

During Failure	Green LED	OFF	
	Red LED 1	OFF	
	Red LED 2	OFF	
During Cooling	Red LED 3	ON	
	Green LED	Blinking	
	Red LED 1	OFF	
	Red LED 2	OFF	
	Red LED 3	OFF	



## Overvoltage

➤ With the motor running:

With Overcurrent

Voltage Model	Disconnection	Reconnection	Disconnection Time
208/220 VAC	> 285 VAC	< 248 VAC	3 sec
440/480 VAC	> 528 VAC	< 516 VAC	3 sec



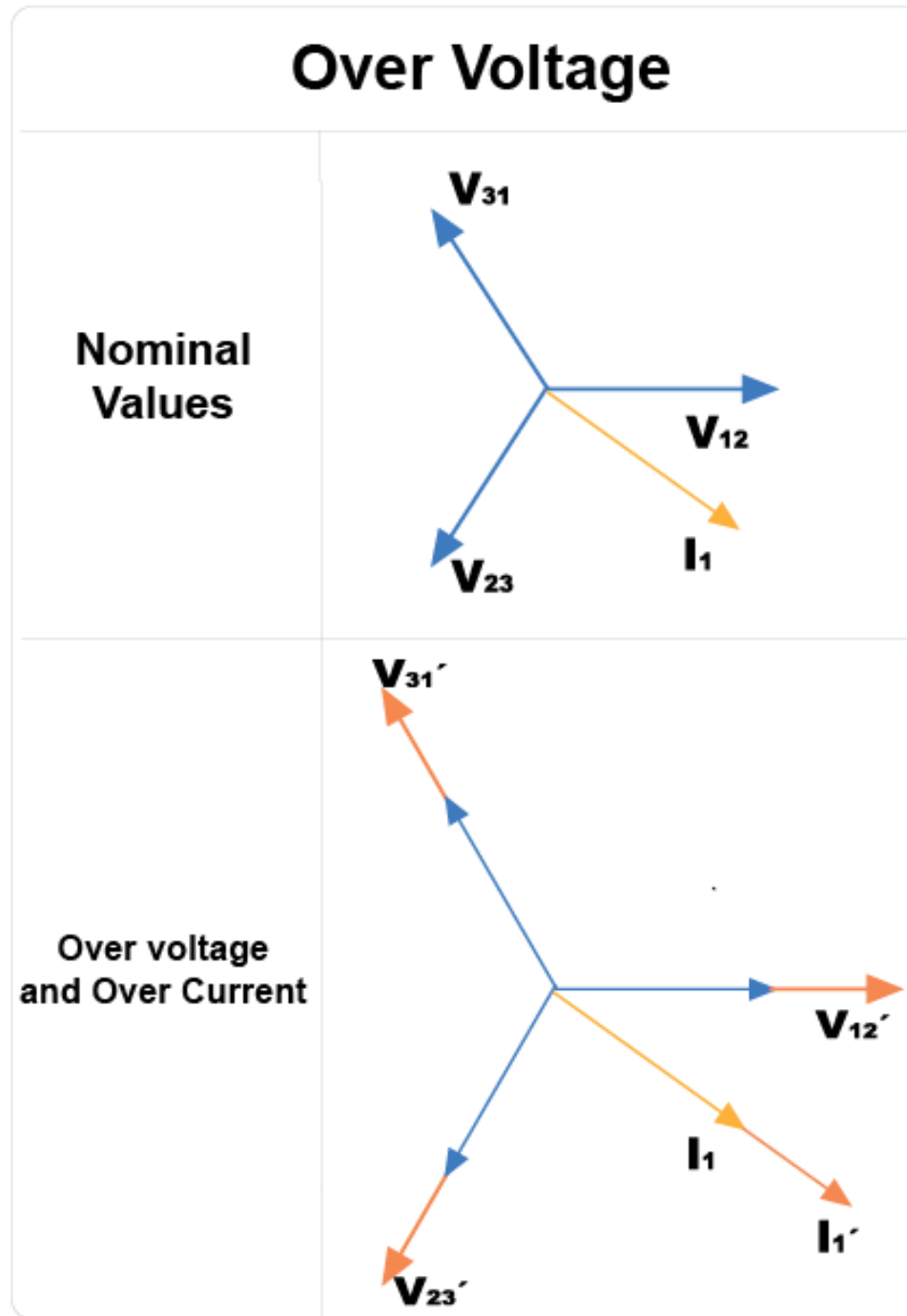
## UV with Running Motor

During Failure	Green LED	OFF	
	Red LED 1	ON	
	Red LED 2	OFF	
	Red LED 3	OFF	
During Cooling	Green LED	OFF	
	Red LED 1	OFF	
	Red LED 2	OFF	
	Red LED 3	OFF	



## Overvoltage (OV)

- With motor stopped
- With the motor running:
  - With Overcurrent
  - Without Overcurrent







# Overvoltage (OV)

## With a stopped Motor



Voltage Model	Disconnection	Reconnection	Disconnection Time
208/220 VAC	> 285 VAC	< 248 VAC	3 sec
440/480 VAC	> 528 VAC	< 516 VAC	3 sec

Condition	Action
OV with stopped motor	ECA100 will not let motor start

## OV with Stopped Motor

During Failure	Green LED	OFF	
	Red LED 1	OFF	
	Red LED 2	OFF	
	Red LED 3	ON	
During Cooling	Green LED	Blinking	
	Red LED 1	OFF	
	Red LED 2	OFF	
	Red LED 3	OFF	



## Overvoltage (OV)

➤ With the motor running:

### ☐ With Overcurrent

Condition	Action
OV with a running motor and OL	ECA100 will disconnect the motor

### ☐ Without Overcurrent

Condition	Action
OV with a running motor	ECA100 will report the failure but will NOT disconnect the motor



## OV while Motor is Running

During Failure	Green LED	OFF	
	Red LED 1	ON	
	Red LED 2	OFF	
	Red LED 3	ON	
During Cooling	Green LED	Blinking	
	Red LED 1	OFF	
	Red LED 2	OFF	
	Red LED 3	OFF	



# Undervoltage (UV)

## With a stopped Motor



Voltage Model	Disconnection	Reconnection	Disconnection Time
208/220 VAC	<187 VAC	>193 VAC	3 sec
440/480 VAC	<396 VAC	> 408 VAC	3 sec

Condition	Action
UV with stopped motor	ECA100 will not let motor start

## OV with Stopped Motor

During Failure	Green LED	OFF	
	Red LED 1	OFF	
	Red LED 2	OFF	
	Red LED 3	ON	
During Cooling	Green LED	Blinking	
	Red LED 1	OFF	
	Red LED 2	OFF	
	Red LED 3	OFF	



## Undervoltage (UV)

➤ With the motor running:

☐ With Overcurrent

Condition	Action
UV with a running motor and OL	ECA100 will disconnect the motor

☐ Without Overcurrent

Condition	Action
UV with a running motor	ECA100 will report the failure but will NOT disconnect the motor



## UV with Running Motor

During Failure	Green LED	OFF	
	Red LED 1	ON	
	Red LED 2	OFF	
	Red LED 3	OFF	
During Cooling	Green LED	OFF	
	Red LED 1	OFF	
	Red LED 2	OFF	
	Red LED 3	OFF	



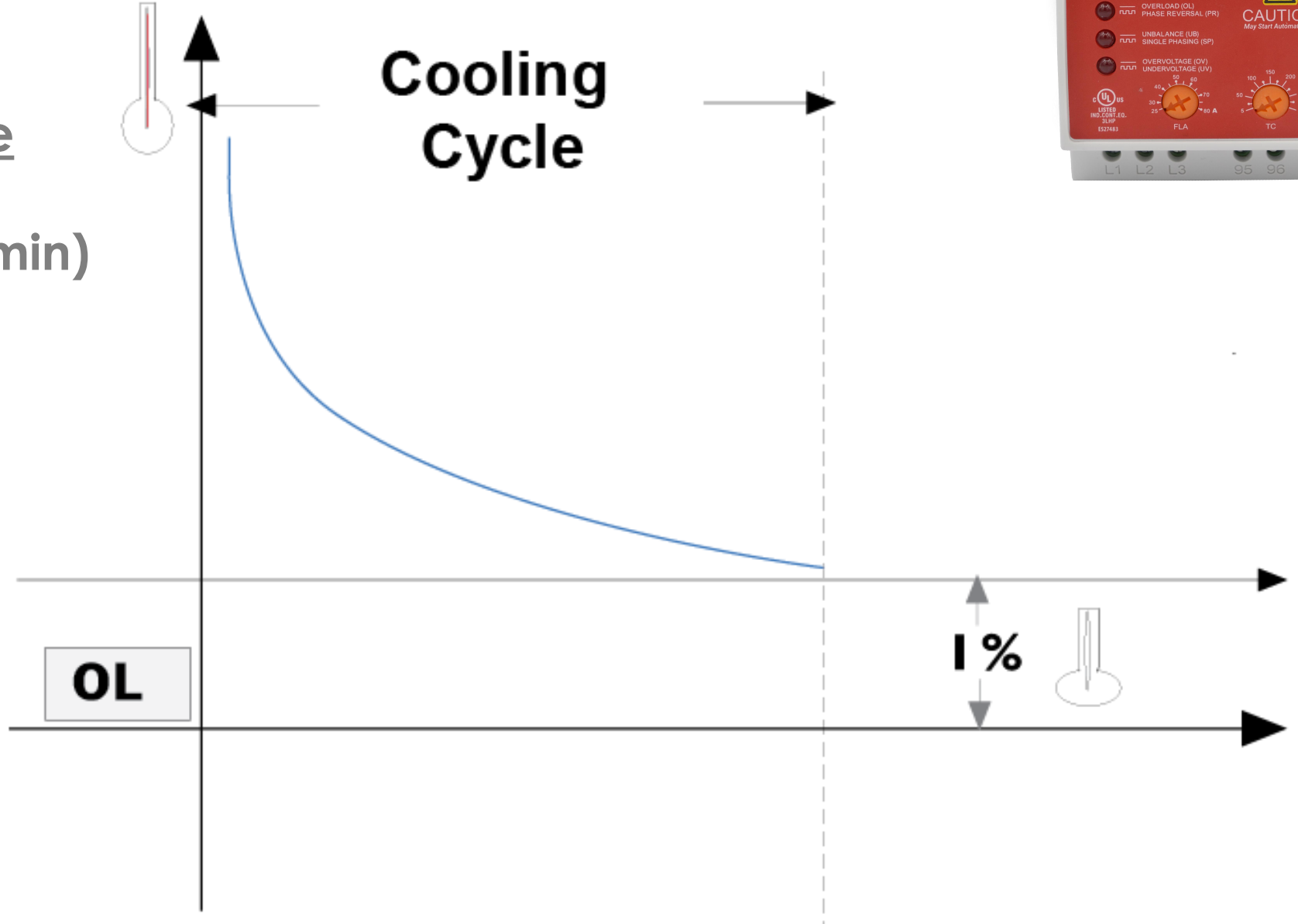
100%

Cooling Cycle



Overload Cooling time

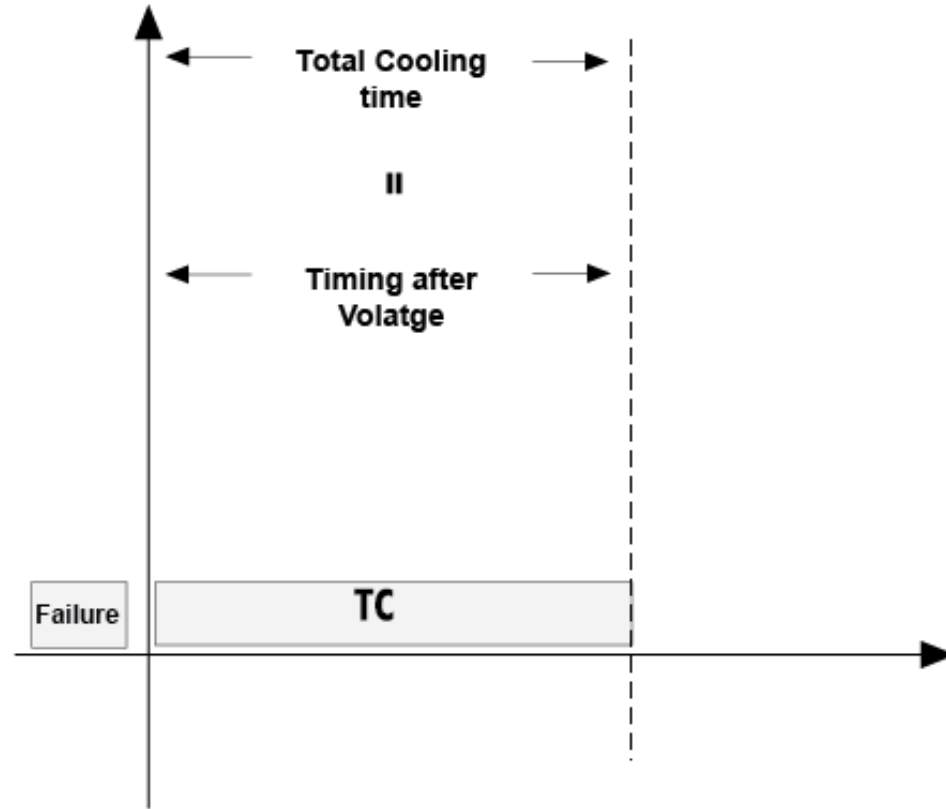
Class 10 → 480 sec (8 min)





