



Harmony Control Relay Application Guide

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Website



[Link](#)

Catalog



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Video



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Do you face such issues?

- Unreliable performance because of poor quality of power supply
- Equipment downtime and lost productivity due to motor failure

These issues are usually caused by common phase issues below:

Phase loss

Total loss of one of the three phases due to blown fuse, open power line, loose connections...

Incorrect phase sequence

Two phases in a three-phase system have been swapped hence causing the motor to run in the reverse direction.

Asymmetry

One or more of the line-to-line voltages in a three-phase system are mismatched.

Undervoltage

When the average voltage of a three-phase power system falls below intended levels.

Overvoltage

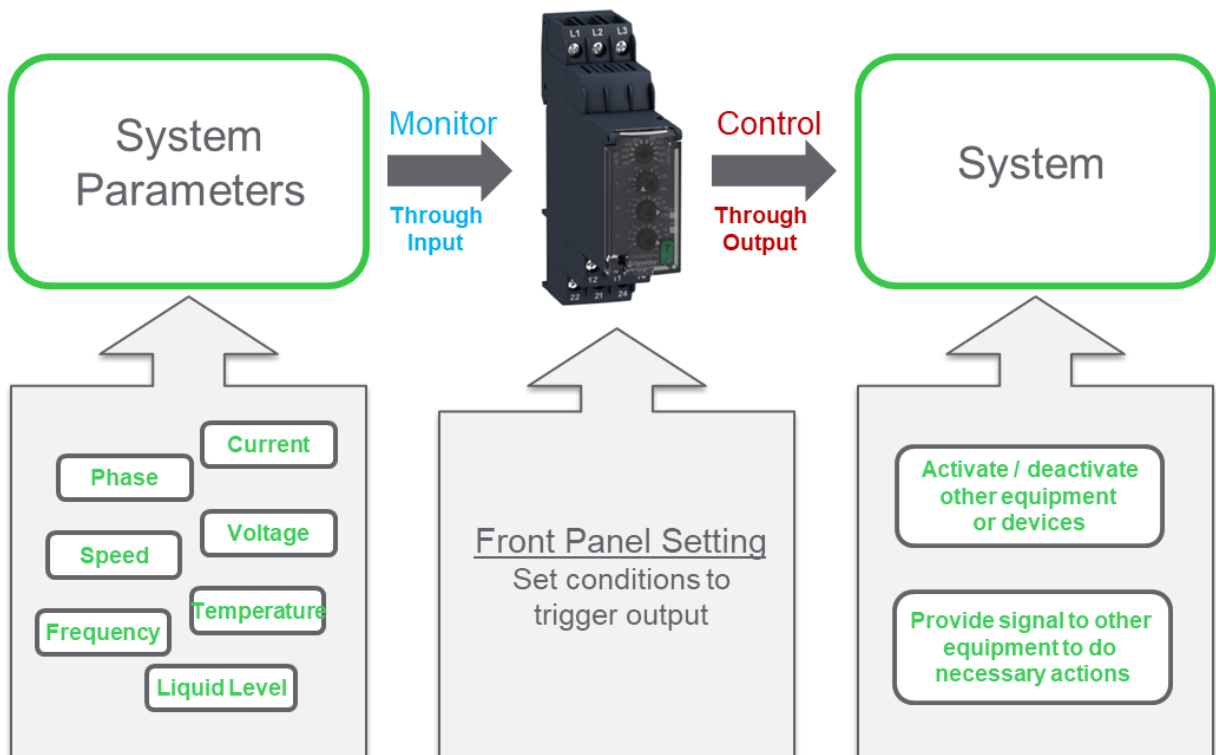
When the supply voltage rises above the rated voltage of the motor.

In general, all these issues can cause the current drawn by the motor to increase. This generates heat that deteriorates the motor insulation and damages the motor rapidly.

Control Relay
is the best protection against these issues!

What is a Control Relay?

