

Installation and Setting Up Procedure

About product

The LA motor protection relay provides superior thermal overload and phase unbalance protection in applications that would traditionally have used thermal bi-metal relays.

This microprocessor-based electronic motor protection relay, designed to IEC 60255-8, provides overload protection for cyclic or sustained loads, as well as providing unbalance current and single phasing protection.

The integral three phase current transformer module block with 22mm primary apertures facilitates 'straight through' conductor routing from the main contactor to the electric motor in the range of 1 to 250 Amps.

Protection Features Include

The NewElec LA motor protection relay provides accurate protection in the event of:

- Overload (for both cyclic and sustained overload conditions)
- Single phasing / unbalance
- Stall protection - with full thermal memory, hot and cold curve tracking to I.E.C. specs

Description of Operation

The overload level is adjusted on the "Maximum Load Current" dial calibrated in amps. The overload trip delay curve is pre-selected 15 sec @ 600% I_e (motor full load current) for a cold motor which reduces to 5 sec @ 600% I_e for a motor preloaded at 80% I_e.

The overload protection prevents damage caused by:

- Sustained overload
- Cyclic overload patterns
- Stall conditions for hot and cold motors

The actual load current is the greatest value measured on the three line currents. Its value is compared with the value set on the "Maximum Load Current" dial. If less than "Maximum Load Current" the motor "Thermal Capacity" is integrated to increase to the value determined by the % motor preload value. If actual load current is greater than the "Maximum Load Current" setting, a trip delay proportional to the "Overload Level" is initiated, to reduce the thermal capacity to zero. After this time the "Main Trip Relay" will be operated and the "Overload" LED indicator turned on. The "Thermal Capacity" will recover at a rate corresponding to 2 x motor heating time constant for a stationary motor and 1 x motor heating time constant for a running motor. Once 33% thermal capacity is regained and the "Reset" button has been pressed the "Overload" LED indication will clear and the "Main Trip Relay" will re-energise. If "Thermal Memory" is <33% the "Overload" LED will flash at 1 second intervals until the "Thermal Memory" is >33% then the Main Trip Relay will be re-energised and the "Overload" indication LED switched off. This will allow the motor to be restarted thus giving conditional auto reset.

The actual load current level of the motor in service can be measured by pressing the "Reset" push-button and turning back the "Maximum Load Current" dial until the "Overload" LED indicator turns on. The calibration on the "Maximum Load Current" dial will at this point correspond to the actual load

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current being drawn by the motor. Single phasing protection for light as well as fully loaded motor during starting and running conditions.

Unbalance condition exists when the three line currents become unbalanced by more than 20% from each other for load current $>50\% I_e$, and 40% for load current $>20\% <50\% I_e$. The unbalance value is measured as the greatest deviation from the average divided by the average.

On detection of an unbalance condition a 5 second trip delay is initiated after which the "Unbalance" LED indication is turned on and the main trip relay is de-energised. Before the motor can be restarted the "Reset" push-button must be pressed to clear the "Unbalance" LED indication and re-energise the main trip relay.

Descriptive LED indication has been provided for ease of fault diagnosis and information:

Red LED indicators have been used to indicate:

- Overload protection trip
- Single phasing OR unbalance trip

Yellow LED indicates:

- In service - the motor is in service by sensing current flowing in the main circuit conductors.

Green LED indicates:

- Relay healthy - that the internal circuits are functioning correctly and are meeting the requirements of the internal on-line diagnostic program tests.

For manual clearance or reset of the LED trip indication and main trip relay latch circuits a control panel mounted push-button has been provided.

The test push-button will cause:

- If continuously pressed while the motor is in service will result in all LED indicators flashing on and off every second.
- If pressed while the motor is not in service will result in the N.O and N.C output contacts to change state.
- An optional internally mounted backup Nicad battery with permanent charger can be fitted to units where loss of auxiliary supply occurs during the opening of the control panel door.