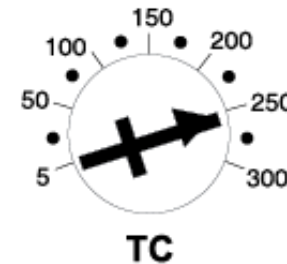
## Start Delay after Voltage Failure

# Start Delay (TC)



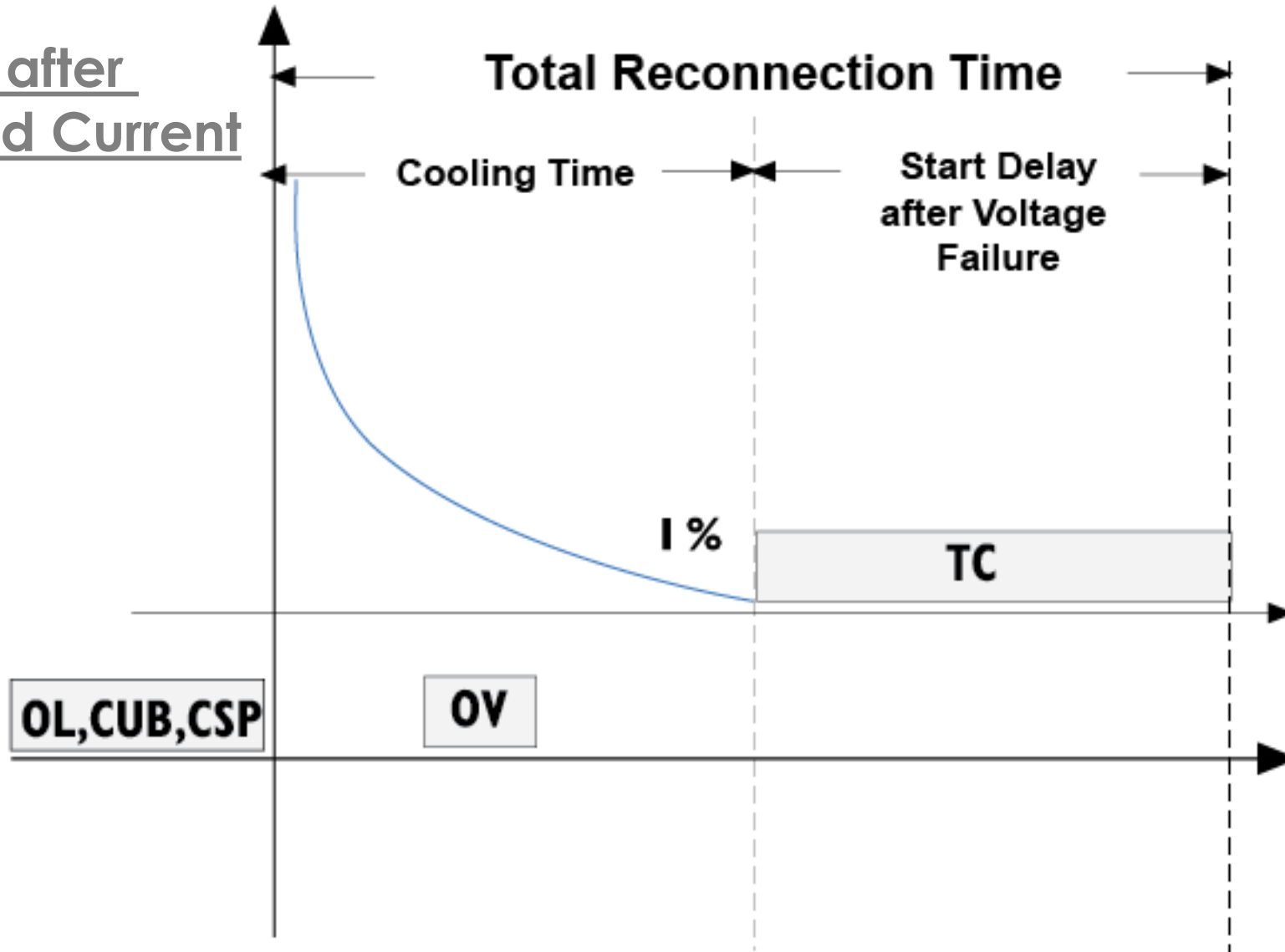
**Start Delay = TC Setting**

**5 sec < TC < 300 sec**





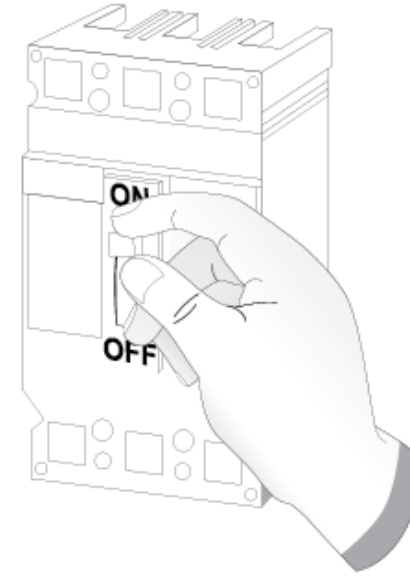
Start Delay after Voltage and Current Failure





a) Turn **OFF** the circuit breaker.

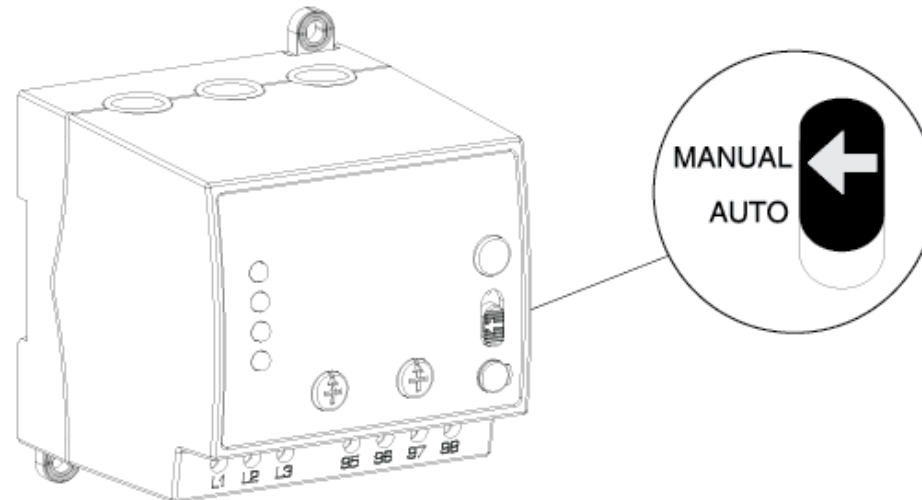
**ON**  
↓  
**OFF**



## Current Setting

**NOTE:** Make sure that wiring is according to connection diagram (see item 4.2).

b) Slide the **AUTO/MANUAL** start mode slide - switch to **MANUAL** position.

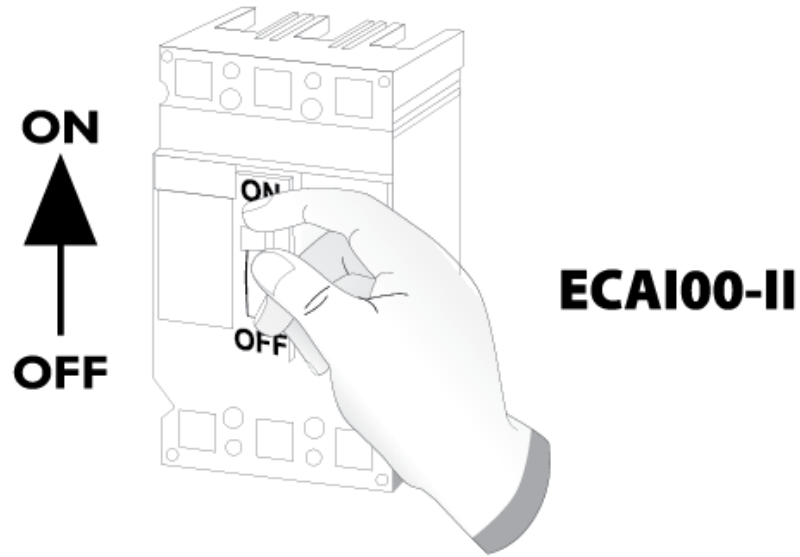




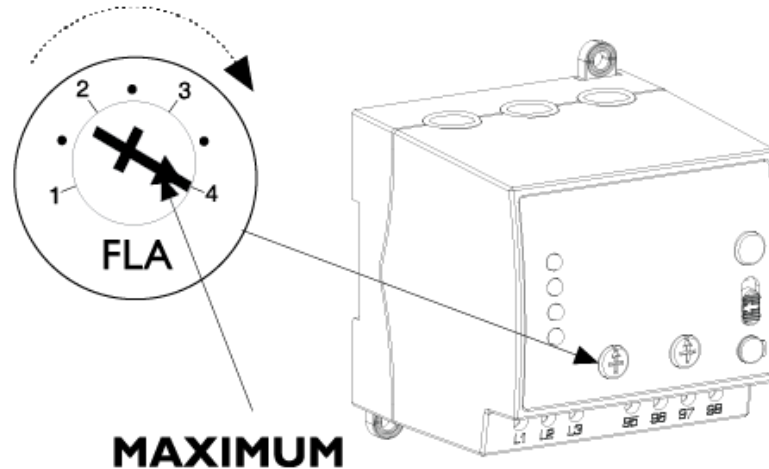


c) Turn **ON** the circuit breaker. (The motor remains **OFF** as the contactor is open through deactivation of the **ECA100-II**)

## Current Setting



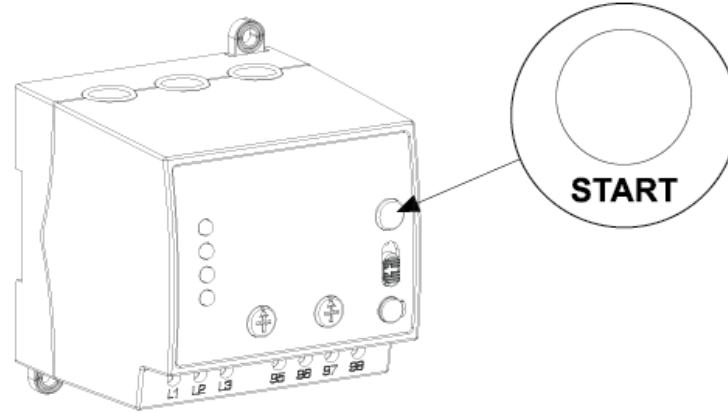
d) Turn right the Current setting knob (**FLA**) up to the maximum value.



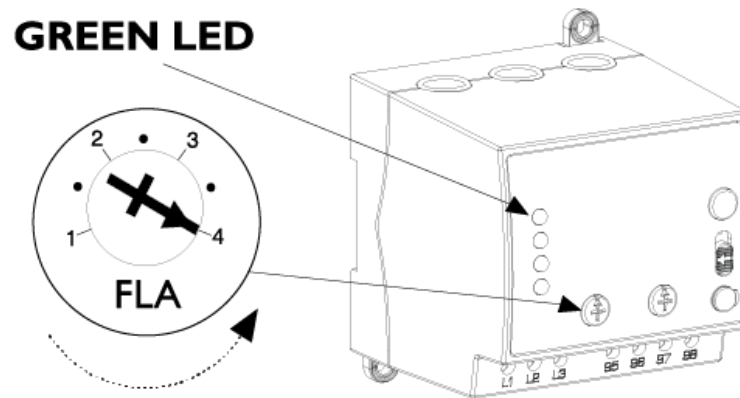


## Current Setting

e) Press the **START** push button and hold it pressed (motor starts running and reaches steady-state operation) while you execute steps **(f)** and **(g)**.



f) Slowly turn left the Current setting knob (**FLA**) until the green LED turns **ON**. At this point, the adjusted level is the actual Motor Operational Current.





## Current Setting

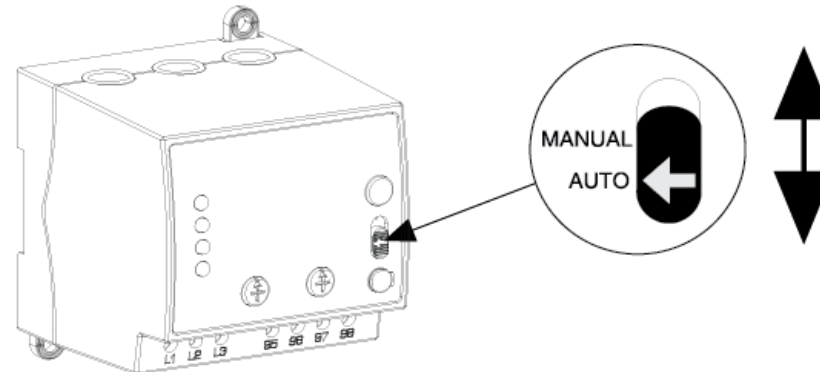
g) Slowly turn right the current setting knob (**FLA**) up to desired protection level:

- Green Led ON= In
- Red Led 1 ON= Overload 10%
- Red Led 2 ON= Overload 15%
- Red Led 3 ON= Overload 20%

MODEL NO. DI0034PCI	
HP 3	VOLTS 230/460 AMP. 7.8/3.9
F/L RPM 1760	ENCL. TEFC (IP65) FRAME NO. 182TC
INS. H	MAX. AMB. 40 °C SERVICE FACTOR 1.15
3-PHASE	TIME RATING CONT. BRG D.E 6306 VV
Hz 60	KVA CODE K NO. O.D.E 6206 VV
	EFFICIENCY 89.5% NEMA DESIGN B
LOW VOLTS	HIGH VOLTS
4 5 6	4 5 6
7 8 9	7 8 9
1 2 3	1 2 3



h) Use **AUTO/MANUAL** start mode slide-switch to select the desired motor start mode.





**WEG W22 Premium IE3 - 96.9%** MOD.TE1BFOX0\$0000301635

03FEV10 000000000

~ 3 FRAME 315L-04 IP55 INS.CL.F Δt 80K

V-Δ/Y	Hz	kW	min <sup>-1</sup>	A	COS φ
380/660	50	250	1490	451/260	0.87
400/690	50	250	1490	433/251	0.86
415/ -	50	250	1490	422/ -	0.85
440/ -	60	290	1785	447/ -	0.88
460/ -	60	290	1790	432/ -	0.87

Δ L1 L2 L3      Y L1 L2 L3

→ 6319-C3(45g)      **MOBIL POLYREX EM**  
 → 6316-C3(34g)      11000 h

DUTY S1      AMB. 40° C      SF 1.15      Alt 1000 m.a.s.l.      WEIGHT 1546 kg

11132082

**North American Electric, Inc. NEMA Premium**

**CRUSHER DUTY MOTOR**

CAT NO: PE587UZ-400-4C      FRAME 587UZ      PHASE 3

DE BRG NU324      ODE BRG 6319      CONN. 12 Lead Δ

MAX AMB. 40° C      INS. CLASS F      RATING CONT      WEIGHT 4983

LUBRICATION Mobil Polyrex EM      SER

60 HERTZ DATA	HP	400	RPM	1789	HP	400	RPM	990	50 HERTZ DATA
	VOLTS	460		VOLTS		380			
F.L. AMPS	434.9		F.L. AMPS		526.5				
S.F. AMPS	500.1		S.F. AMPS		526.5				
S.F. 1.15 DESIGN C CODE G			S.F. 1.0 DESIGN C CODE H						
NEMA NOM.EFF.	96.2 %	NOM. P.F.	0.887	NEMA NOM.EFF.	95.1 %	NOM. P.F.	0.887		
NEMA MIN.EFF.	95.4 %	MAX. KVAR	45.3	NEMA MIN.EFF.	94.4 %	MAX. KVAR	48.2		

CONNECTION DIAGRAMS

Across The Line

PWS Start

PWS Run

Designed specifically for use on crushing and pulverizing equipment and other equipment requiring extremely high starting torques and



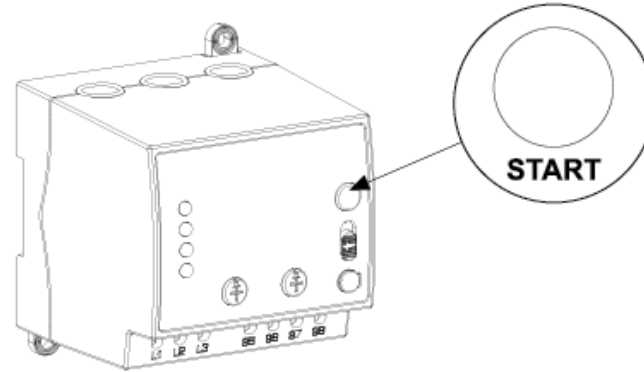
## ECA100-11 Setting

**NOTICE:** In case the **AUTO/MANUAL** start mode slide - switch is set on **MANUAL** and the **ECA100-II** relay trips due to any fault detection, you shall press **START** push button to re-activate the Contactor or Line Starter Circuit.

Although the **AUTO/MANUAL** start mode slide - switch is set on **AUTO**, pressing **START** push button is required if three (3) current failures have appeared in less than 30 minutes and qualified technicians have detected and solved causes of failures.