- Monitor and detect operating conditions concerning phase, current, voltage, frequency, temperature, liquid level and speed
- Inform users about abnormal conditions and allow them to take necessary corrective actions before severe and costly failures can occur



Harmony Control Relay Product Overview



Type	Conventional			Near field communication (NFC) technology
Range	RM17	RM22	RM35	RMNF22TB30
Dimension (mm)	17.5	22.5	35	22.5
Applications	3-phase, 1-phase voltage, 1-phase current	3-phase, 1-phase voltage, 1-phase current, Liquid level	3-phase, 1-phase voltage, 1-phase current, Liquid level Pump, Frequency, Speed, Temperature	3-phase
No. of contacts	1 or 2 C/O	2 C/O	1 or 2 C/O 2 N/O	2 C/O (individually configurable)
Current (A)	5; 8	8	5	8
Dial Pointer LED, Diagnostic Button	No	Yes		No
Logic	Positive			Positive/Negative
Time delay	With/Without			
Power supply	Self Powered/ External power supply			

Unique Value Propositions



RM17
17.5 mm



RM22
22.5 mm



RM35
35 mm

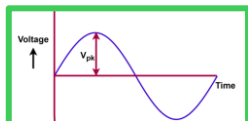
Compact modular sizes (width)
to fit most application needs



IP50 lead-sealable settings protection cover helps prevent dust and unintended human intervention



Dial pointer LED for easy setup in dark conditions



True RMS measurement to measure pure sinusoidal waves and non-sinusoidal waves more accurately.

This eliminates errors in the measured waveforms from short spikes, sudden surges or distortions, thereby minimizing unexpected trips from highly polluted networks



Diagnostic button is used to close the downstream circuit immediately without sending a fault input signal to the relays.

This shortens the testing time during commissioning and troubleshooting.

*For conventional type control relays



Advanced control of your three-phase network with NFC Control Relay

Near field communication (NFC) is a technology commonly used in smartphones enabling users to make mobile payments.

Brought to a control relay, it dramatically improves the solution's usability and the user's experience, bringing digital instead of analog operation.



NFC Control Relay
RMNF22 TB30

3 Phase Control all in one!

- **One reference covering 7 control functions** – Phase loss, phase sequence, asymmetry, overvoltage, undervoltage, overfrequency and underfrequency
- **2 outputs, individually configurable**
- **Wide range of voltage** supplied – 208...480 VAC, **90%** of global market applications
- **Monitors** 3-phase or 3-phase + N network
- **Conventional terminal layout** of 22.5 mm width – meaning no changes to panel wiring design

Enhance monitoring and testing

- **4 new LEDs at the side** to address customer's needs to know exact fault visually
- **Read** relay status to obtain real time data of network connections
- **Diagnose** feature to show 20 historical faults through event logging
- **Configure up to 10 Alarms with different monitoring functions**
- **Simulator** available to check logic validity in alarm combination
- Manage relays **without power**

Time-saving

- Easy and fast **cloning** the parameters between relays
- **Settings shared** via multiple channels dependent of phone (email, SMS etc.)
- **Auto-configure** option to "teach" the product to propose settings with real-time 3-phase network connections

Peace of mind from superior security

- **Set a four-digit password** to ensure the relay remains safe and untampered

Scan here to view our
Promotion video



Scan here to read our
Blog article



Applications

Harmony Control Relay offers a comprehensive range of control relay to suit a wide range of applications



[Escalator](#)



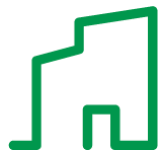
[HVAC Machinery](#)



[Data Centre](#)



[Street Lighting](#)



[Elevator
Machine Room](#)



[Pumps](#)




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Processing](#)



[Wind Turbines](#)



[Material Handling](#)

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Motor protection (Escalator, Material Handling...)

Three-phase monitoring

Challenge

Motor failure and reverse motor operation, due to phase loss or phase sequence, can lead to equipment failure

Solution



Recommend!



RM17TG00
RM17TG20

RM22TG0

RMNF22TB30

RM17TG00/RM17TG20/RM22TG0

If a sequencing fault or total loss of two or more phases is detected (detected as soon as two of the voltages drops below 100V), the relay opens instantly and LED goes off

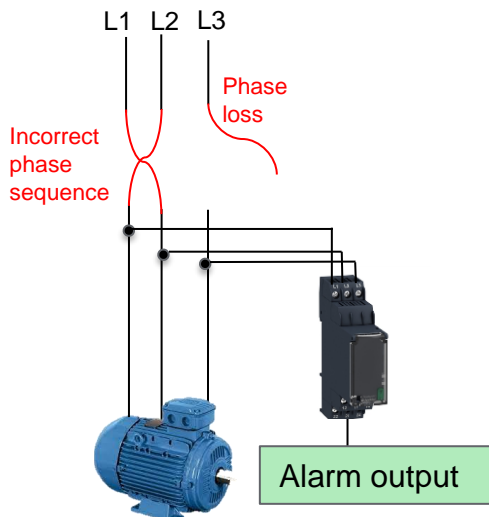
RMNF22TB30 (NFC Control Relay)

- Phase loss or phase sequence values can be set individually using the Zelio NFC App
- If a sequencing or phase loss fault is detected, the relay output opens or closes based on user Alarm settings in App



Ideal for trouble shooting and maintenance!

