

Frequency Monitor Relay PHD-100/120, PHD-173/240, PHD-380/480, DIN-rail mounted

Introduction

This unit monitors the frequency of a single phase supply and operates a relay if the frequency goes above or below set levels. Front panel controls allow selection of:

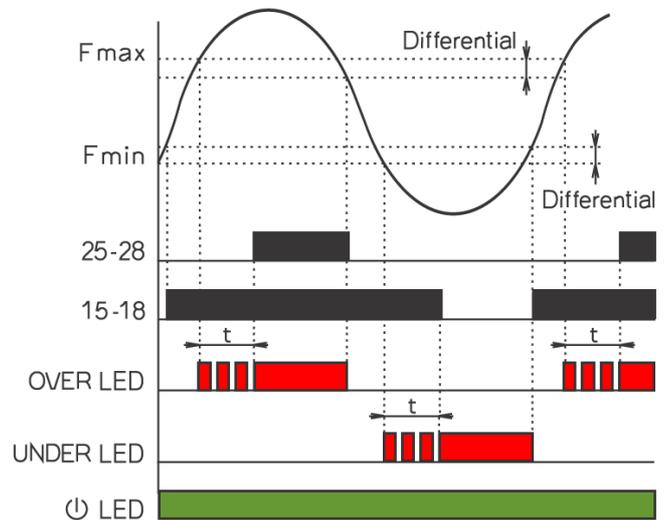
- nominal, under- and over-frequencies,
- hysteresis (differential) and
- time delay before a trip triggers a relay response.

LEDs indicate power on and trip status. Two changeover, volt-free relays are fitted.

These instructions contain important safety information. Please read them thoroughly before commissioning, operating or maintenance of the unit.

Specification

Parameter	PHD	100/120	173/240	380/480
Supply voltage range		43-87	71-174	161-346
Overload capacity - continuous		87	174V	346V
10s max		104V	209V	416V
Supply threshold (U_{open})		43V	71V	161V
Burden on supply (Max)		1W 1.6 VA approx.		
Nominal frequency (F_n)		50/60/400 Hz		
Over-frequency range (F_{max})		Adjustable 80-120 % F_n		
Under-frequency range (F_{min})		Adjustable 80-120 % F_n		
Differential		Adjustable 0.5 to 5 % F_n		
Trip time delay		Adjustable 0.5 to 10s		
Relay contacts:		2 x changeover, volt-free, for general switching operations		
Load capacity - a.c.		250V @ 8A, 2 kVA		
Load capacity - d.c.		30V 8A		
Insulation		4 kV/1 min		
Mechanical endurance		30x10 ⁶ operations		
Other Data:				
Dimensions		90 x 52 x 64 mm		
Weight		124g approx.		
Maximum conductor size		2 x 1.5 mm ² or 1 x 2.5 mm ²		
Operating temperature		-20 to +55 °C		
Storage temperature		-30 to +70 °C		
Over-voltage category		III		
Pollution degree		2		
Environmental protection		IP40 for front panel IP20 for terminals.		
Standards		EN 60255-6, EN 60255-27, EN 61000-6-2, EN 61000-6-4		
	Insulation Class: Ensure any external circuits connected to the relay are provided with double or reinforced insulation.			



The time delay and differential trip levels help to prevent relay chatter as the monitored frequency varies.

As the relays have changeover contacts, the relay outputs can be inverted by wiring to the alternative terminals 15-16 or 25-26.

Operation

The unit obtains its power supply from the supply being monitored.

The green  LED lights to show when this supply is present.

Under normal conditions, with the supply frequency at near nominal value, both red LEDs will be off, the Under relay will be energised and the Over relay will be de-energised. If the supply falls below the operating threshold U_{open} , both relays de-energise and both LEDs flash slowly to indicate insufficient supply voltage.

Under-frequency Operation

If the supply frequency goes below the set under-frequency (F_{min}), the **Under LED** will light and the Under relay (15-16/18) will **de-energise** after the set delay. During the delay period, the **Under LED** will flash.

If the frequency then returns above F_{min} plus the differential value, the **Under LED** will go off and the Under relay will energise again, without delay.

Over-frequency Operation

If the supply frequency goes above the set over-frequency (F_{max}), the **Over LED** will light and the Over relay (25-26/28) will **energise** after the set delay. During the delay period, the **Over LED** will flash.

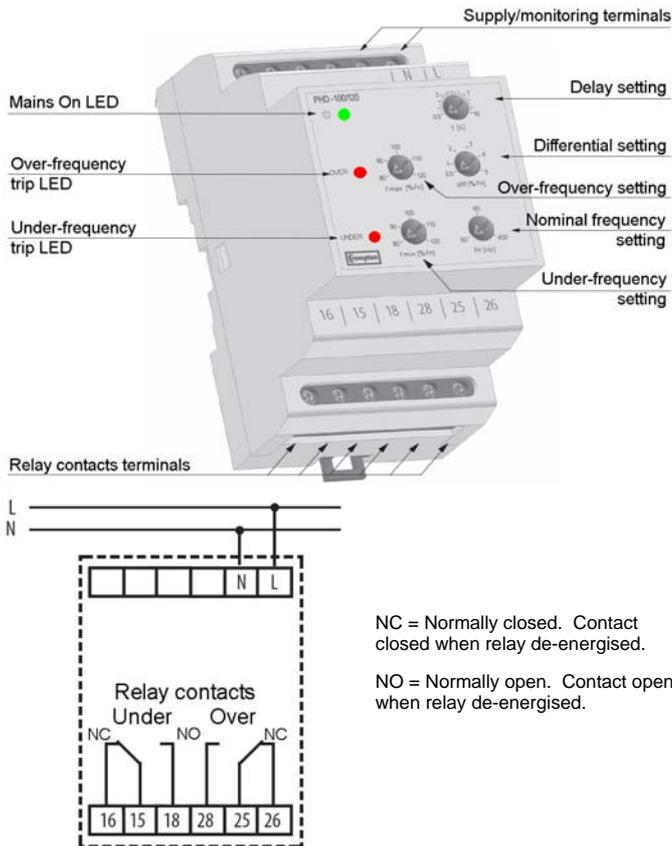
If the frequency then falls below F_{max} minus the differential value, the Over relay will de-energise and the **Over LED** will go off, without delay.