Information required for Initial Settings

This user friendly relay requires only that you set the motor full load current on the "MAXIMUM LOAD CURRENT" setting dial to coincide with the protected motor's full load capability.

Note: This relay has a fixed cold thermal curve of 15 seconds which integrates to a 5 second curve as the motor reaches its full thermal capacity. Use of this product on large motors designed for cold thermal curves in excess of 15 seconds will result in over protection of the motor.

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- Ensure that the selected LA relay does in fact cover the full load current range of the protected motor. The relay MUST be installed in the MAIN CIRCUIT of the starter. Being compact in design the built in single-turn feed-through primary winding transformers permit the main circuit cable conductors of up to 20 mm to pass through the protection relay.
- If your MCC has electrical and mechanical interlocked door cubicles consider fitting internally mounted backup Nicad batteries with a permanent charger inside the relay. This will retain the LED indications and thermal memory in the eventuality of loss of the auxiliary supply to the relay. If this is not done, the protection relay will allocate a 5 second hot curve for the protected motor when the supply power is restored which will slowly recover to a 15 second cold curve if the motor is not started immediately.
- Wire up the auxiliary power supply to the relay ensuring that the correct connections are terminated to the appropriate supply voltage of either 110 OR 220 Volt a.c as the case might be.
- Connect the N.C contact in series with your trip circuit. (Usually the main contactor holding coil) and, if required the N.O contact can be used for signalling or control purposes. Note that the relay is configured FAIL SAFE to that the output contacts will operate on loss of the auxiliary power supply.
- Set the motor full load current on the "Maximum Load Current" dial in accordance with the protected motor full load capability.
- Apply power to the relay.

Tip:

Applicable once the motor is running. When using the LA motor protection relay on an application where the motor load is relatively constant, it may be a good idea to set the "Maximum Load Current" dial to coincide with the actual mechanical load being drawn by the motor. This can be achieved by holding in the reset button while at the same time slowly turning the counter clockwise on the "Maximum Load Current" dial until the red "Overload" LED lights up. When this point is reached, you will have established the actual load current being drawn by the protected motor.

Now, while still holding down the reset button gently turn the "Maximum Load Current" dial clockwise until the "overload" LED extinguishes and leave as a final setting. The result of this setting up method will enhance the protection to the motor in that frequent overload trips would signal possible bearing degradation which would translate as extra abnormal load to the motor in overcoming additional frictional forces.

Adding or Removing Features on Site

No additional features can be set OR disabled on site.

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Specifications

Input Current

From NewElec Current Transformer Module Block

Overload Curve Accuracy

± 5% : 1,2 to 10 (I_e)

± 7% : 1 to 1,2 (I_e)

Overload Withstand Ratings

LA 10 : 50 Amp cont.

LA 50 : 100 Amp cont.

LA 100 : 200 Amp cont.

LA 250 : 500 Amp cont.

Auxiliary Supply

Range : 110V or 220V AC

Operating Range : 85% to 120%

Burden : 3VA

Frequency Range : 45 to 65Hz

Isolation : 2kV 1 minute
IEC 255-5 / A

Impulse Withstand : Transient 5kV
IEC 255-5 / Class 3

Environmental Withstand

Insulation : IEC 255-5 / A

Impulse Voltage : IEC 255-5 / Class 3

Interference

High Frequency : IEC 255-22-1

Electromagnetic : IEC 255-22-3

Overload Reset Delay

Running : 1 X t heating

Standing : 2 X t heating

Unbalanced Current

Setting (I₂) : 20% (ILOAD)

Calibration : Amps

Detection Level : 102% (I₂)

Repeatability : ± 2%

Trip Delay : 4 seconds

Delay Accuracy : ± 0,05 seconds

Maximum Load Current Setting

Level Setting Accuracy : ± 2%

Repeatability : ± 1%

Detection Level : 102% of (I_e)

Operational Level : 104% of (I_e)

Calibration : Amps R.M.S.