- Four front-facing LED lights to indicate the exact fault condition
- Real-time monitoring of system conditions via App
- Record 20 historical faults into events with data of exact failures via App





Compressor system (HVAC machinery etc. Refrigerating Machines, Air Conditioners...)

Three-phase monitoring

Challenge

Compressors are unable to function when fault conditions such as phase loss, phase sequence, asymmetry, overvoltage and undervoltage occur

Solution



RM17TE00



RM35TF30

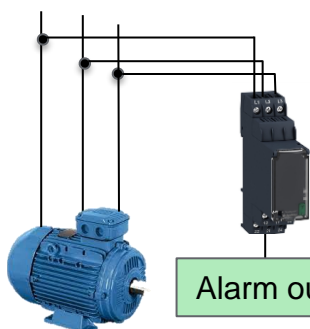


Recommend!



RMNF22TB30

L1 L2 L3



Alarm output

RM17TE00, RM35TF30

- If a sequencing or phase loss fault is detected, the relay opens instantly
- If an asymmetry or voltage fault is detected, the relay opens at the end of the time delay set by the user

An adjustable time delay on threshold crossing provides immunity to transients and helps prevent spurious triggering of the output relay

RMNF22TB30 (NFC Control Relay)

- If a sequencing or phase loss fault is detected, the relay output opens or closes based on user Alarm settings in Zelio NFC App
- If a voltage fault or asymmetry is detected, the relay opens or closes at the end of time delay set by the user through the App



Easy configuration!

- One product reference with 7 control functions: Phase loss, Phase sequence, Asymmetry, Overvoltage, Undervoltage, Overfrequency and Underfrequency
- 2 individually configurable relay outputs to enhance monitoring





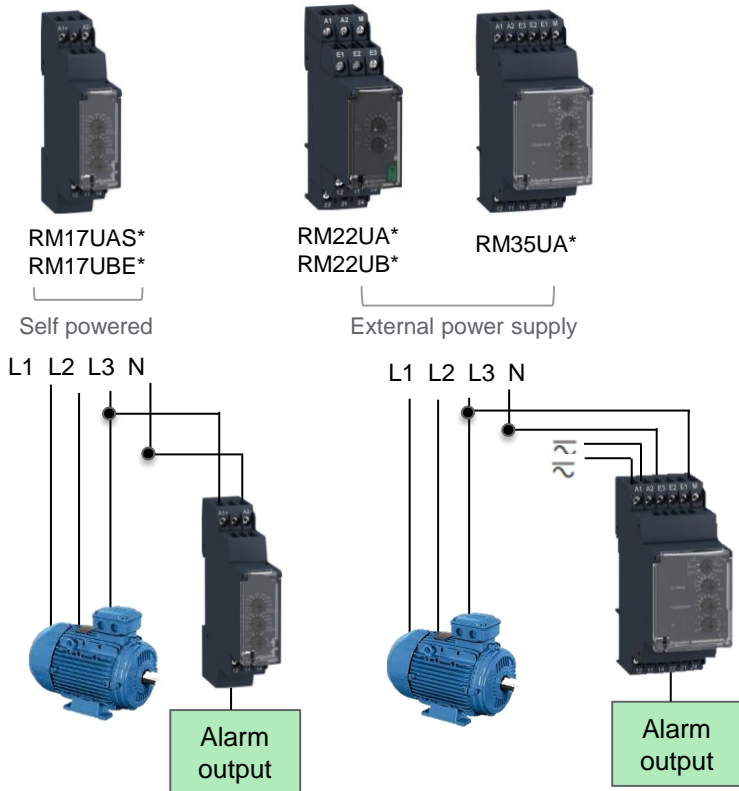
Monitor Power Supply (Telecommunication tower, Data center, Utility supply, Battery monitoring)

Single-phase monitoring (voltage)

Challenge

Power disruption due to overvoltage or/and undervoltage conditions could lead to equipment and system failure

Solution



- The undervoltage or overvoltage threshold value is set by means of the potentiometer(s) graduated as a % of the scale value
 - An adjustable time delay on threshold crossing provides immunity to transients, helping prevent spurious triggering of the output relay
 - Support two operating modes: Overvoltage or undervoltage; Overvoltage and undervoltage in window mode
- Overvoltage
- If controlled voltage exceeds the threshold setting for a time greater than time delay, the output relay opens and R LED goes off
 - As soon as the voltage falls below the threshold setting value minus the hysteresis, the relay instantly closes for no memory mode
- Undervoltage
- If the controlled voltage falls below the threshold setting for a time greater than time delay, the output relay opens and the R LED goes off
 - As soon as the voltage rises above the value of the threshold setting plus the hysteresis, the relay instantly closes
- If "Memory" mode is selected, the relay opens when threshold crossing is detected and then stays in that position. The power must be switched off to reset the product





Lighting Control (Building, Car tunnel, Street lighting...)