Note; Red LED indicates fault condition, not relay status

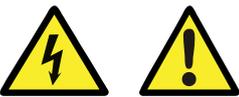
Installation

The unit is intended for mounting on a standard DIN rail. Hook the unit onto the top of the rail and press the bottom of the unit until it locks in place. To remove the unit from the rail, lever down the black tab at the bottom of the unit to release it from the rail.

The unit is intended for use in a reasonably stable ambient temperature within the range -20 to +55°C. Do not mount the unit where there is excessive vibration or in excessive direct sunlight.



NC = Normally closed. Contact closed when relay de-energised.
 NO = Normally open. Contact open when relay de-energised.

Warnings:  **Caution: Risk of Electric Shock**

- During normal operation, voltages hazardous to life may be present at some of the terminals of this unit. Installation and servicing should be performed only by qualified, properly trained personnel abiding by local regulations. Ensure all supplies are de-energised before attempting connection or other procedures.
- It is recommended adjustments be made with the supplies de-energised, but if this is not possible, then extreme caution should be exercised.
- Terminals should not be user accessible after installation and external installation provisions must be sufficient to prevent hazards under fault conditions.
- This unit is not intended to function as part of a system providing the sole means of fault protection - good engineering practice dictates that any critical function be protected by at least two independent and diverse means.
- The unit does not have internal fuses therefore external fuses must be used for protection and safety under fault conditions.
- If this equipment is used in a manner not specified by the manufacturer, protection provided by the equipment may be impaired.

Safety

The unit was designed in accordance with BS EN 60255-6 and -27 – Permanently connected use, Normal condition. Insulation category III, pollution degree 2, basic insulation for rated voltage. Measurement Category III.

All of the above information, including drawings, illustrations and graphic designs, reflects our present understanding and is to the best of our knowledge and belief correct and reliable. Users, however, should independently evaluate the suitability of each product for the desired application. Under no circumstances does this constitute an assurance of any particular quality or performance. Such an assurance is only provided in the context of our product specifications or explicit contractual arrangements. Our liability for these products is set forth in our standard terms and conditions of sale.

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EMC Installation Requirements

This unit has been designed to provide protection against EM (electromagnetic) interference in line, in accordance with BS EN 61000-6-2 and -6-4. Precautions necessary to provide proper operation of this and adjacent equipment will be installation dependent and so the following can only be general guidance:

- Avoid routing wiring to this unit alongside cables and products that are, or could be, a source of interference.
- To protect the product against incorrect operation or permanent damage, surge transients must be controlled. It is good EMC practice to suppress differential surges to 2kV or less at the source. The unit has been designed to automatically recover from typical transients, however in extreme circumstances it may be necessary to temporarily disconnect the auxiliary supply for a period of greater than 5 seconds to restore correct operation.
- Screened communication leads are recommended and may be required. These and other connecting leads may require the fitting of RF suppression components, such as ferrite absorbers, line filters etc., if RF fields cause problems.
- It is good practice to install sensitive electronic instruments that are performing critical functions in EMC enclosures that protect against electrical interference causing a disturbance in function.

Wiring

All connections are made to screw clamp terminals. Terminals are suitable for copper wires only and will accept one stranded 0.05 - 2.5mm² (30 - 12 AWG) stranded or solid core cables. Terminal screws should be tightened to 0.5 Nm. Choice of cable should meet local regulations.

Instrument transformers used for connection to the meter must be of approved type, compliant with ANSI/IEEE C57.13 / IEC 60044-1 to provide isolation from measuring inputs.

For UL approved installation, use National Electrical Code (NEC) Class 1 wiring, rated at 600V 60°C min rating.

Fusing

A suitable switch or circuit breaker conforming to the relevant parts of IEC 60947-1 and IEC 60947-3 should be included in the building installation. It should be positioned so as to be easy to operate, in close proximity to the equipment, and clearly identified as the disconnecting device.

This unit must be fitted with external fuses in voltage supply lines. Lines must be fused with a quick blow fuse 1A maximum. Choose fuses of a type and with a breaking capacity appropriate to the supply and in accordance with local regulations.

For UL approved installations:

UL listed branch circuit fuses, suitable for the installation voltage, shall be provided and installed in accordance with national installation code – 1A fast acting AC rated at the inputs.

Maintenance

In normal use, little or no maintenance is needed. Where used, ensure any CT secondary circuits are short circuited prior to carrying out installation or maintenance of the unit. As appropriate for service conditions, isolate electrical power, inspect the unit and remove any dust or other foreign material present. Periodically check all connections for freedom from corrosion and screw tightness, particularly if vibration is present.