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Power Load Monitor

INTRODUCTION

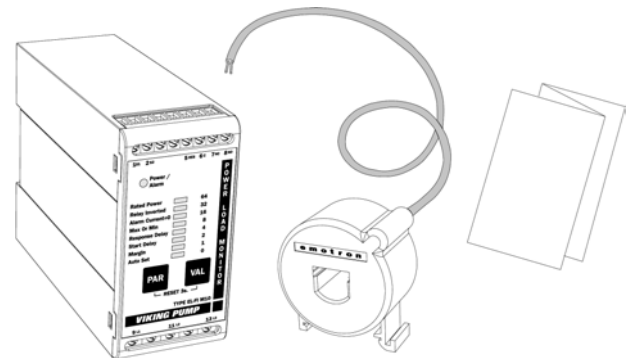
This instruction manual describes the installation and operation of the Power Load Monitor. Its function is to supervise induction motor driven equipment and provide alarms or motor shutdown when abnormal conditions are detected. If the machine's "normal" load level is exceeded, the internal relay change state and the alarm LED turns red. The output relay contact can be used for alarm indication and/or machine shutdown. The unit is intended for price sensitive applications that only demand non-complex protection against under or overload for motors up to 50A.

| VIKING PART NUMBER | RATED MOTOR CURRENT (A) |
|--------------------|-------------------------|
| 2-E90-012-999-00 | 0.4 - 10.0 |
| 2-E90-013-999-00 | 10.1 - 25.0 |
| 2-E90-014-999-00 | 26 - 50 |

Your shipment should contain the following items:

- Power Load Monitor
- Current transformer
- Instruction manual

Check carefully that the Power Load Monitor complies with the motor's input voltage and that the current transformer rating is as stated on the delivery packaging and that the contents have not been damaged in shipping.



Shipment Contents

WIRING

This wiring example shows how the Power Load Monitor can be used to control the starting and stopping circuit of the motor. Other wiring configurations are possible.

The current transformer must be placed in the same phase that is connected to terminal 9, phase L1. For single phase connection refer to Figure 2 for the alternate single phase connection. To complete the remaining wiring refer to Figure 1.

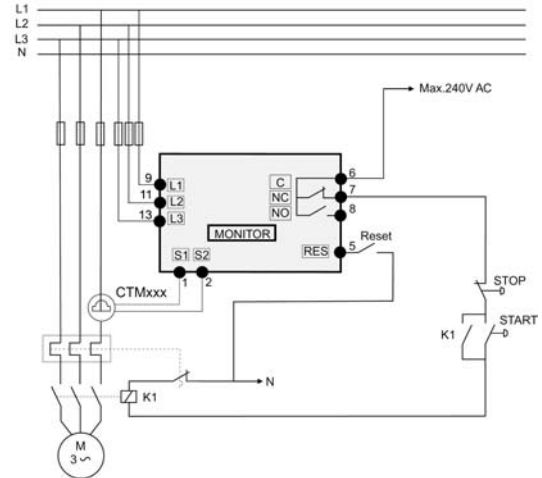


FIGURE 1
Standard Wiring Three-Phase Motors

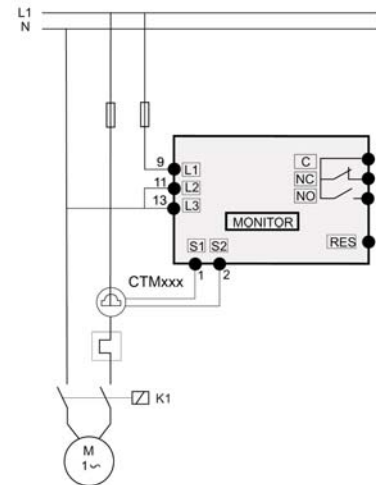


FIGURE 2
Single-Phase Wiring Example

DANGER !

The monitor must be installed by qualified personal.

- Always disconnect, lockout, and tag out supply circuits prior to installing.
- The installation must comply with standard and local regulations.
- Study this manual thoroughly before installing and using the Power Load Monitor.
- Pay special attention to this section and the parts marked "CAUTION!" or "DANGER".
- Should questions or uncertainties arise, please contact your authorized Viking distributor.

Note!

Removing or breaking the seal on the housing will invalidate the warranty.

CAUTION !

If the START/ STOP is connected according to figure 1, it is recommended that terminals 6 and 7 be by-passed during settings. After the settings are completed the by-pass must be taken out.