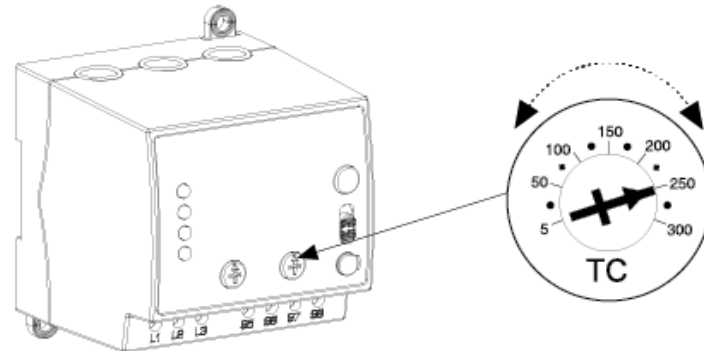


e.



i) Using a flat screwdriver, turn the **TC** setting knob until you set the start delay desired (TC is the time between Voltage fault recovery and restart the system according to application needs).

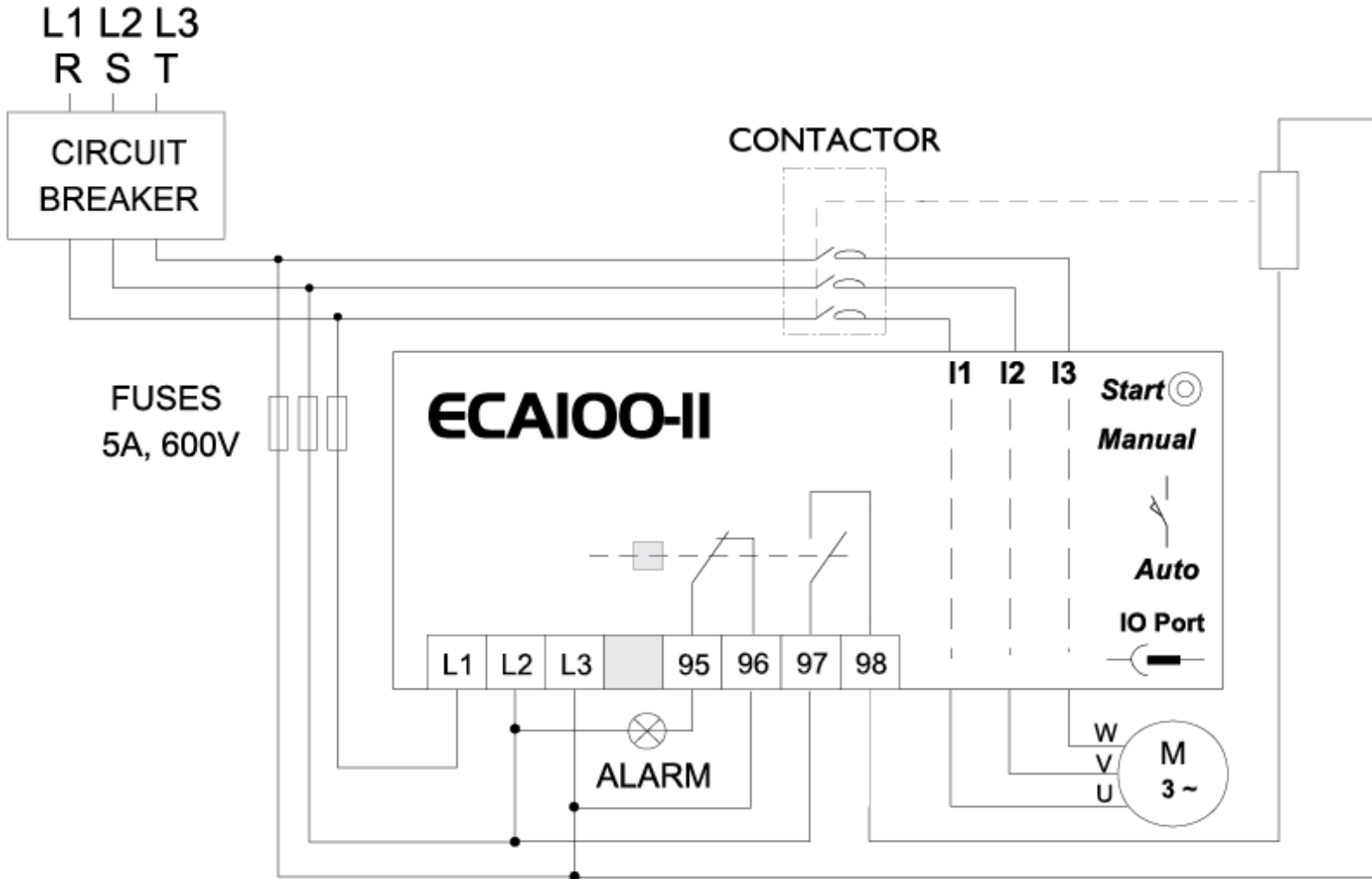
ts





# ECA100-11

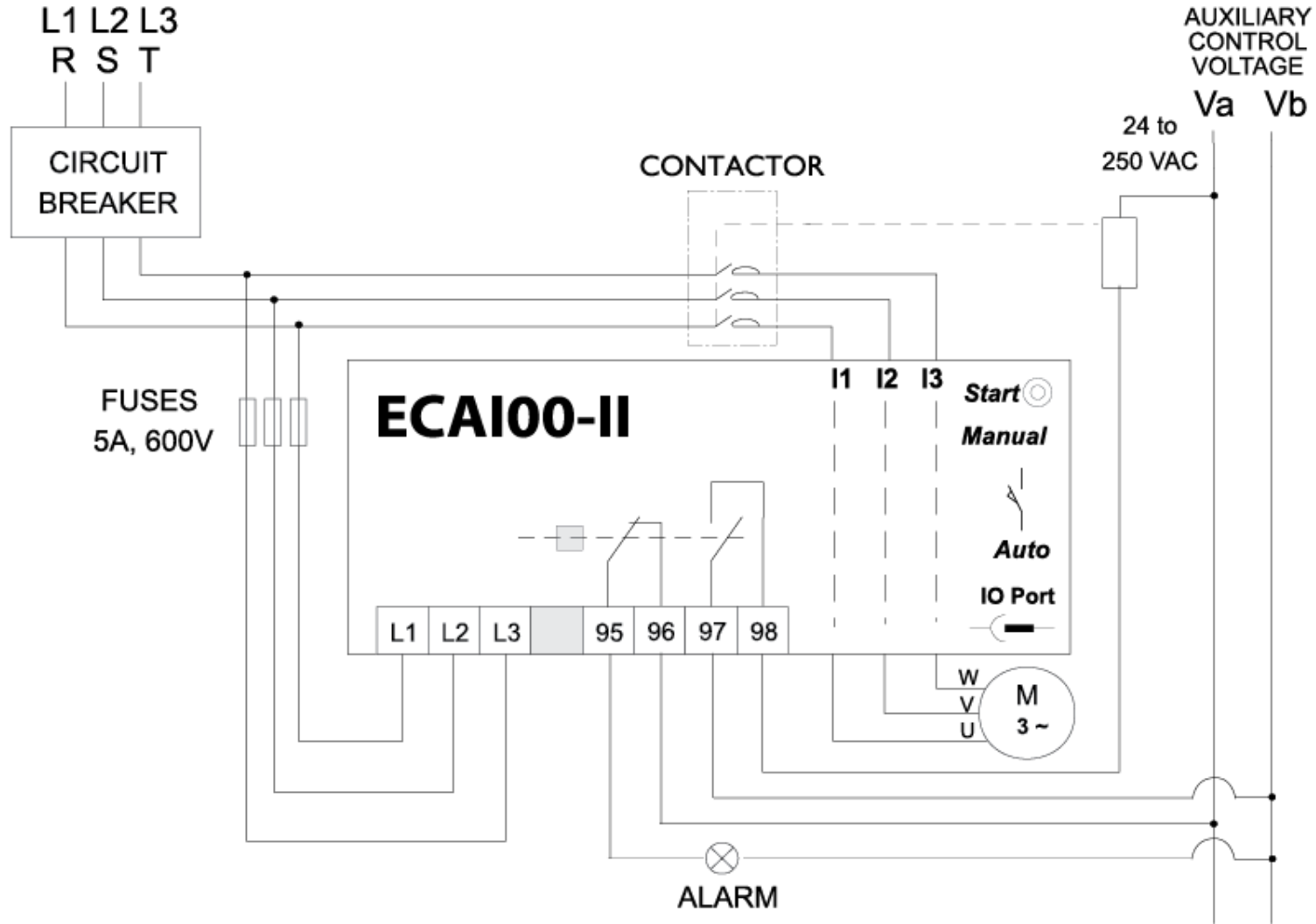
## Wiring diagram





# ECA100-11 Wiring diagram

## 440/480 VAC





## A) Power Supply Circuit

a.1	Rated Voltage, $U_e$	208/220	440/480	VAC
a.2	Voltage Operation Limits, $U_e$	124 → 300	264 → 672	VAC
a.3	Average Consumption, $I_n$	38 mA		
a.4	Frequency Operation Limits, $F_N$	42 → 70Hz		50/60 Hz
a.5	Rated Duty	Uninterrupted Duty		





## B) Application Data, Environmental Conditions, Operation Limits and Installing

b.1	Designed according to European Standards	IEC61010-1, IEC60255-6 IEC60947-1	LVD & EMC
b.2	UL Listing	Aux. Device NKCR Certified for USA Aux. Device NKCR7 Certified for Canada	<b>E527483</b>
b.3	CE Marking	CE, Low Voltage Devices	IEC60947-1
b.4	Ambient Air Temperature (Operation)	-5 °C to 55 °C (23 °F to 131 °F)	
b.5	Ambient Air Temperature (Storage)	-10 °C to + 70 °C (14 °F to 158 °F)	
b.6	Maximun Relative Humidity	85% R.H.	
b.7	Vibrations	Class 1, Amplitude <0.035mm or 1G 10Hz < f < 150Hz	IEC 60255-21-1
b.8	Degree of Protection	IP20, Protected against objects > 12.5mm	IEC 60529
b.9	Pollution Degree	Degree 3	IEC 60255-5
b.10	Overvoltage Category	Category III	IEC 60255-5
b.11	Rated Insulation Voltage	500V	According to UL
b.12	Impulse Voltage Test	5 KV	IEC 60255-5
b.13	Dielectric Voltage-Withstand Test	2.5 KV 50/60 Hz@1min	UL 508
b.14	Flammability Rating of Enclosure	V0	UL-94
b.15	Enclosure Material	Polymers: PC, ABS, NYLON	
b.16	Mounting Position	Any Position	
b.17	Mounting Features	Symmetrical DIN Rail	IEC 715 DIN 43880
		Flat surface mounting,screw 3/16"x1/2"	NEMA Style
b.18	Terminals Screw Type	Flat M3	
	Tightening Screw Torque	5.1 Kgf-cm / 4.4 lb-in	
	Terminals Wiring	>10 AWG (4mm <sup>2</sup> )<18 AWG	
b.19	Current Sensing Holes for Motor Wiring	$\phi \leq 11\text{mm}$ , AWG 4	
b.20	Dimensions	92 x 91 x 96 (L x W x H)	mm
b.21	Weight	398 (0.87)	g/lb



ECA100-11

### C) Control Characteristics

c.1	Auxiliary Relay Contact Rating	B300 Pilot Duty	UL 508 Section 139.1
c.2	Electrical Life Expectancy	100.000 Operations	
c.3	Mechanical Life Expectancy	10.000.000 Operations	
c.4	Utilization Category	AC-15, Capacity for loads > 72 VA	IEC60947-5-1

### D) Range Setting, Measuring

	(According to Voltage Model)	208	480	VAC	
d.1	Voltage Measurement Range, Um	145-285	300-625	VAC	
	(According to Current Model)	3.5 -12.5	10 - 32	25-80	A
	Current measurement range, In	0.7 - 125	2.0 - 320	4.0 - 800	
d.2	Frequency Measurement (Parameter available only through IO Port)	Accuracy $\pm$ 2%			Hz





## E) Algorithms and Protection Functions

	(According to Voltage Model)	208	480	VAC	
e.1	Undervoltage (UV) @ Imotor=0 or OL	187	396	VAC	
e.2	Overvoltage (OV) @ Imotor=0 or OL	254	528	VAC	
e.3	Voltage Hysteresis Threshold	6	12	VAC	
e.4	Current Adjust (FLA) by Model	3.5 → 12.5	10 → 32	25 → 80	A (Level settings)
e.5	Voltage Unbalance Detection (VUB)	IN + /-8%, OUT + /-6%			
e.6	Single Phasing (VSP)	INV VUB > 33%, OUT VUB < 28%			
e.7	Phase Reversal (PR)	Normal Sequence ABC, reversal sequence CBA			
e.8	Current Unbalance (CUB)	CUB > 48%			
e.9	Current Single Phasing (CSP)	CUB > 60%			
e.10	Thermal Class	Cold Curve: 10, Hot Curve: 3 According to the previous level of load and time of operation		IEC 60255-8-1990	
e.11	Trip Delay because of Overload (OL)	According to Overload Level (Inverse Time Current)		IEC 60255-8-1990	
e.12	Permanent disconnection because of Third Current Failure	3 Current Failures in less than 30 min		IEEE Std. C37.112-1996	
e.13	Trip Delay because of Phase Reversal	< 1 sec			
e.14	Trip Delay because of Other Voltage Failures	3 sec			
e.15	Start Up Delay because of Cooling (Thermal Model)	480 sec			
e.16	Start Up Delay (TC)	5 → 300 sec		Level settings	
e.17	Start Mode	Auto/Manual		Switch selection	

ECA100-11



## G) Immunity and Emissions, Electromagnetic Compatibility (EMC) for Heavy Industrial Environment

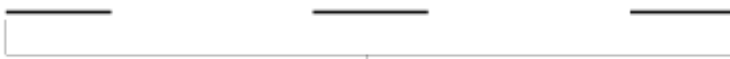
### ECA100-11

g.1	Electrostatic Discharge	IEC 61000-4-2
g.2	Immunity to Ratio Frequency Test	IEC 61000-4-3
g.3	Electrical Fast Transients	IEC 61000-4-4
g.4	Surge Immunity Test	IEC 61000-4-5
g.5	Ratio-Frequency Continuous Conducted	IEC 61000-4-6
g.6	Power Frequency Magnetic Field	IEC 61000-4-8
g.7	Voltage Dips, Short Interruptions and Voltage Variations	IEC 61000-4-11
g.8	Harmonics and Interharmonics Immunity Tests	IEC 61000-4-13
g.9	Voltage Fluctuation Immunity	IEC 61000-4-14
g.10	Unbalance Immunity Test	IEC 61000-4-27
g.11	Variation of Power Frequency	IEC 61000-4-28



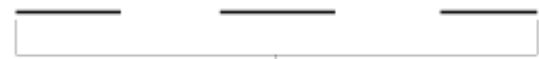


# ECA100-II



**VOLTAGE**

208 – 208/220 VAC  
480 – 440/480 VAC



**AMPERAGE**

012 – 3.5-12.5 A\*  
032 – 10-32 A  
080 – 25-80 A

\* Available only for 208 VAC model



Questions?





# ECA500-11



ECA500-11 is an electronic Total Motor Protection Relay that constantly supervises the motor current and the main electrical parameters such as voltage, power factor, real power, reactive power and energy consumption, giving the most reliable protection against overload, phase failure, phase reversal, single phasing and unbalanced conditions.