Single-phase monitoring (current)

Challenge

Monitoring lighting circuits in critical locations to detect burnt-out lights caused by undercurrent or overcurrent conditions

Solution



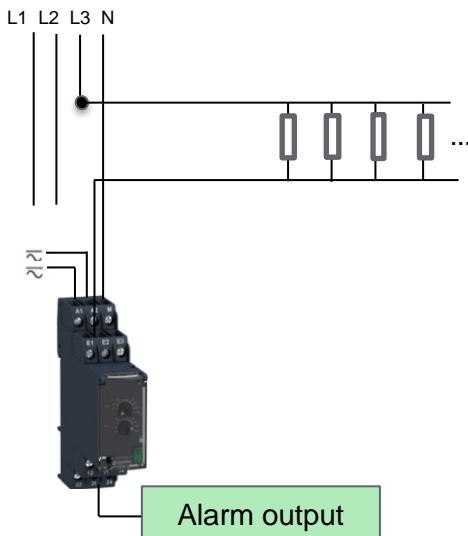
RM17JC000MW
(with built in CT transformer)



RM22JA*



RM35JA*



- The undercurrent or overcurrent threshold value is set by means of the potentiometer(s) graduated as a % of the scale value
- An adjustable time delay on threshold crossing provides immunity to transients, helping prevent spurious triggering of the output relay.
- Support two operating modes: Overcurrent or undercurrent; Overcurrent and undercurrent in window mode

Overcurrent

- If controlled current exceeds the threshold setting for a time greater than time delay, the output relay opens and R LED goes off
- As soon as the current falls below the threshold setting value minus the hysteresis, the relay instantly closes for no memory mode

Undercurrent

- If the controlled current falls below the threshold setting for a time greater than time delay, the output relay opens and the R LED goes off.
- As soon as the current rises above the value of the threshold setting plus the hysteresis, the relay instantly closes

If "Memory" mode is selected, the relay opens when threshold crossing is detected and then stays in that position. The power must be switched off to reset the product





Temperature control for elevator machine rooms

Temperature monitoring

Challenge

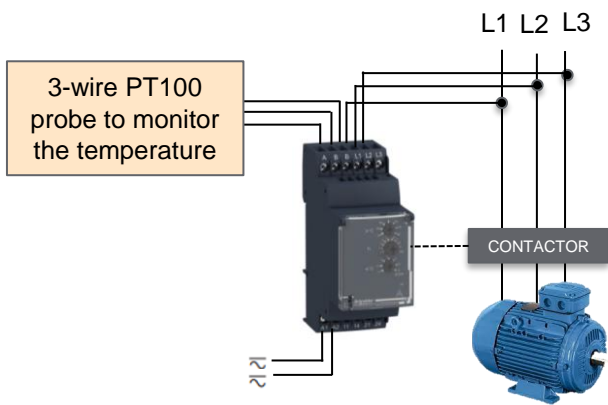
If the room air temperature in elevator machine room is too hot or cold, it can lead to equipment failure (e.g. overheating due to high outside temperature)

Solution



RM35AT*

1-Phase (monitor overtemperature, undertemperature)
RM35ATL0MW RM35ATR5MW
3-Phase (monitor overtemperature, undertemperature, Phase loss, phase sequence)
RM35ATW5MW



3 phase set up

- Designed for monitoring the temperature in elevator machine rooms, in compliance with **directive EN81**
- Independent adjustment of high (34...46°C) and low (-1...11 °C) thresholds
- If the temperature monitored by the PT100 probe remains between the two thresholds set on the front panel, the output relay is closed
- When the temperature crosses one of the threshold settings on the front panel (high or low threshold), the time delay set on the front panel is activated. The yellow LED corresponding to the threshold crossed (low or high) flashes.
- At the end of the time delay, if the temperature is still outside the threshold setting, the output relay opens and the yellow LED goes out.
- The output relay closes instantly when the temperature returns within the window of the two threshold settings on the front panel plus (undertemperature) or minus (overtemperature) the fixed hysteresis.
- If the PT100 probe is incorrectly wired (missing or short-circuited) the relay is open and the 3 LEDs flash to alert users