LATCHED OR UN - LATCHED ALARM

Un-Latched (Auto Reset) when voltage supplied to terminal 5 and 6. Latched Alarm when terminal 5 and 6 opened (not connected).

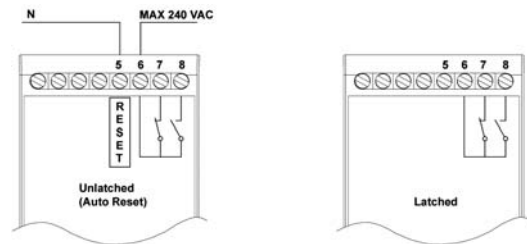


FIGURE 3.
Wiring Example For Latched Or Un-Latched Alarm

CURRENT TRANSFORMER SELECTION FOR MOTORS UP TO 50 A

1. Check the rated motor current on the motor plate.
2. Compare this value with the Rated Motor Current in table 1.
3. From table 1, select the appropriate numbers of windings for the current transformer.

| CURRENT TRANSFORMERS | | | |
|-------------------------|------------------|------------------|------------------|
| VIKING PART NUMBER | 2-E90-012-999-00 | 2-E90-013-999-00 | 2-E90-014-999-00 |
| TRANSFORMER MODEL | CTM010 | CTM025 | CTM050 |
| RATED MOTOR CURRENT (A) | | | |
| 0.40-1.00 | 10 | | |
| 1.01- 2.00 | 5 | | |
| 2.01-3.00 | 3 | | |
| 3.1-5.0 | 2 | | |
| 5.1-10.0 | 1 | | |
| 10.1-12.5 | | 2 | |
| 12.6-25.0 | | 1 | |
| 26-50 | | | 1 |

TABLE 1
Current Transformer And Number Of Primary Windings

DANGER !
Terminals 1 and 2 (s1, s2) carry line voltage.

EXAMPLE

- Rated motor current = 12 A.
- Select 10. 1 - 12. 5 from the first column in table 1 and choose 2-E90-013-999-00 with two (2) primary windings.

Note!

Maximum length of CTM cable is 39 inches (1 m).

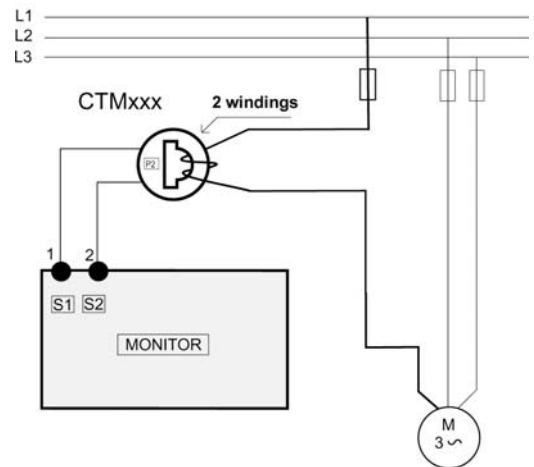


FIGURE 4
Example: CTM O25 With 2 Windings For 12 A Motor

Note!

Normally the appropriate current transformer will have been ordered and shipped with the Power Load Monitor, check that this is the case; contact the supplier if in doubt.

Note!

The transformer connection and orientation are not polarity sensitive.

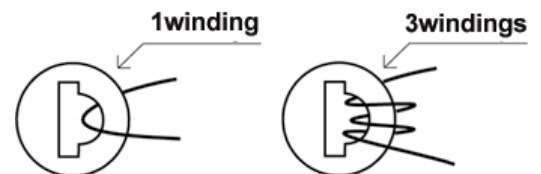


FIGURE 5
Example 1 And 3 Windings.

OPERATION

LED

- A constant green LED indicates a parameter type.
- A flashing green LED indicates a value.

Under normal system operation, the eight LED's are all off (see table 2). Any LED's illuminated will be automatically switched off 30 seconds after the last key press.

AUTO SET

The alarm load level is automatically set by the Auto Set function (see Programming). The value for a parameter, e.g. seconds, kW, HP or margin, can only be set as 0, 1, 2, 4, 8, 16, 32 or 64. Select closest value.

PROGRAMMING

Set up the monitor as below:

CAUTION!

Make sure that all safety measures have been taken before switching on the supply voltage and starting the motor/ machine in order to avoid personal injury.

Verify that suction and discharge lines are connected and tight, valves are open and liquid is flowing under normal conditions to the pump before beginning to set the Power Load Monitor for normal operating conditions.