# ECA500-11

## FEATURES

- **Measurement of:**
  - Current.
  - Voltage.
  - Frequency.
  - PF, KVA, KWH and KW.
  - Temperature.
- **Adjustments of:**
  - Overload.
  - Undercurrent.
  - Overvoltage.
  - Undervoltage.
  - Current Unbalance.
  - Voltage Unbalance.
  - Frequency.
  - Trip Delay.
  - Start Up Delay after Voltage Fault Recovery.
  - Motor Thermal Class.
  - Clock Adjustment.
  - Control of Motor High-Inertia Load.
  - Schedule Timer (weekly & holidays).
  - AUTO / MANUAL Restart Mode.
  - Password.





# ECA500-11

- **Communications:**
- IO Port. or RS485@9600 baud outputs available ( MODBUS RTU protocol )(\*).
- Digital Output Status.
- Remote On/Off.
  
- **Reports:**
- Voltage & Current report.
- PF, KVA, KWH, KW and Frequency report.
- Adjustment Values report.
- Total Motor Running Time report.
- Start Mode report.
- 20 Last Fault report.
- Power Frequency report.
- Motor Temperature report.





# ECA500-11

- **Protection against:**
- Overload / Undercurrent.
- Overvoltage / Undervoltage.
- Frequency Shift.
- Voltage Unbalance.
- Current Unbalance.
- Single Phasing.
- Phase Reversal.
- Locked Rotor.





- **Physical features:**
  - Din-Rail, Flat Surface.
  - 16x2 backlight **LCD Display** with current values, voltage values and load report information on screen.
  - Four (4) push buttons for operation and protection parameter adjustments ( 1 for START, 2 for ADJUST and 1 for SELECT ).
  - Enclosure material UL94V0.
  - Two (2) relay SPDT outputs (3A@240 VAC / 1.5A@480 VAC).
  - Two (2) Digital Inputs.
  - One (1) Analog Temperature Input ( for PTC100 Sensor ).
  - Internal CT's available.
  - External CT's connections available.
- **Others:**
  - Thermal memory.



<b>VOLTAGE FAILURES</b>	Overload/Underload	✓
	Current Unbalance	✓
	3 Successive Failures	✓
	<b>Accelerated Locked Rotor</b>	✓

<b>VOLTAGE FAULTS</b>	Over/Low Voltage	✓
	Frequency Variation	✓
	Unbalance	✓
	Phase Loss/Phase Reversal	✓

<b>ADVANTAGES</b>	Digital Interface + History (20 Faults)	✓
	Port GIO	✓
	3 ways of mounting	✓
	Schedule Control (60 Events)	✓
	<b>Multivoltage</b> + Adjustable Thermal Class	✓
	<b>Increased Measurement Capability</b>	✓
<b>PT100 Temperature Compensation</b>	✓	
<b>Auxiliary I/O + RS485 Port</b>	✓	

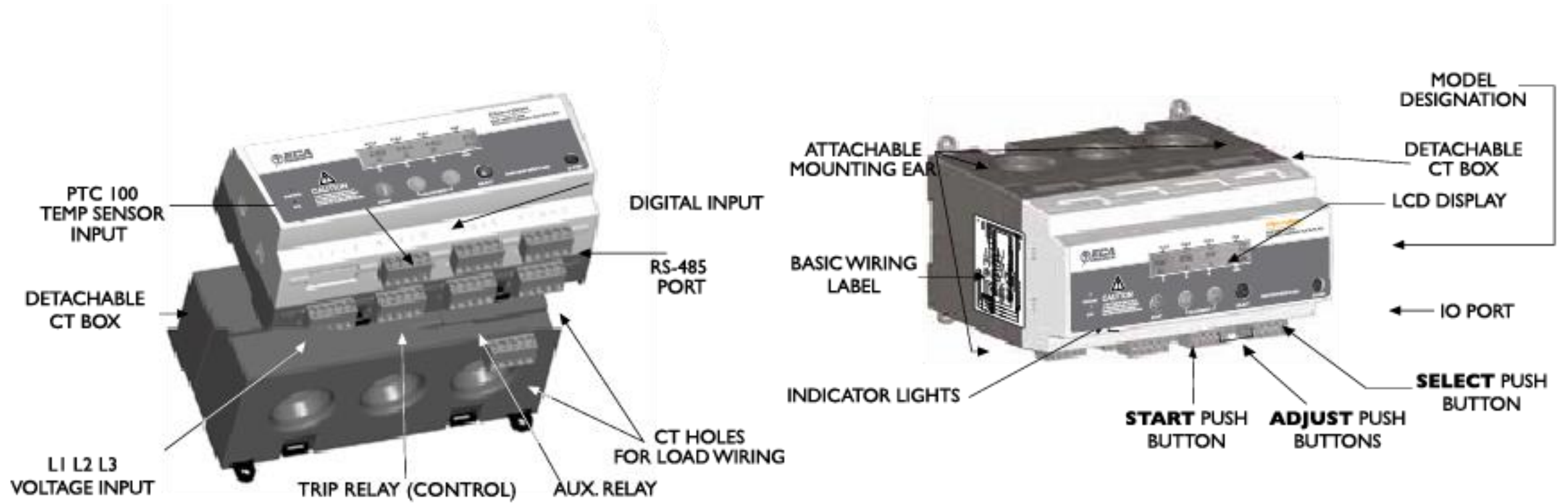


## ECA500-11



Model	Voltage	Amperage Range
ECA500-11-208050	208/220 VAC	15 - 50 A
ECA500-11-208100	208/220 VAC	30 - 100 A
ECA500-11-208180	208/220 VAC	55 - 180 A
ECA500-11-208000	208/220 VAC	CT – External 150-660A
ECA500-11-480100	440/480 VAC	30 - 100 A
ECA500-11-480180	440/480 VAC	55 - 180 A
ECA500-11-480000	440/480 VAC	CT – External 150-660A

# ECA500-11





# ECA500-11

## Overload (OL)

I motor > FLA setting

### Thermal protection algorithm

➤ Motor operating in normal condition:

Thermal class is dynamically adjusted.

➤ Motor operating: I motor > FLA

Thermal protection is activated and when heat is 100% it will disconnect the motor.



## OL Cool down

V12	V23	V31	VUB
220	218	222	0%
Heat		50.4%	
I1	I2	I3	CUB

## OL Fault Historical Register

Failure Number	Failure Date	Failure Time
1	31/05	3:27
	0' OL	190A
	I1	I2
	I3	CUB

Failure Duration: OL  
Failure Indication: OL  
Failure Value: 190A





## ECA500-11

Selection of the Thermal class of the motor:  
Class 5 Smaller motors with fast acceleration requiring extremely fast tripping in the event of overload.

Class 10 (Fast) Motors used in compressor, refrigeration equipment, submersible pumps and motors of general purpose usually classified under IEC standard that reach continual operation in less than 4 seconds.

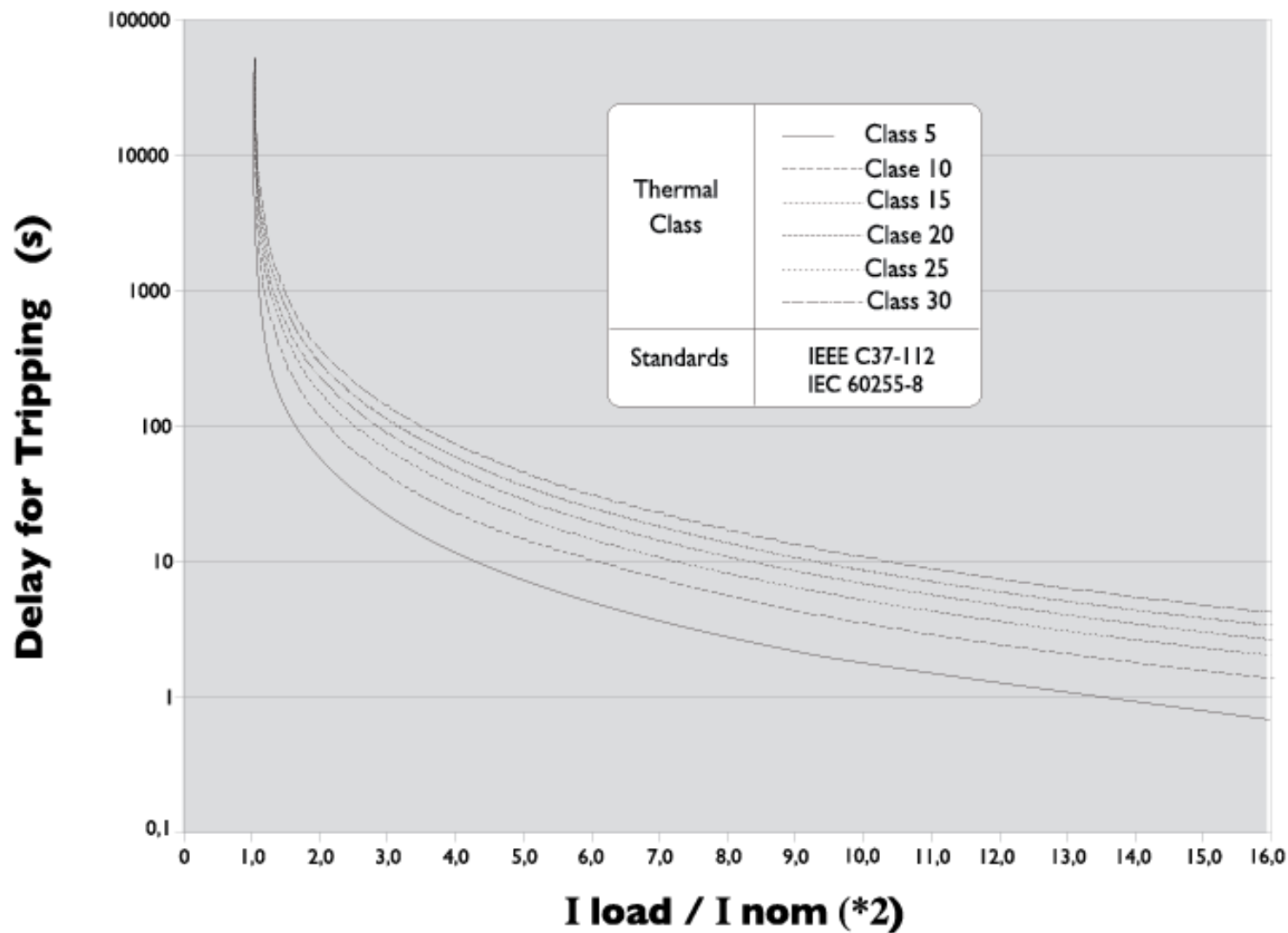
Class 15 Motors for specialized applications.

Class 20 (standard) Motors of general purpose qualified under NEMA standard.

Class 30 (slow) Industrial motors for high inertia loads with tripping time that exceeds 10 seconds.



## Tripping Cold Curve (\*1)



**(\*1) Hot Curve = Cold Curve / 3**

**(\*2) I nom = Current value on ECA500-11 adjusted previously by the user**



# ECA500-11

## Underload (UL)

- **Underload by current (%In)**

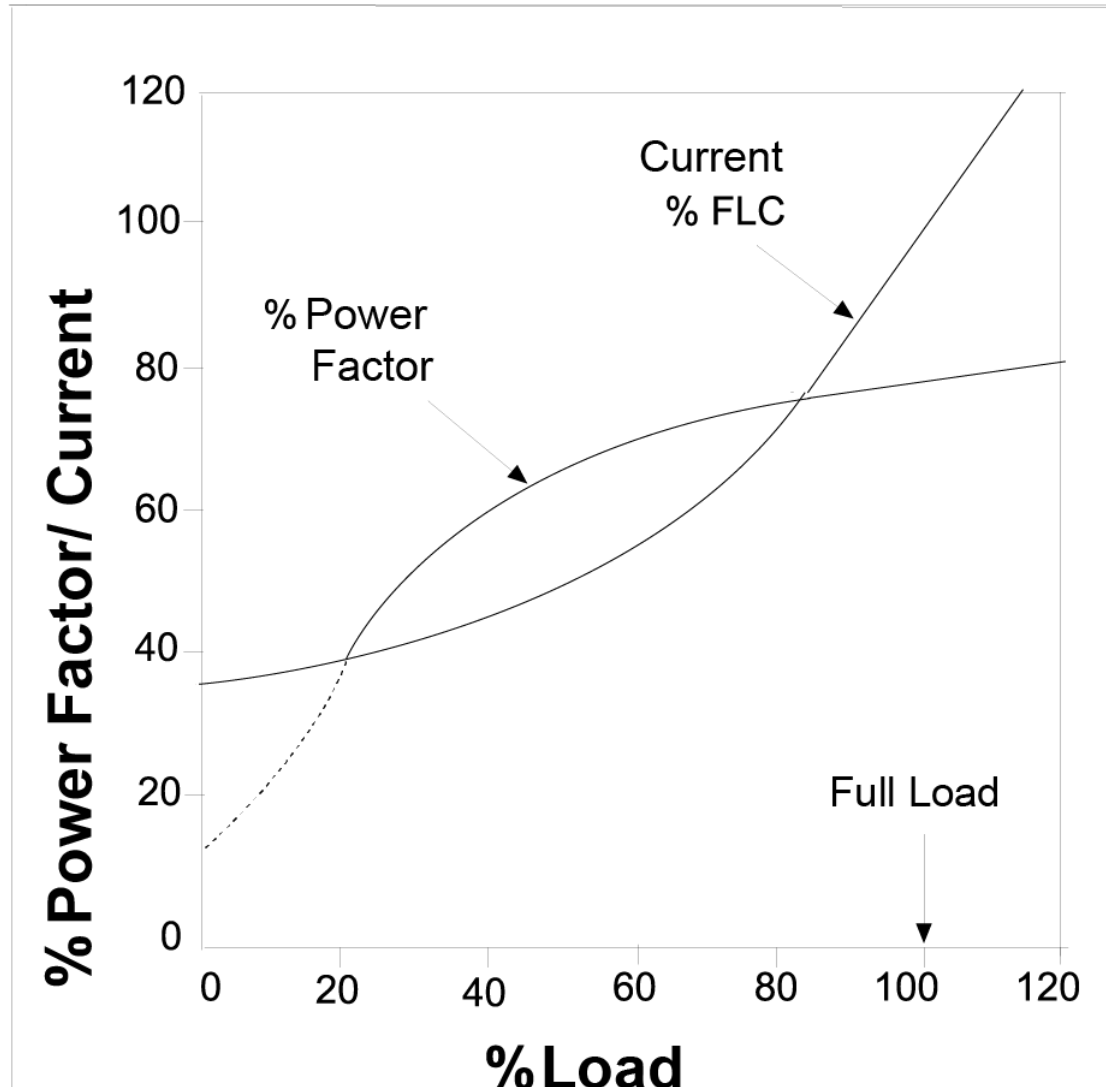
The recommended threshold value to protect from an underload fault condition through current monitoring is 80% of the maximum rated load current (FLA) specified by the manufacturer.