Monitor 1 phase and 3 phase pumps

Pump control

Challenge

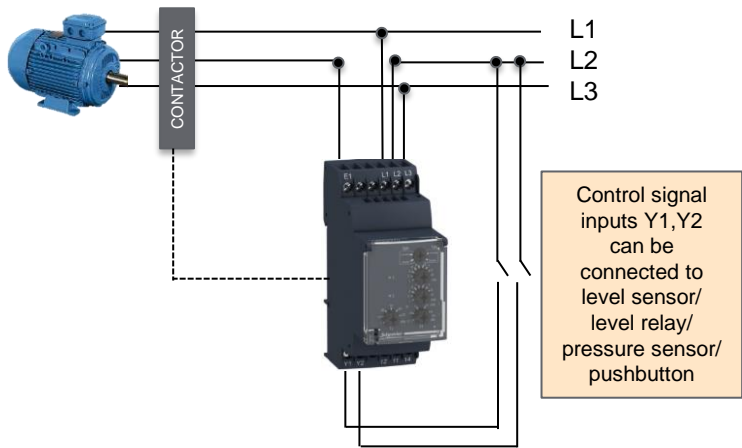
Pump can be damaged due to dry running (undercurrent), overloading (current) and motor failure (Phase loss and phase sequence)

Solution



RM35BA10

1-Phase	3-Phase
Monitor Overcurrent & Undercurrent	Monitor Phase sequence, Phase loss, Overcurrent & Undercurrent



3 phase set up, <10A

- RM35BA10 can operate on a 1-phase (230 V ac) or 3-phase supply (208...480 Vac)
 - Overcurrent and undercurrent values are set by two separate potentiometers, graduated from 1 to 10 A
 - If a setting error occurs (e.g. low threshold greater than high threshold during double control mode), output relay opens and all the LEDs flash to signal the error
 - If a current fault occurs (overcurrent or undercurrent), the relay opens when the fault persists for longer than the threshold time delay setting
 - When current returns to correct value, output relay remain open. It can only be re-energized by a RESET: either by switching off the power (double control mode) or by closing external contact Y2 (in single control mode)
 - An inhibition time delay on energization allows detection of current peaks on motor starting
- Double control mode:* control a pump via two external control signals Y1 and Y2
- Single control mode:* control a pump via an external signal Y1; Y2 can be used to reset the relay after a current fault





Monitor the levels of conductive/non-conductive liquids (Pumps, Food processing, Pharmaceutical...)

Liquid level monitoring

Challenge

Accurate liquid level control through filling or/and emptying to protect pumps against dry running, overflow protection in tanks, control dosing of liquids in mixing processes and to help protect heating elements in the event of non-immersion.

Solution



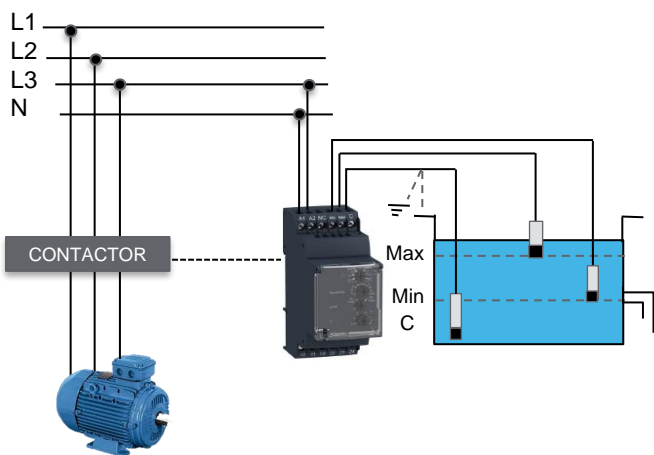
RM22L*

RM35LM*

RM35LV*

Detection by resistive probes

Detection by discrete sensors



- Selector switches on the front panel allows selection of the sensitivity range, empty or fill function, number of levels (1/2) and type of time delay
- Operating principle is based on measurement of the apparent resistance of the liquid between two submerged probes. When this value is less than the threshold setting on the front panel of the device, the relay changes state
- To avoid electrolytic phenomena, an AC current runs across the probes

E.g. Control of two levels, empty and fill functions

Emptying function

- Output relay stays open until the liquid reaches the Max. level probe. As soon as the Max. level is reached, the contact closes and then allows emptying of the tank. When the level drops below the Min level, the contact opens to stop the emptying process