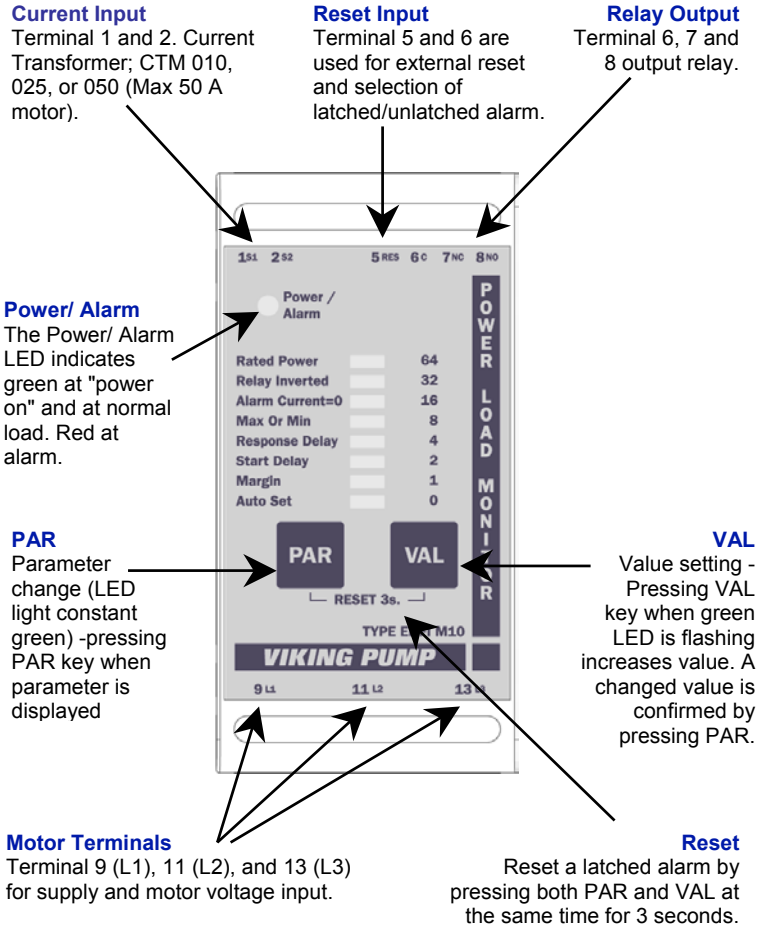
SET- UP AND FIRST START

1. Switch on the supply voltage - Power LED turns green.
2. Press **PAR** once - "LED" AUTO SET turns green.
3. Keep pressing **PAR** until the desired parameter is selected e. g. RATED POWER, see table 2 and 3.
4. Press **VAL** - Factory set value or earlier set value flashes e. g. "64".
5. Keep pressing **VAL** until desired value is displayed (0 - 64).
6. Confirm chosen value by pressing **PAR**.
7. Press **PAR** again and repeat steps 3 to 6 for all parameters except for AUTO SET. See tables 2, 3 and fig. 6 for possible value setting for each of the eight parameters.
8. Start and run motor/system at normal load conditions, also wait until the START DELAY has expired.

Hint!

Short-circuit the output relay during the set-up, this prevents the equipment from stopping unintentionally, see Caution! in section "Wiring".

9. Press **PAR** once - "LED" AUTO SET turns green.
10. Press and hold **VAL** for 3 seconds, at normal machine load. The Auto Set load level is automatically set and the LED is switched off.
11. Set/re-set e.g. start delay, response delay, margin etc. if necessary (see table 2, 3, and figure 6).



EXAMPLE: PUMP WITH OVERLOAD PROTECTION

Pump with overload protection, motor 11 kW (fig. 6).

1. Check output power on motor plate and see table 3 (11 kW =Rated Motor Power 6.1- 12) -setting 8.
2. Switch on the supply voltage - Power LED green.
3. Press **PAR** once - “LED” AUTO SET turns green.
4. Keep pressing **PAR** until RATED POWER is selected.
5. Press **VAL** - Value “64” flashes (factory setting).
6. Set recommended value according to table 3. Keep pressing **VAL** until chosen value (8) flashes.
7. Confirm chosen value by pressing **PAR**.
8. Press **PAR** again and select MAX.
9. Press **VAL** . Choose the factory setting MAX - Overload Protection – “1”.
10. Confirm chosen value (1) by pressing **PAR**.
11. Press **PAR** again and select RELAY INVERTED.
12. Press **VAL**. Choose the factory setting “no” =“0”.
13. Confirm chosen value (0) by pressing **PAR**.