- **Underload by Power Factor (PF)**

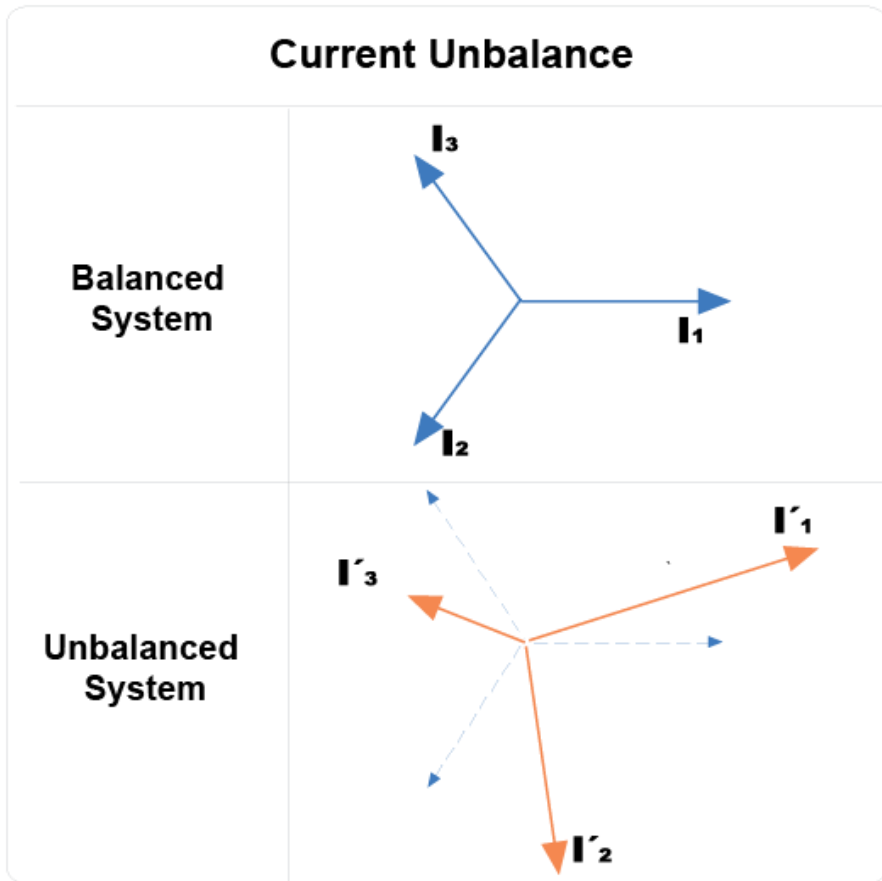
Indicator applicable to motors that are oversized contributing to loss in efficiencies or running at low load or without load (dry running).



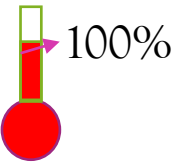
## Underload



# Current Unbalance (CUB)



- Condition:  $CUB > 48\%$
- Disconnecting time: 3 sec
- Accumulated heat: 100% immediately

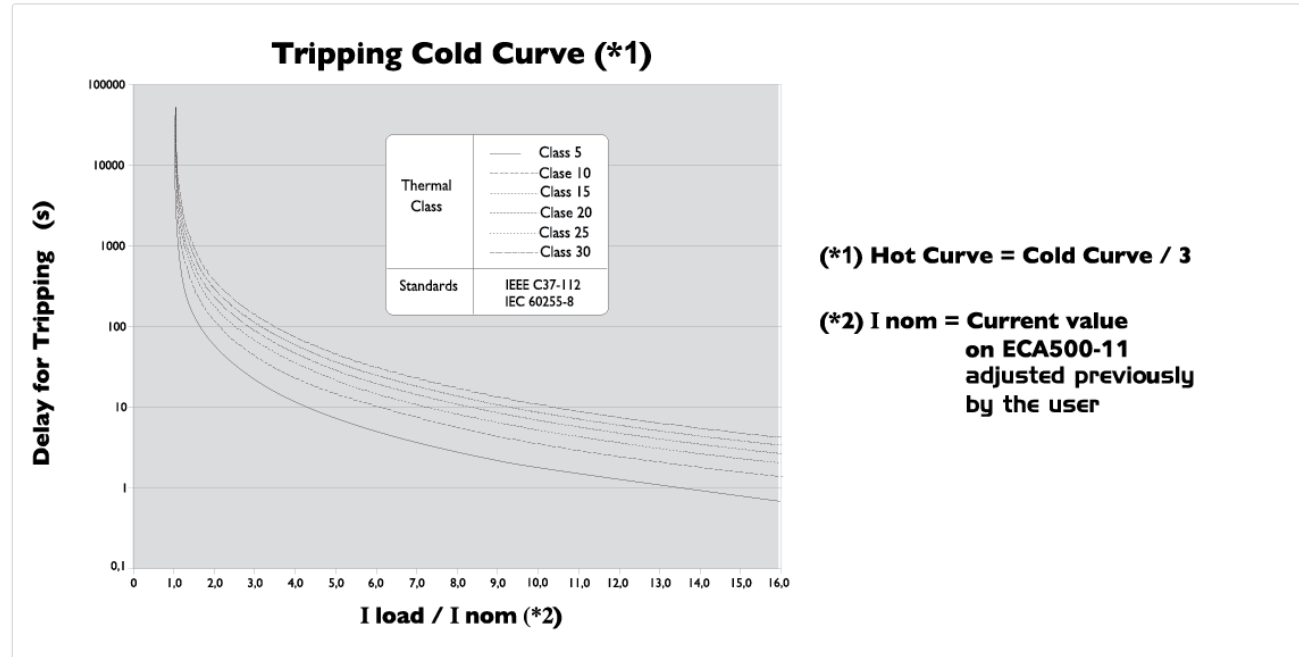




# Accelerate Locked Rotor Detection

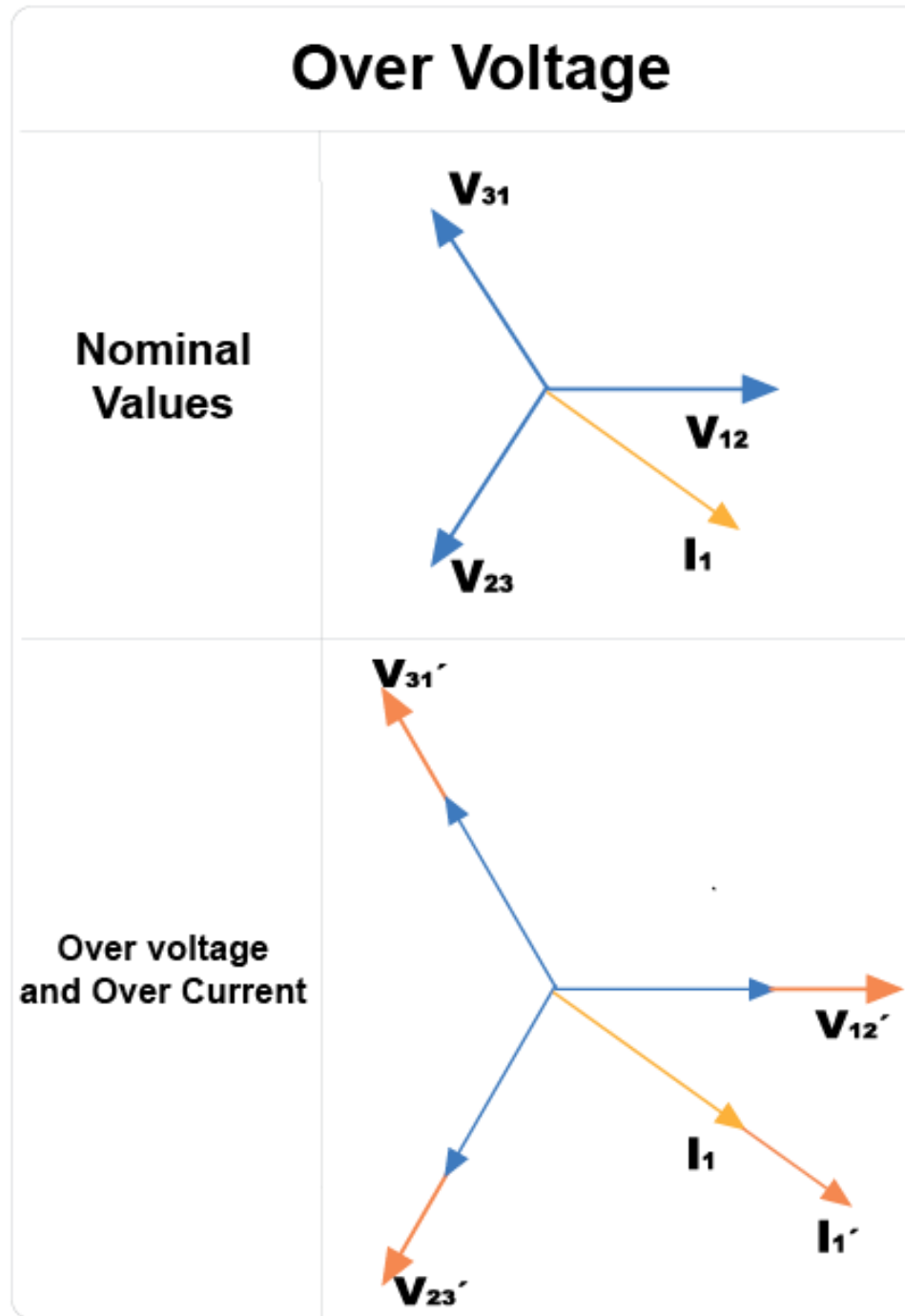


# High Inertia Load option



## Overvoltage

- With motor stopped
- With the motor running:
  - With Overcurrent
  - Without Overcurrent





## Undervoltage (UV)

- With motor stopped
- With the motor running:
  - With Overcurrent
  - Without Overcurrent