Filling function

- Output relay stays energized until the liquid reaches the Max. level probe. As soon as the Max. level is reached, the contact opens and the pump stops. When the level drops below the Min. level, the contact closes again and pumping restarts to raise the level

Control of a single level can be achieved by using the second selector switch. In this case, the Max. level probe stays up in the air and an adjustable time delay avoids any wave effect





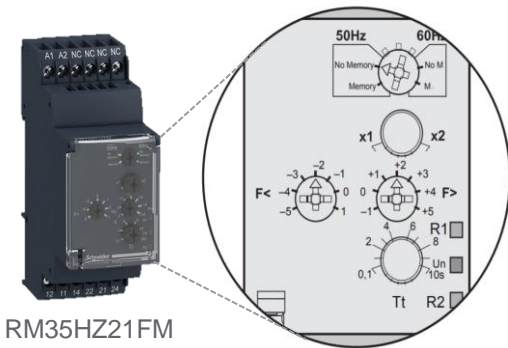
Monitors frequency variations on 50/60 Hz AC supplies (Wind turbines, Generator...)

Frequency monitoring

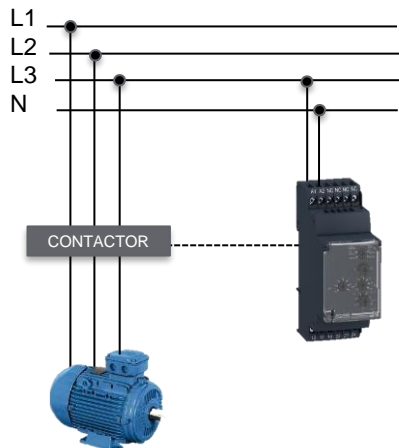
Challenge

Avoid risk of a system collapse due to frequency instability (especially when wind power penetration is high and system inertia is low in wind turbines)

Solution



RM35HZ21FM



- Under-frequency or over-frequency threshold values are set using two graduated potentiometers indicating the variation value of the frequency to be monitored.
- A switch x1/x2 allows the control scale to be doubled. Hysteresis is fixed at 0.3 Hz

Overfrequency

- If frequency of the voltage controlled exceeds the over-frequency threshold setting for a time greater than time delay, the corresponding output relay opens and its LED goes off.
- As soon as the frequency drops below the value of the threshold setting, minus the hysteresis, the relay instantly closes for no memory mode

Underfrequency

If the frequency of the voltage controlled falls below the under-frequency threshold setting for a time greater than time delay, the corresponding output relay opens and its LED goes out

- As soon as the frequency rises above the value of the threshold setting, plus the hysteresis, the relay instantly closes for no memory mode

If "Memory" mode is selected, the relay opens after the time delay and stays in that position when crossing of the threshold is detected. The power needs to be switched off to reset the product





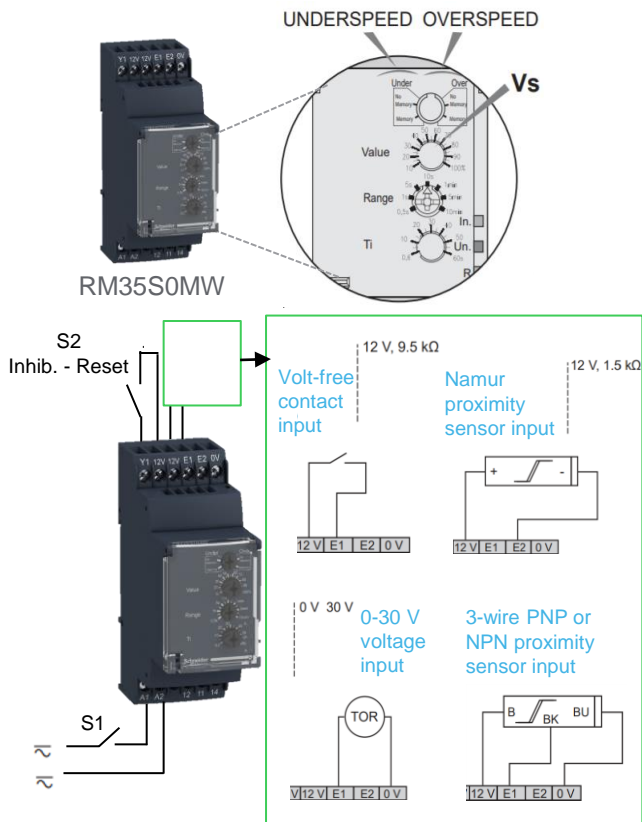
Monitoring speed or rate of rotary or linear movements (Packaging, Material handling...)