The above parameters are necessary to set for safe functioning. Note that “Rated Power” for the motor must be set before Auto Set.

CAUTION!

Positive displacement pumps require some form of over-pressure protection to be placed in the discharge line in conjunction with the Power Load Monitor. Pressure spikes created by sudden discharge line blockage may cause serious pump damage.

Hints!

Change the load on the machine to find out if appropriate load limit margin is set correctly. You can also reduce the margin by one or more steps to find out at what level the machine will trip. See figure 6. Set/Reset e.g. start delay, response delay, trip margin etc. if necessary (see *table 2*).

If the alarm level is difficult to set - simply perform an Auto Set when the motor is stopped. Then start the machine, run at normal load and perform an Auto Set again.

If a wrong value is unintentionally set - simply set a new value. If the value is not confirmed by pressing **PAR**, the new value is not accepted (time out after 30 seconds).

| PARAMETER | VALUE | FACTORY SETTING | NOTE |
|---------------------------|---|-----------------|--|
| RATED POWER | 0 1 2 4 8 16 32 64 | 64 | See Table 3 |
| RELAY INVERTED | 0(no) 1(yes) | 0 | 0=Relay Activated alarm |
| ALARM CURRENT= 0 | 0(no) 1(yes) | 0 | Alarm at no motor current |
| MAX OR MIN | 0(MIN) 1(MAX) | 1 | 0=underload 1=overload |
| RESPONSE DELAY | 0 1 2 4 8 16 32 64 | 2 | Response delay in seconds (0=50ms) |
| START DELAY | 0 1 2 4 8 16 32 64 | 2 | Start delay in seconds |
| MARGIN (% of rated power) | 0 1 2 4 8 16 32 64 | 8 | Load change for alarm sensitivity. Fig 6 |
| AUTO SET | Autoset load level is automatically set if VAL key is pressed for 3 seconds | | VAL key must be pressed when LED parameter AUTOSSET is lit. LED bar is switched off when Autoset level is set. |

TABLE 2
Parameters and Values

| SETTING | RATED MOTOR POWER IN HP OR Kw |
|---------|-------------------------------|
| 0 | 0 - 0.5 |
| 1 | 0.51 - 1.5 |
| 2 | 1.51 - 2.5 |
| 4 | 2.51 - 6 |
| 8 | 6.1 - 12 |
| 16 | 12.1 - 24 |
| 32 | 24.1 - 48 |
| 64 | 48.1 - 75 |

TABLE 3
Setting or Rated Motor Power

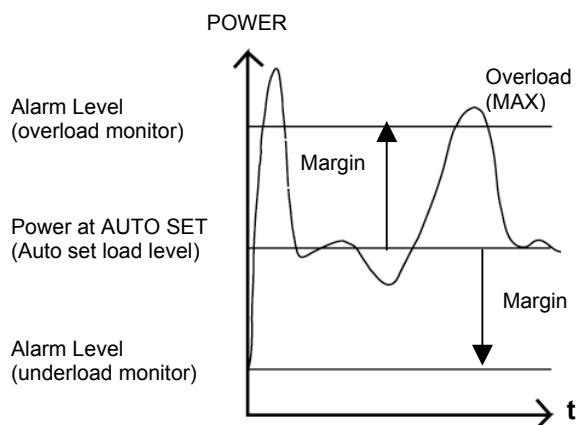
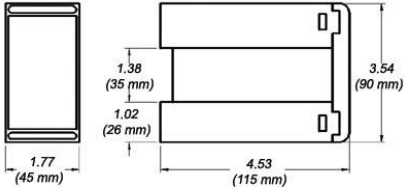