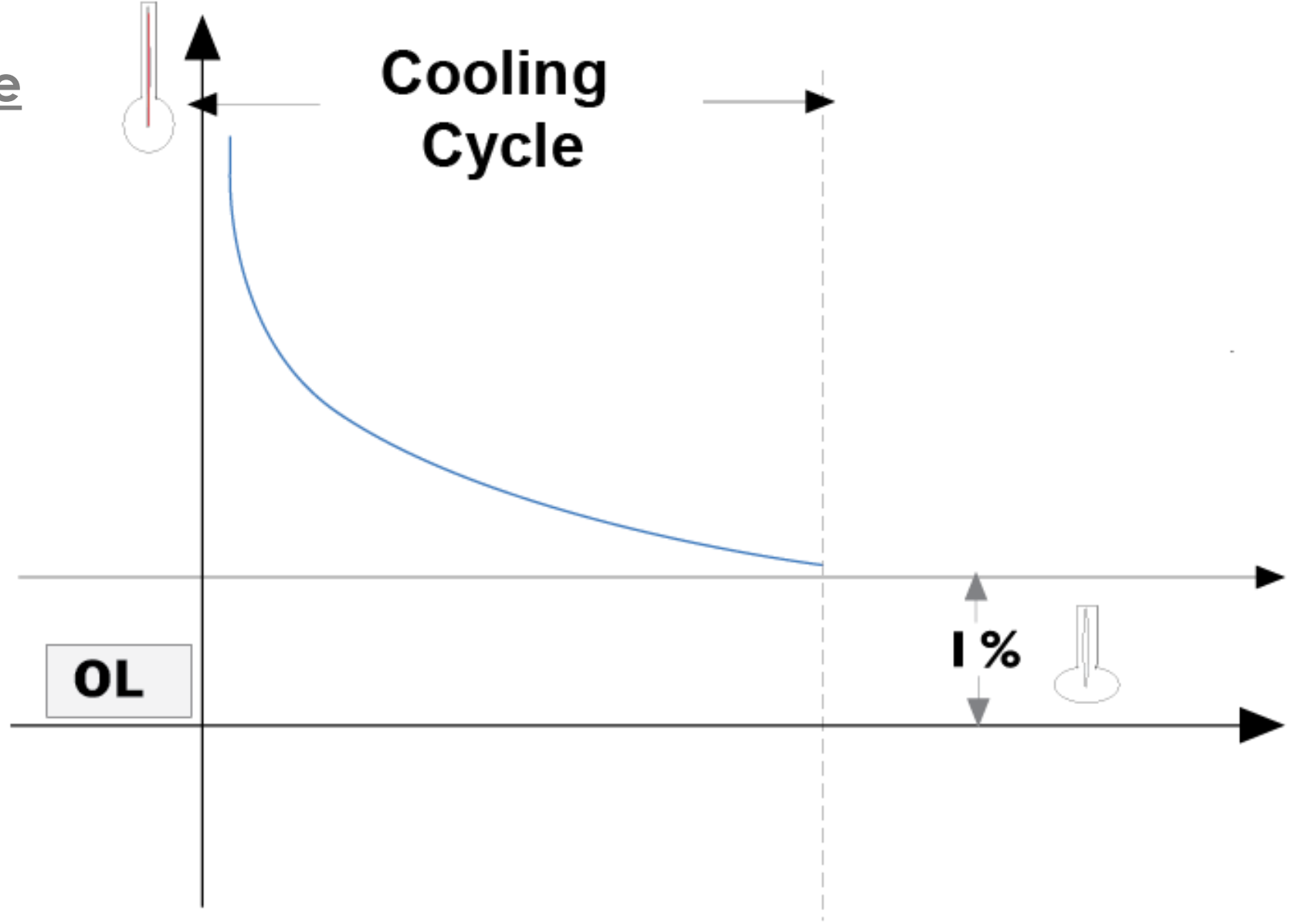


**100%**

Overload Cooling time



**Cooling  
Cycle**



**OL**

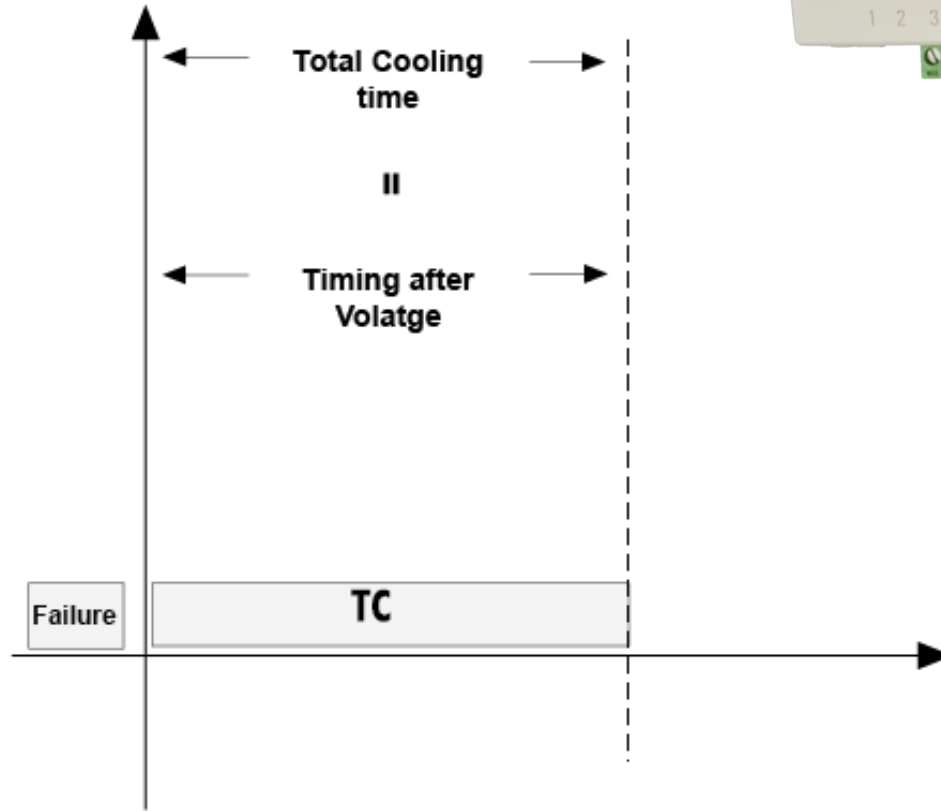
**1%**



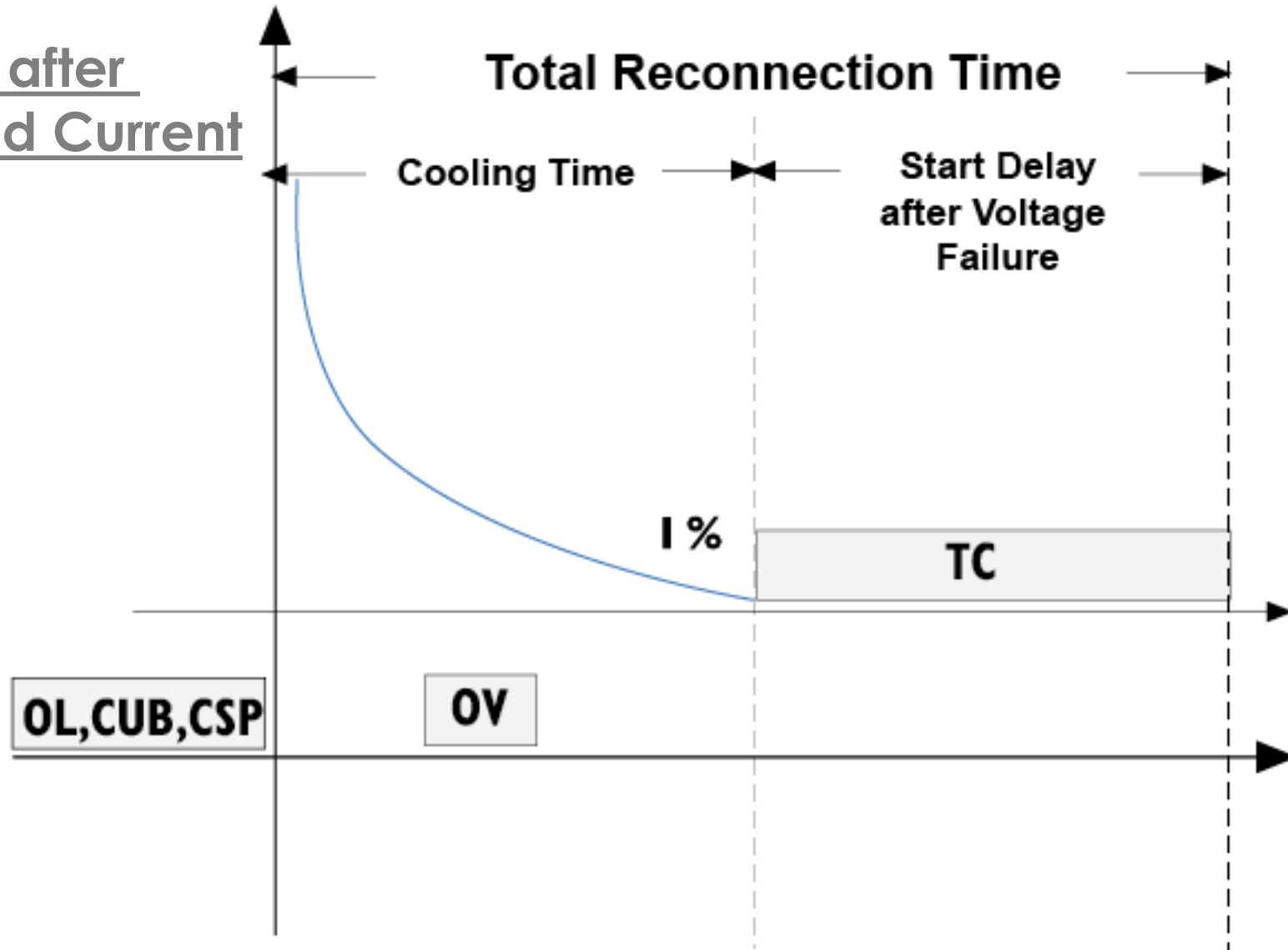


# Start Delay after Voltage Failure

## Start Delay (TC)

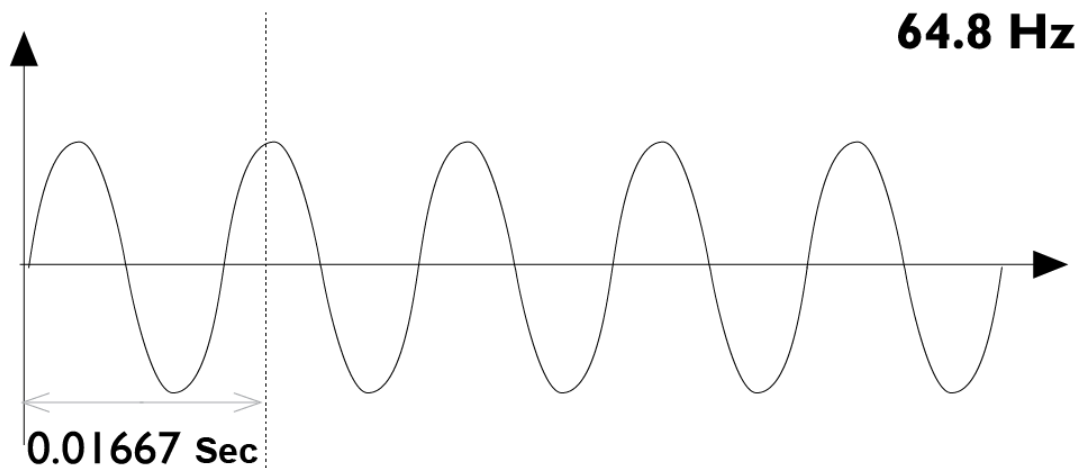
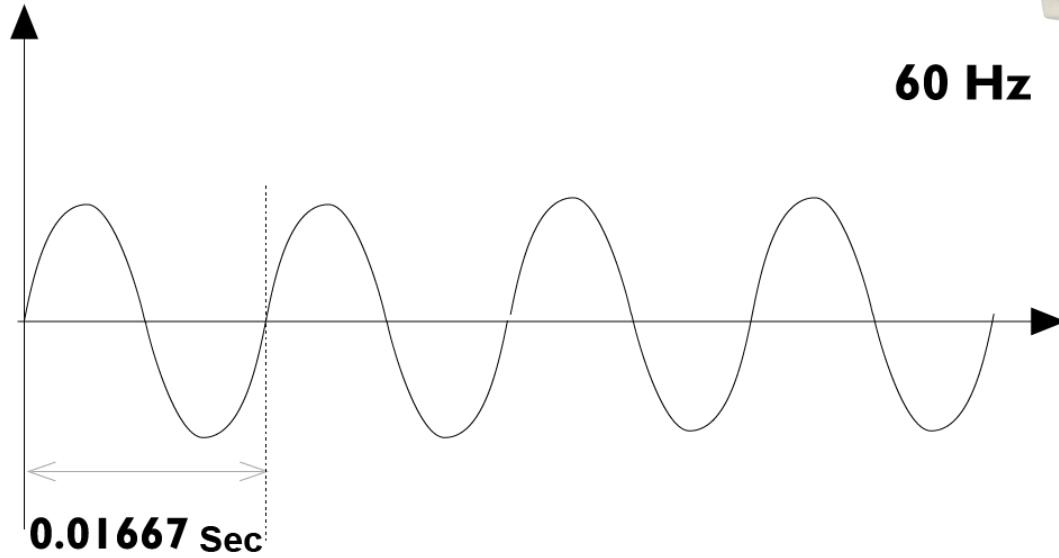


Start Delay after Voltage and Current Failure





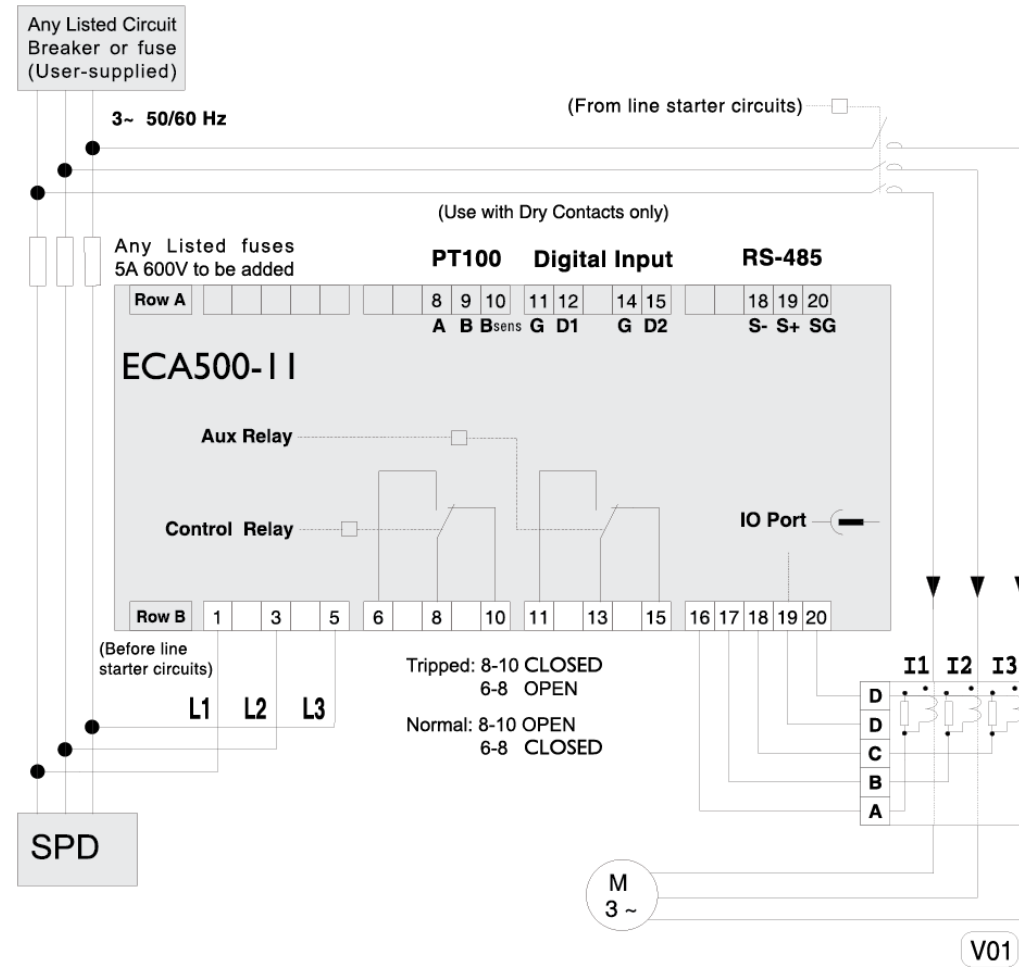
# Frequency Shift (FS)





# Wiring Diagram

## ECA500-11



### REQUIREMENTS FOR SURGE PROTECTIVE DEVICE, (user-supplied)

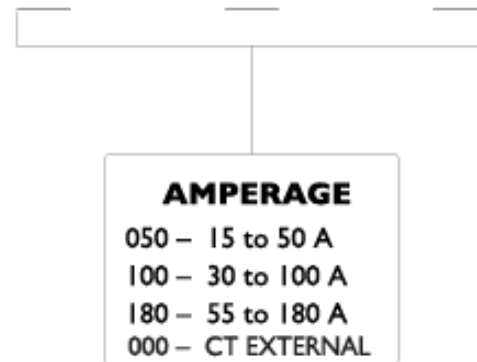
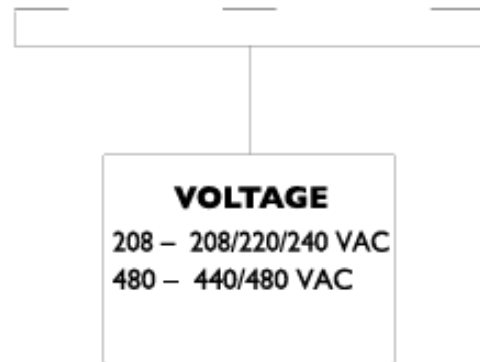
#### Recognized SPD Type 2

ng configuration  
 Power Frequency:  
 age Protection Rating (VPR):  
 minimal Discharge Current (In)  
 . Continuous Voltage (MCOV)  
 t-circuit current rating (SCCR)

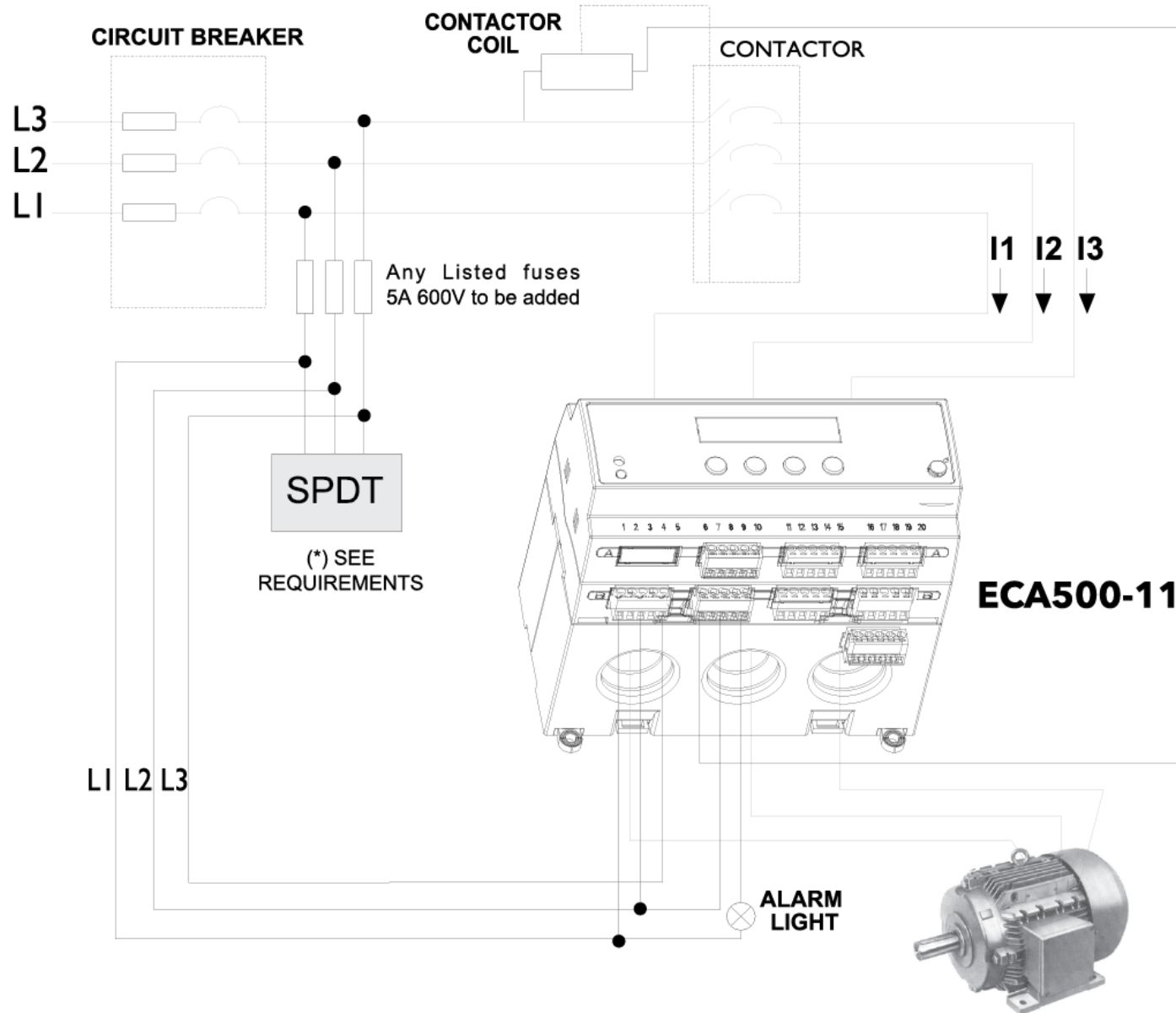
3-phase (DELTA or WYE or arrangement of 3 x 1-Ph)  
 50 or 60 Hz.  
 $\leq 1800 V$   
 $\geq 10 kA$   
 Any value between 1.1 and 1.4  $U_e$ , where  $U_e$  is  
 the nominal voltage of the installation  
 10 kA min