Speed monitoring

Challenge

If a conveyor experience unwanted slowdown, rapid speed or complete stoppage, the results could be disastrous as machine could be damaged and led to costly process downtime

Solution



- RM35S0MW monitors underspeed or overspeed of a process using discrete sensors
- The cycle of the process being monitored is a series of impulses characterized by a two-state signal: high and low
- The speed is obtained by measuring the period of this signal, from the detection of first change of state (either rising or falling edge)
- To allow the process being monitored to reach its nominal operating speed on energization, relay is inhibited by starting inhibition time delay (Ti) or closing of S2

Inhibition keeps the output relay in the closed position and is signaled by illumination of the inhibition LED. It last as long as it is necessary for the product to detect at least 2 periods

When the signal has not been 'characterized' by the end of the inhibition period, the inhibition LED flashes for as long as speed measurement is impossible

Underspeed

At the end of Ti, as soon as the speed measured drops below the threshold setting, the output relay open. It returns to its initial state when the speed is again higher than the threshold plus hysteresis for no memory mode

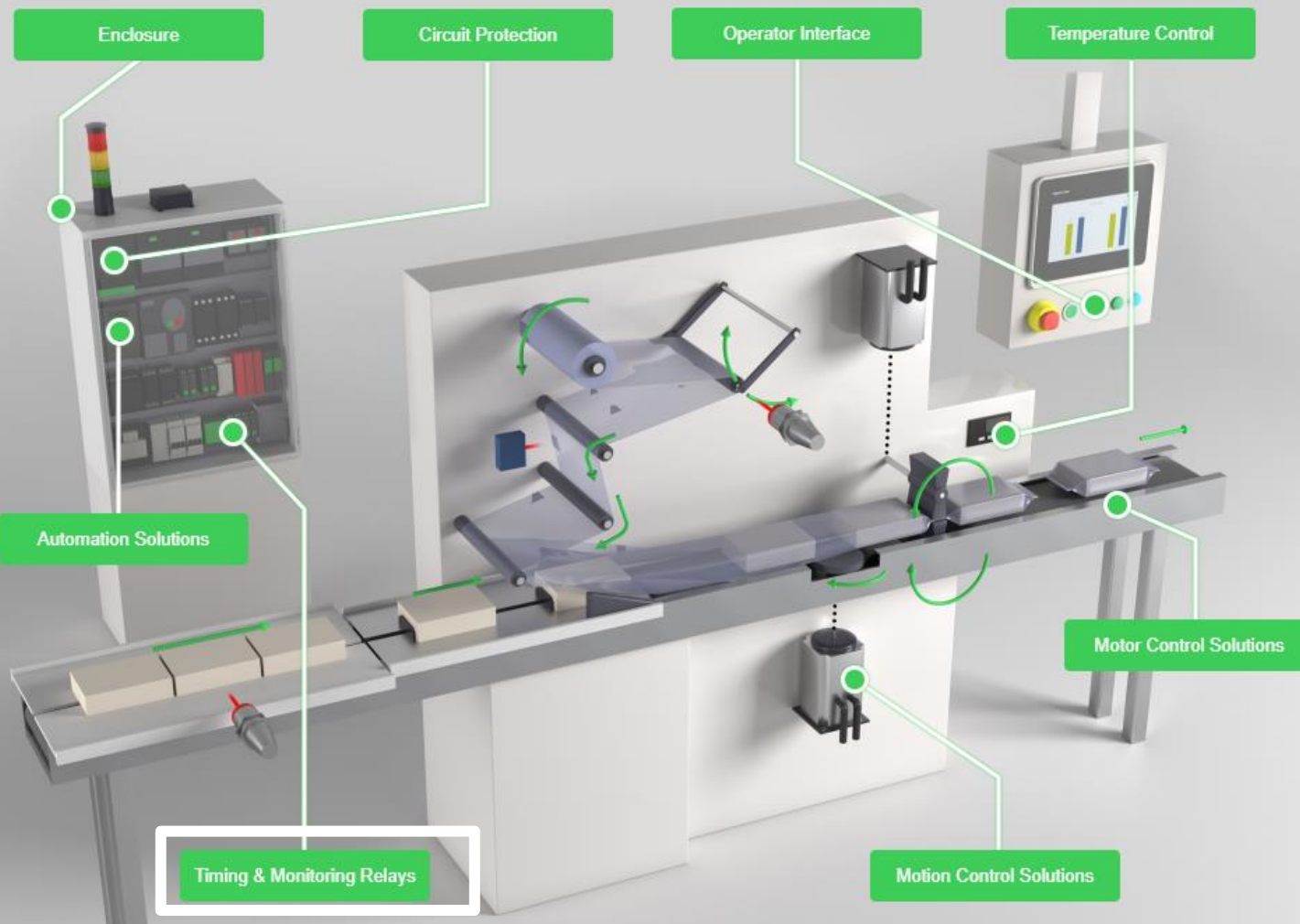
Overspeed

At the end of Ti, as soon as the speed measured is higher than the threshold setting, the output relay open. It returns to its initial state when the speed is again lower than the threshold plus hysteresis for no memory mode

If "Memory" mode is selected, the output relay stays in the open state, irrespective of any further changes in the process speed. It will not be able to return to the closed state until contact S2 closes (at least 50 ms)



Product Bundle for Packaging application



Unwanted slowdown, rapid speed or complete stoppage can damage conveyor and cause downtime

Dedicated **speed control relay** to monitor the speed of conveyor belt to ensure a constant speed is maintained

RM35S0MW




Directional change in conveyor belt or motor failure can also damage conveyor and cause downtime

NFC Control Relay can easily and efficiently monitor phase loss, phase sequence, asymmetry, overvoltage and undervoltage

RMNF22TB30

Product Selection Table

Application	Functions	Range/Reference
3 Phase Monitoring	Phase loss, Phase sequence	RM17TG*, RM22TG0
	Phase loss, Phase sequence and Asymmetry	RM17TA*, RM22TA*
	Phase loss, Phase sequence and Motor temperature	RM35TM*
	Phase loss, Phase sequence and Undervoltage	RM17TU*, RM22TU*
	Phase loss, Overvoltage and Undervoltage, Absence of neutral	RM17UB*, RM35UB*
	Phase loss, Phase sequence, Overvoltage and Undervoltage	RM22TR*
	Phase loss, Phase sequence, Asymmetry, Overvoltage and Undervoltage	RM17TE00, RM35TF30