FIGURE 6
Alarm Level and Margin

TECHNICAL DATA

| | |
|-------------------------------------|--|
| Dimensions (WxHxD) | 1.77" x 3.54"x4.53 " (45x90x115mm)  |
| Mounting | 35mm DIN-rail 46277 |
| Weight | 5.65 oz. (175g) |
| Supply Voltage | 1x100-240 (±10%) 3x100-600 (±10%) 3x600-690 (±10%) |
| Frequency | 50 or 60 Hz |
| Current Input | Current Transformer CTM 010,025, or 050 (max 50 A motor) |
| Power Consumption | Max 3 W |
| Start-up Delay | 1-64 seconds |
| Response Delay | 0.05–64 seconds |
| Relay Output | 5 A/240 VAC Resistive, 1.5 A/240 VAC Pilot Duty/AC12 |
| Fuse | Max 10 A |
| Terminal Wire Size | Use 75° C copper (CU) wire only. 0.2-4.0 mm ² single core (AWG12) 0.2-2.5 mm ² flexible core (AWG14) Strip length 0.32" (8mm) |
| Terminal Tightening Torque | 5-7 lb-in (0.56-0.79 Nm) |
| Repeatability | ± 2.5% FS, 24H @ 77°F (25°C) |
| Temperature Tolerance | <0.1%/ °C |
| External RESET on Terminal 5 | Max 240VAC or 48 VDC High :> 24VAC/DC Low: < 1VAC/DC |
| Operating Temperature | 4-122°F (-20-+50°C) |
| Storage Temperature | 22-176°F (-30-+80°C) |
| Protection Class | IP20 |
| Approved To | CE, cUL (UL up to 600V) |

TERMINALS

| TERMINAL | LABEL | FUNCTION |
|----------|-------|---|
| 1 | S1 | Current transformer input for CTM 010, CTM 025,CTM 050 ¹ |
| 2 | S2 | Current transformer input ¹ |
| 3 | | |
| 4 | | |
| 5 | RES | Reset input. Latched or unlatched alarm is selected via this input. |
| 6 | C | Alarm relay common and also reset common |
| 7 | NC | Alarm relay is normally closed. |
| 8 | NO | Alarm relay is normally open. |
| 9 | L1 | Motor voltage phase L1 |
| 10 | | |
| 11 | L2 | Motor voltage phase L2 (N for single phase motors) ² |
| 12 | | |
| 13 | L3 | Motor voltage phase L3 (N for single phase motors) ² |

¹ Note Terminals 1 and 2 (S1, S2) carry Line voltage

² N Must be connected to terminal 11 and 13 (single phase)

PARAMETER LIST

| PARAMETER | FACTORY SETTING | ACTUAL SETTING | ALTERNATE SETTING |
|-------------------|-----------------|----------------|-------------------|
| Rated Power | 64 | | |
| Relay Inverted | 0 | | |
| Alarm Current = 0 | 0 | | |
| Max or Min | 1 | | |
| Response Delay | 2 | | |
| Start Delay | 2 | | |
| Margin | 8 | | |

DISMANTLING AND DISPOSAL

The housing is made of recyclable plastic, PC/ ABS and the circuit board contains small amounts of tin and lead. When disposing, the parts must be handled and recycled in accordance with local regulations.

EU (EUROPEAN UNION) SPECIFICATIONS

**EMC EN 50081- 1, EN 50081- 2,
EN 50082- 1, EN 61000- 6- 2**

Electrical safety IEC 947- 5- 1

Rated insulated voltage 690 V

Rated impulse withstand voltage 4000V

Pollution degree 2

Terminals 5, 6, 7 and 8 are basic insulated from the line.

US SPECIFICATIONS

FCC (Federal Communications Commission)

This equipment has been tested and found to comply with the limits for a class A digital device pursuant to the Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference, in which case, the user will be required to correct the interference at their own expense.



CANADA SPECIFICATIONS

DOC (Department of communications)

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the Canadian interference- Causing Equipment Regulations. Le présent appareil numérique n'émet pas de bruits radio- électriques dépassant les limites applicables aux appareils numériques de la Classe A prescrite dans le Règlement sur le brouillage radioélectrique édicté du Canada.



WARRANTY

Viking warrants all products manufactured by it to be free from defects in workmanship or material for a period of one (1) year from date of startup, provided that in no event shall this warranty extend more than eighteen (18) months from the date of shipment from Viking. If, during said warranty period, any products sold by Viking prove to be defective in workmanship or material under normal use and service, and if such products are returned to Viking's factory at Cedar Falls, Iowa, transportation charges prepaid, and if the products are found by Viking to be defective in workmanship or material, they will be replaced or repaired free of charge, FOB. Cedar Falls, Iowa.

Viking assumes no liability for consequential damages of any kind and the purchaser by acceptance of delivery assumes all liability for the consequences of the use or misuse of Viking products by the purchaser, his employees or others. Viking will assume no field expense for service or parts unless authorized by it in advance.

Equipment and accessories purchased by Viking from outside sources, which are incorporated into any Viking product, are warranted only to the extent of and by the original manufacturer's warranty or guarantee, if any.

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