# ECA500-11



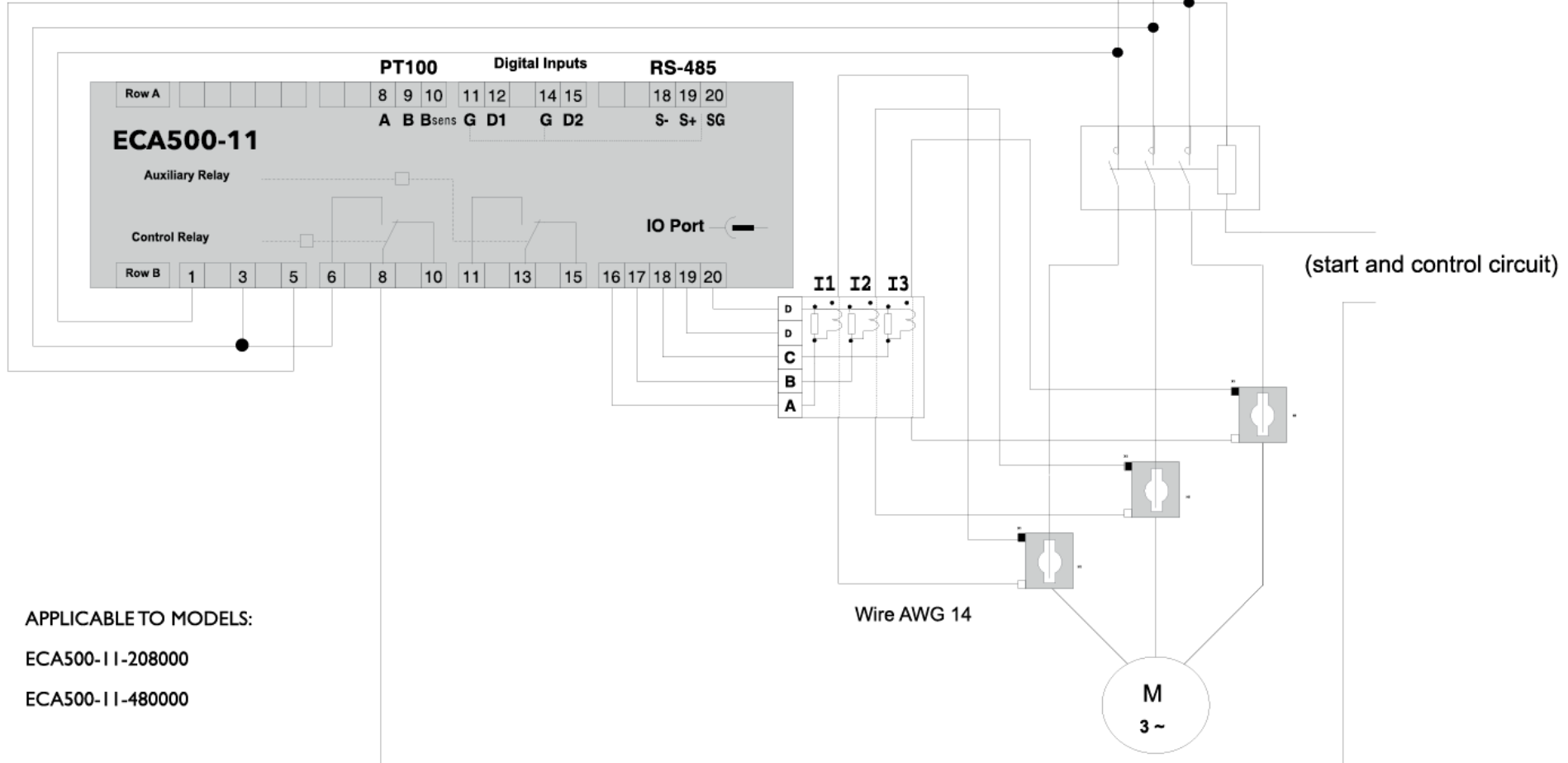
# ECA500-11





# ECA500-11

(Contactor handle from start and control circuit)



APPLICABLE TO MODELS:

ECA500-11-208000

ECA500-11-480000





## NOTES:

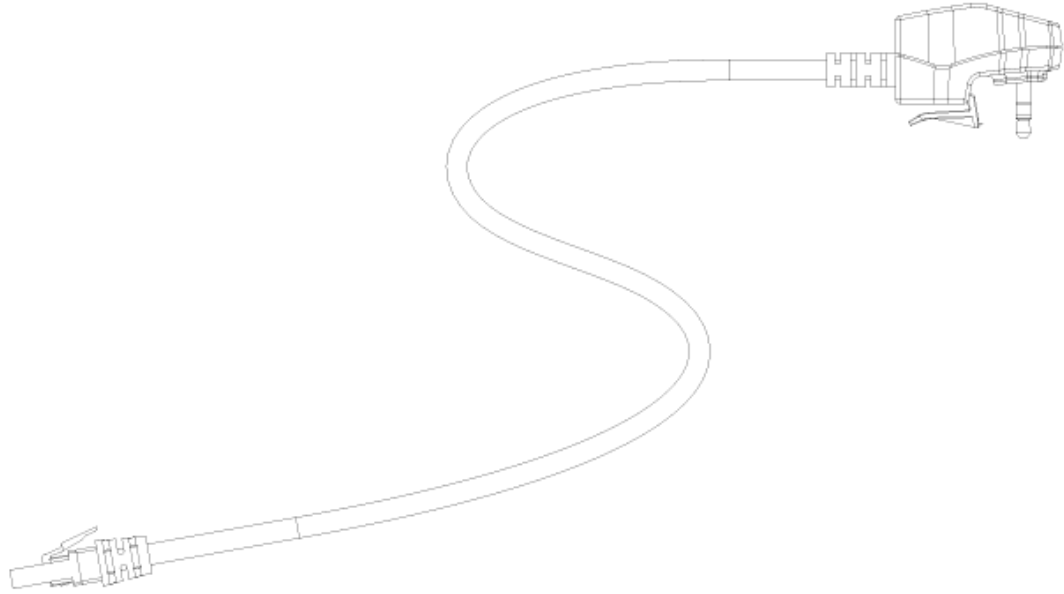
- The models identified as ECA500-11-480000 and ECA500-11-208000 are used exclusively with external CT. These models are to protect motors up to 660A nominal current.
- The user must specify the nominal motor current. With this information, the user will select the nominal current range from the table and find the corresponding "/5" relation required in selecting the CT for installation.
- The user must set up the **ECA500-11** with external CT using the instructions of adjustments contained in this application note. (All the others functions and protections will remain as specified in the installation's instruction **ECA500-11**).
- The calibration of the **ECA500-11** will remain under warranty, as long as the external CT are of commercial grade and rated Class I, secondary 5A.

## RECOMMENDED EXTERNAL CT RATIO ACCORDING TO NOMINAL CURRENT

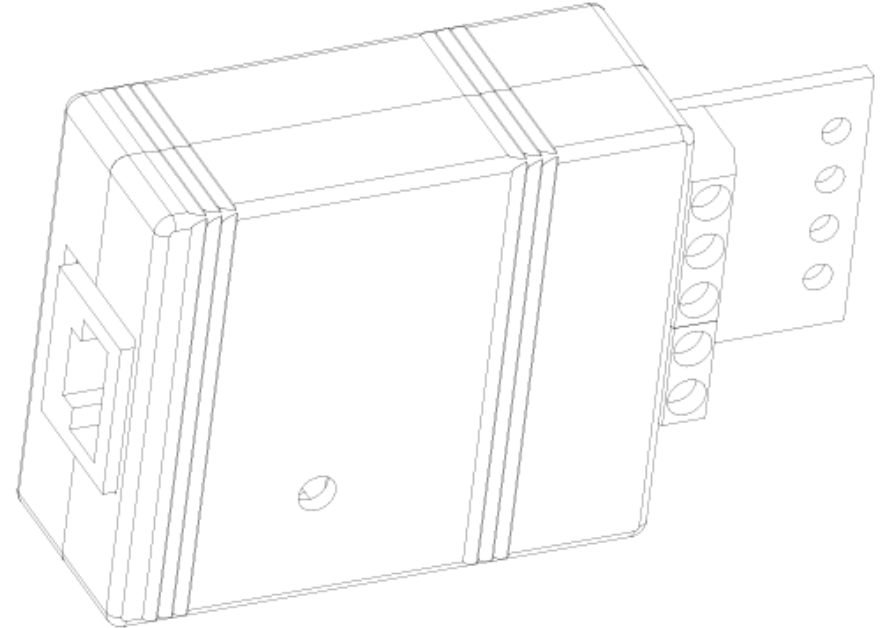
Range of nominal current		Current transformers
Min.	Max.	Relation /5
150	200	600
190	250	750
200	260	800
250	330	1000
300	400	1200
375	500	1500
500	660	2000

Example: if a motor consume a nominal current of 350 amperes, the external toroids to select will be a value of 1200/5.

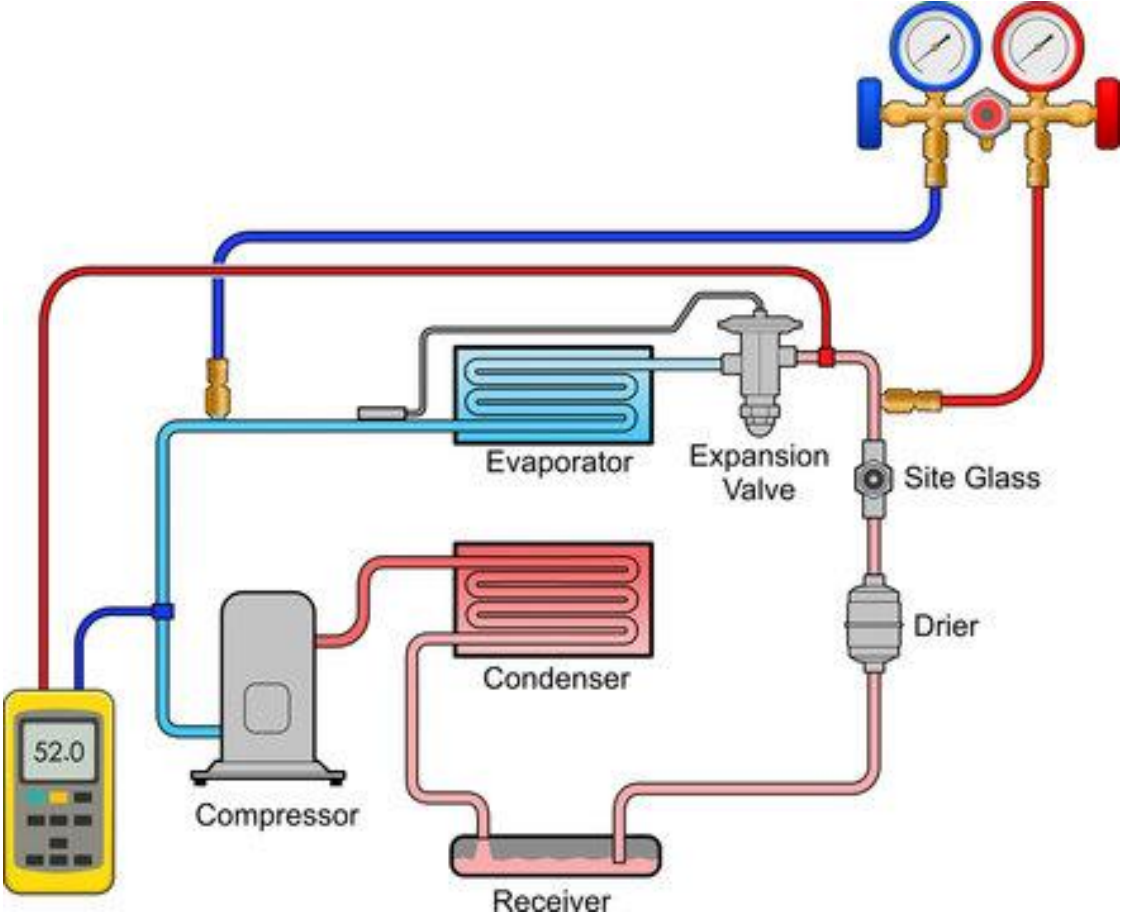
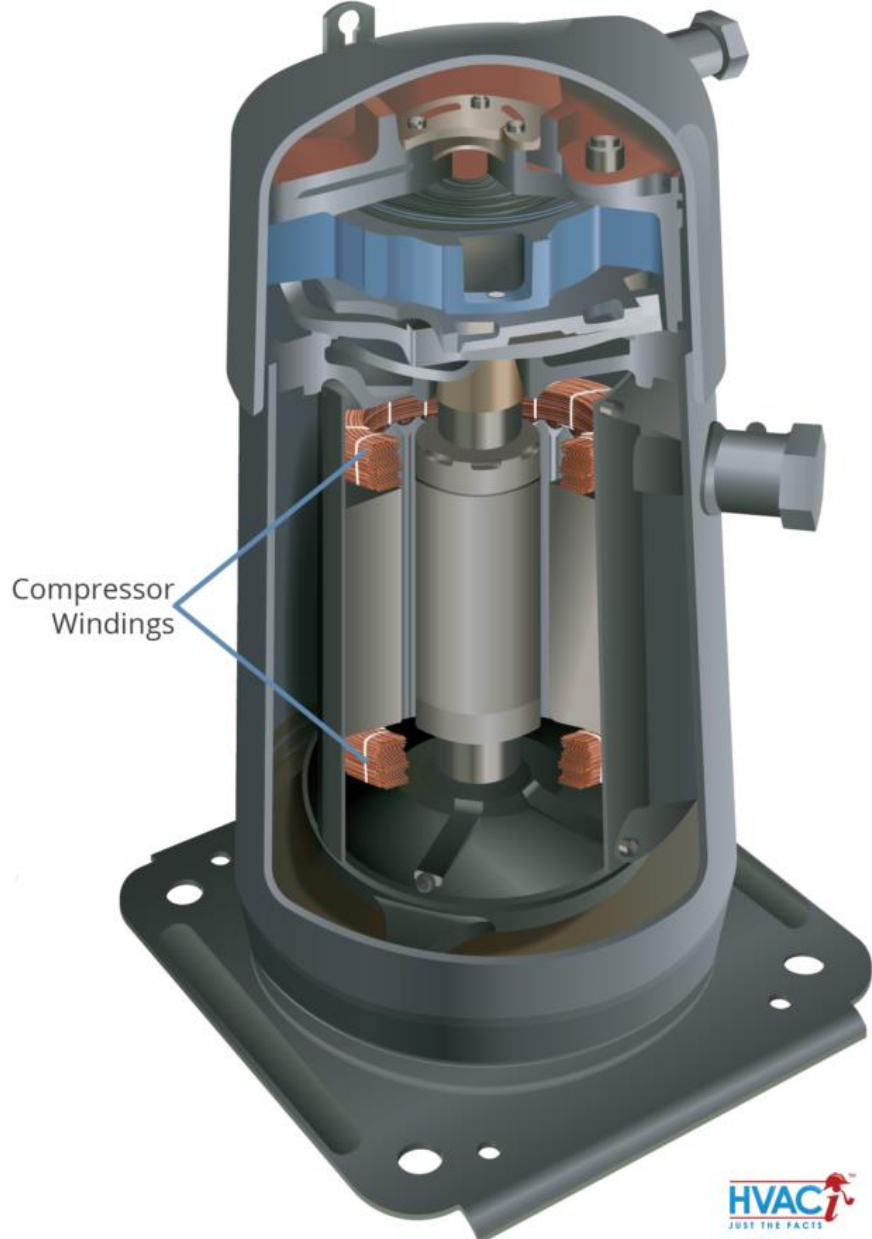
IO-PLUG-RJ45