	Phase loss, Phase sequence, Asymmetry, Overvoltage and Undervoltage, Overfrequency and Underfrequency	RMNF22TB30 
Temperature control for elevator machine rooms and 3 Phase supplies	Phase loss, Phase sequence, Over temperature and Under temperature	RM35AT*
1 Phase voltage monitoring	Overvoltage or Undervoltage Overvoltage and Undervoltage	RM17UA*, RM22UA* RM22UB*
1 Phase current monitoring	Overcurrent or Undercurrent Overcurrent and Undercurrent	RM22JA*
Pump Control	Phase loss, Phase sequence, Overcurrent and Undercurrent	RM35BA10
Level control	Fill/Empty operation	RM22L*, RM35L*
Frequency control	Over-frequency and Under-frequency	RM35HZ21FM
Speed control	Over or Under operating rate/speed	RM35S0MW

* Refer to [catalog](#) for more details on specific references

Why Harmony Control Relay?

Simple approach to monitor your equipment

Comprehensive Monitoring Range

Monitor and detect abnormal operating conditions concerning phase, current, voltage, frequency, speed, liquid level, pump and temperature

Innovative Design and Features

Unique from competitors!

- Compact modular sizes (17.5/22.5/35 mm in width) adapted for industrial and building control panels
- IP50 lead-sealable protection cover for all conventional model helps prevent dust and unintended human intervention
- Dial pointer LED indicator and Diagnostic Button to assist commissioning and troubleshooting
- NFC Control Relay for advanced three-phase control at the tip of your finger tips

Worldwide Certification



Worldwide Availability

Distribution centers across many countries in Europe, Americas, China, Asia – everywhere in the world for easy procurement and support!



Terminologies

- **Positive logic**

Relay output energized in normal situation; de-energized in abnormal situation

- **Negative logic**

Relay output are de-energized in normal situation; energized in abnormal situation

- **Self powered**

No need for auxiliary voltage to power the control relay. Energy is obtained directly from the line that the control relay is monitoring

- **Without memory**

Relay output will return to the initial state when fault condition(s) is removed

- **With memory**

Relay output will maintain the last state after triggered. User needs to power off the device to reset

- **Hysteresis**

Refers to “a range” or “bandwidth” . In the case of our control relays, it can be considered as the threshold for the reset function. The hysteresis is necessary for the relay to avoid nuisance tripping.

- **Window mode**

Relay checks that the controlled value stays between minimum and a maximum threshold

Points to note

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications.

It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof.

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