IO-A-RS485



# Scroll Compressor







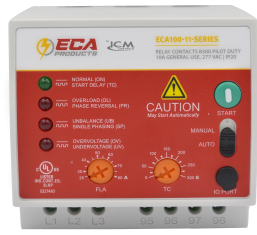
4/16/2024



Sample Footer Text



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CONTROL  
COMMUNICATION PORT

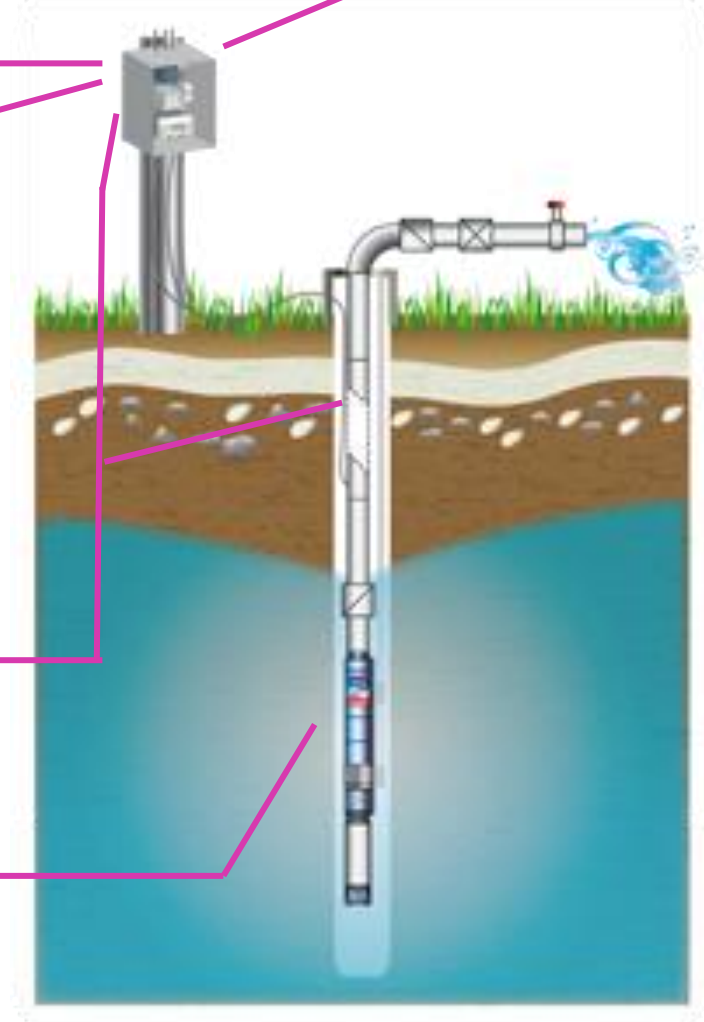
POWER SUPPLY FAILURES

PROTECTION  
HIGH AND LOW  
VOLTAGE  
PHASE LOSS  
PHASE REVERSAL  
VOLTAGE  
UNBALANCE

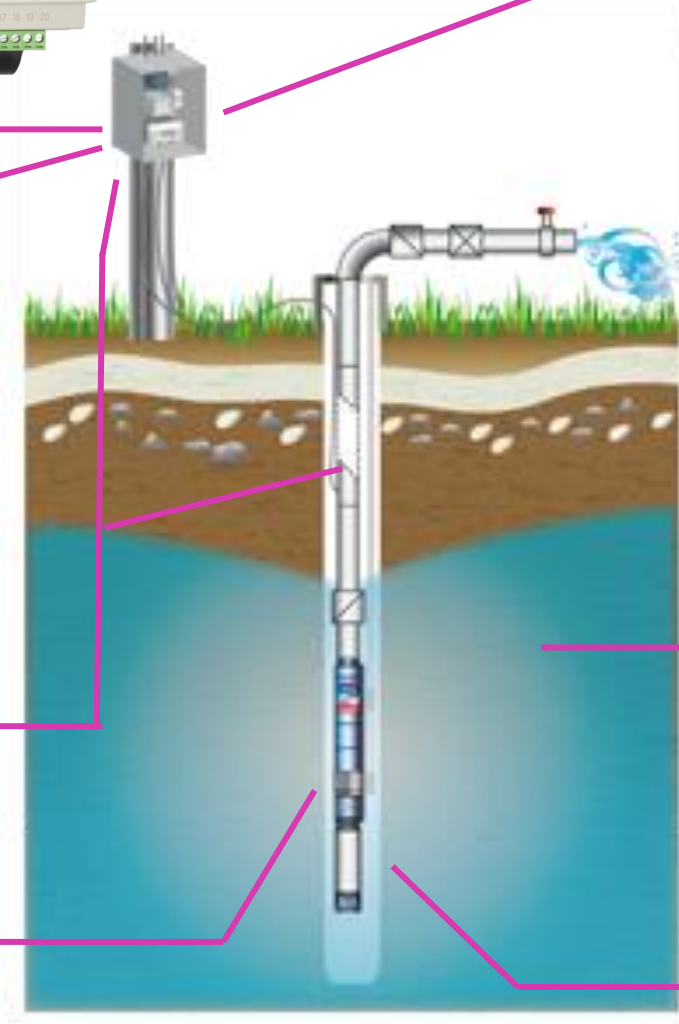
CURRENT UNBALANCE AND  
LOST PHASE  
DEFECTIVE CONNECTION  
CONTACTOR AND  
WIRING FAILURES

OVERLOAD

MOTOR OVERHEATING  
BEARING WEAR  
MUD  
LOCKED MOTOR



SYSTEM MONITORING  
MEASUREMENT OF:  
CURRENT  
VOLTAGE  
FREQUENCY



**CONTROL**

- TEMPERATURE
- START LIMIT
- WELL RECOVERY TIME
- COMMUNICATION PORT
- 60 EVENTS
- PROGRAMMABLE TIMER
- 2 DIGITAL INPUTS
- AUXILIARY RELAY

**POWER SUPPLY FALIURES**

- HIGH AND LOW VOLTAGE
- FREQUENCY
- PHASE LOSS
- PHASE REVERSA
- VOLTAGE UNBALANCE

**SYSTEM MONITORING**

- MEASUREMENT AND REPORT OF:
- CURRENT
- VOLTAGE
- FREQUENCY
- POWER FACTOR
- KVA, KW, KW/H
- TEMPERATURE(\*)

**CURRENT UNBALANCE AND**

- LOST PHASE
- DEFECTIVE CONNECTION
- CONTACTOR AND WIRING FAILURES

**UNDER LOAD PROTECTION**

- AND TEMPERATURE(\*)
- DRY WELL
- ZERO FLOW
- LOW FLOW(\*)

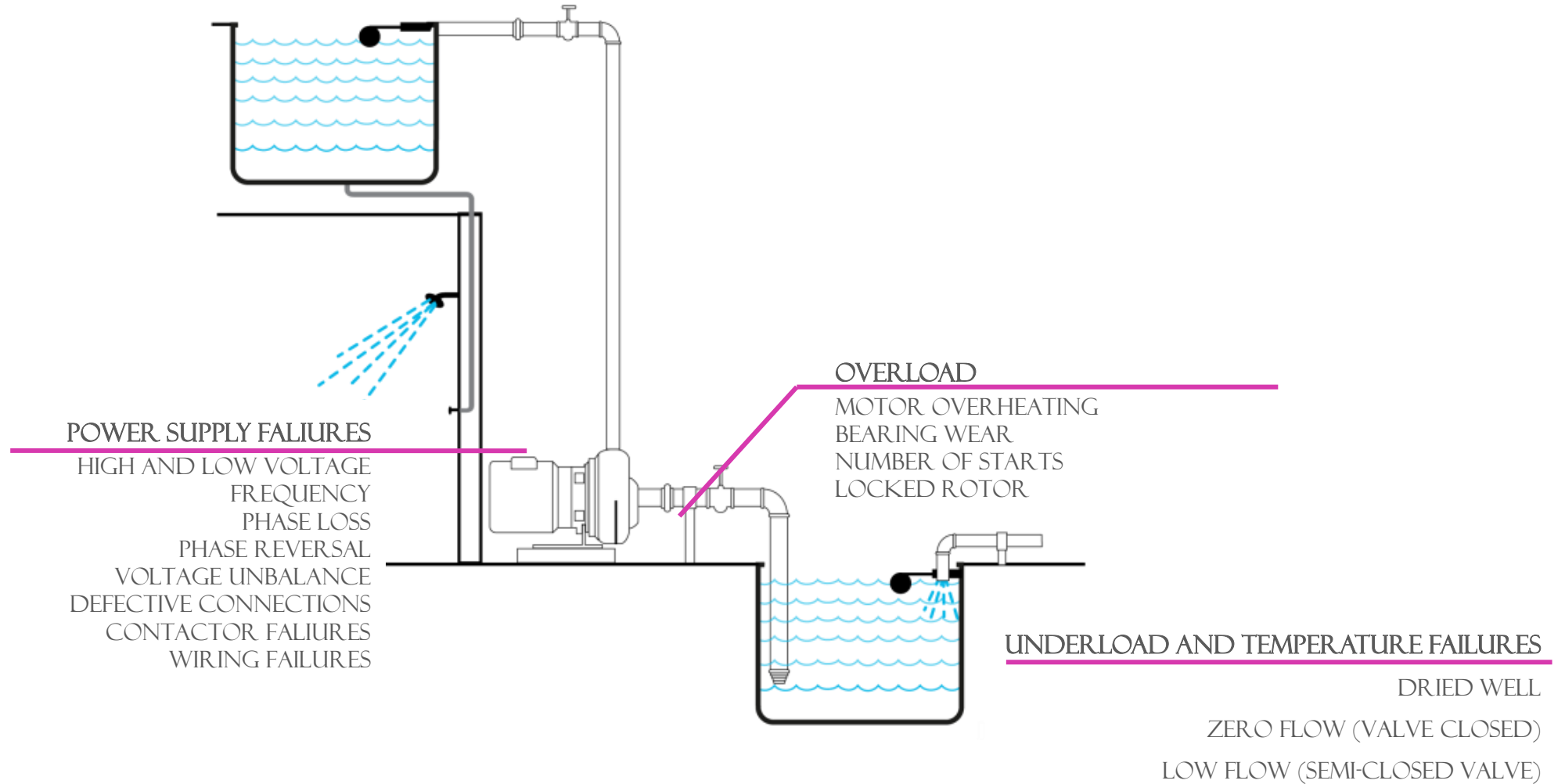
**OVERLOAD**

- MOTOR OVERHEATING
- BEARING WEAR
- NUMBER OF STARTS
- MUD

**LOCKED ROTOR**

- PROTECTION
- CLOGGING OF THE PUMP

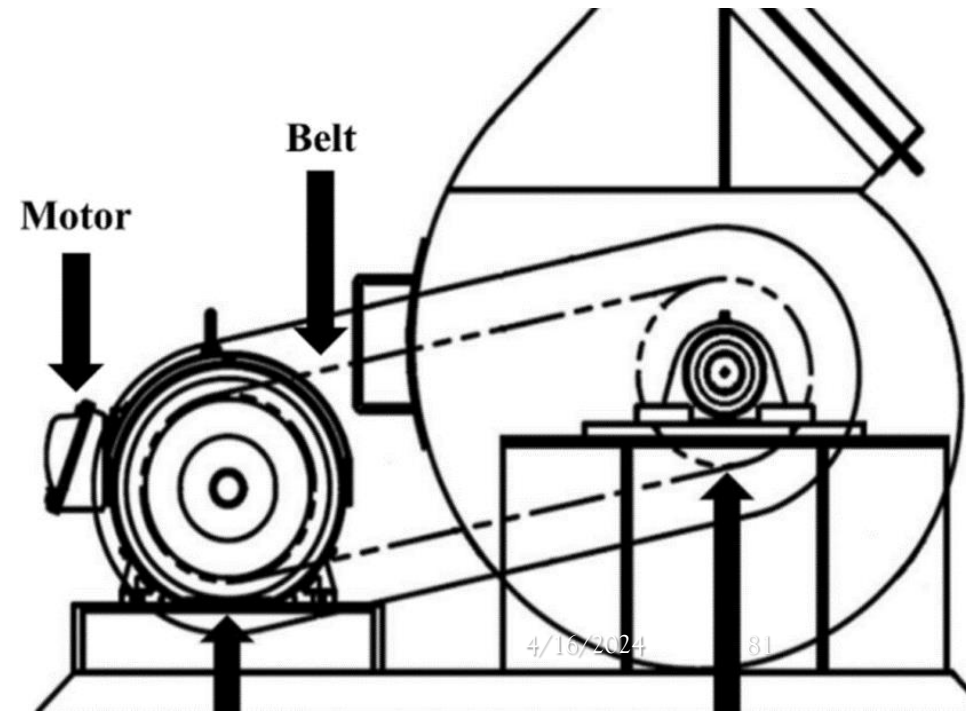
# WATER PUMPS





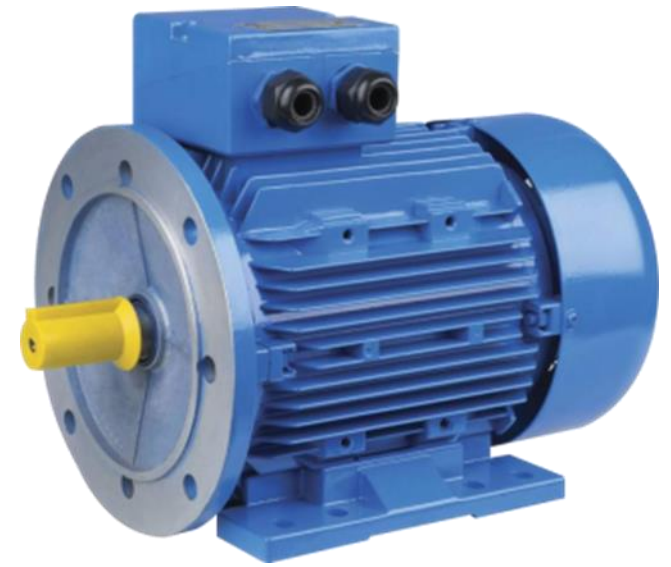


Sample Footer Text



4/16/2024

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ECA100-11



ECA500-11