Setting Range : 10% to 100% I_n

Response : Average Value

Contact Ratings

Main Trip Relay : 5 Amps 220V AC

Configuration : 1 n/o + 1 n/c

Terminals : n/c 14 and 15

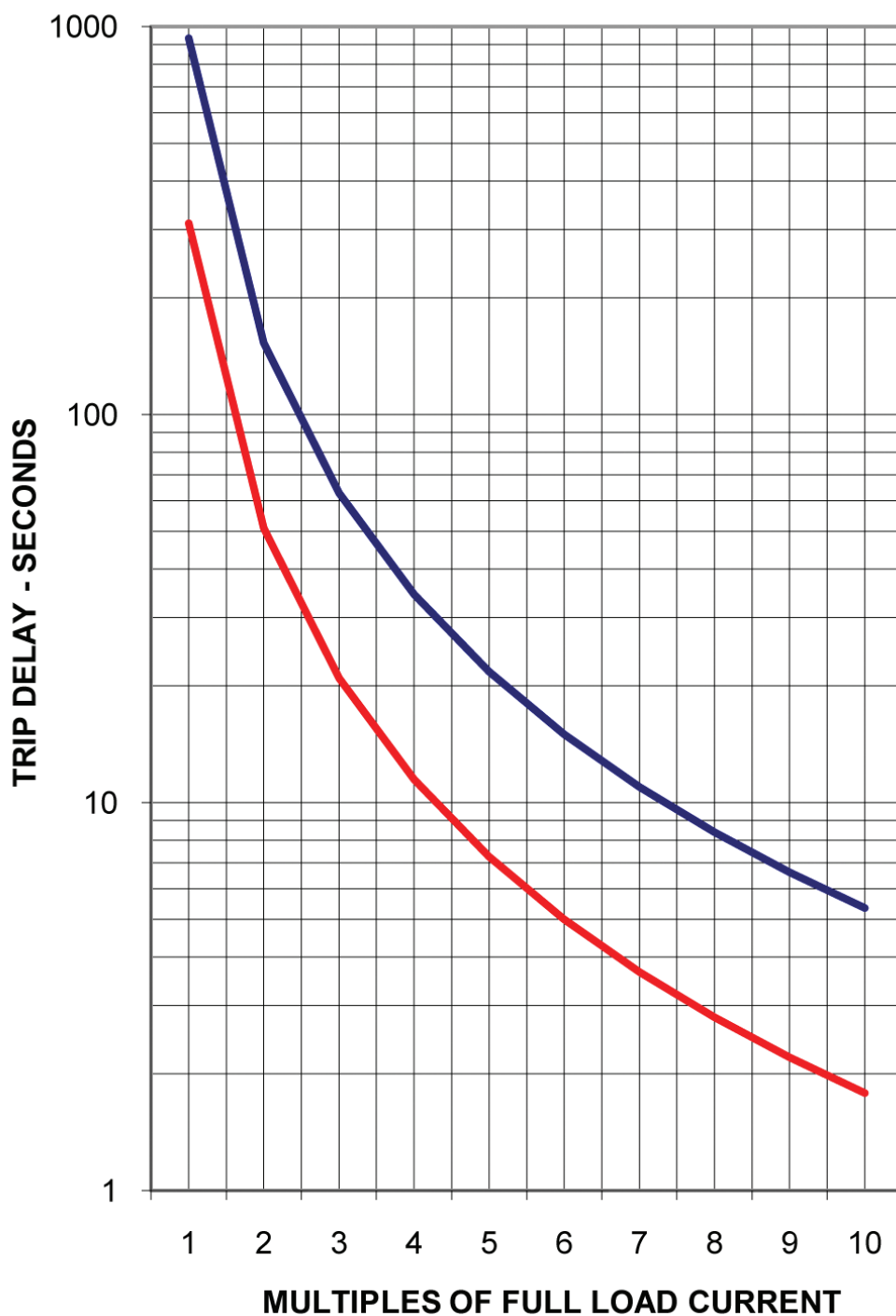
: n/c 16 and 17

Isolation : 2kV separate circuits

: 1kV across contacts

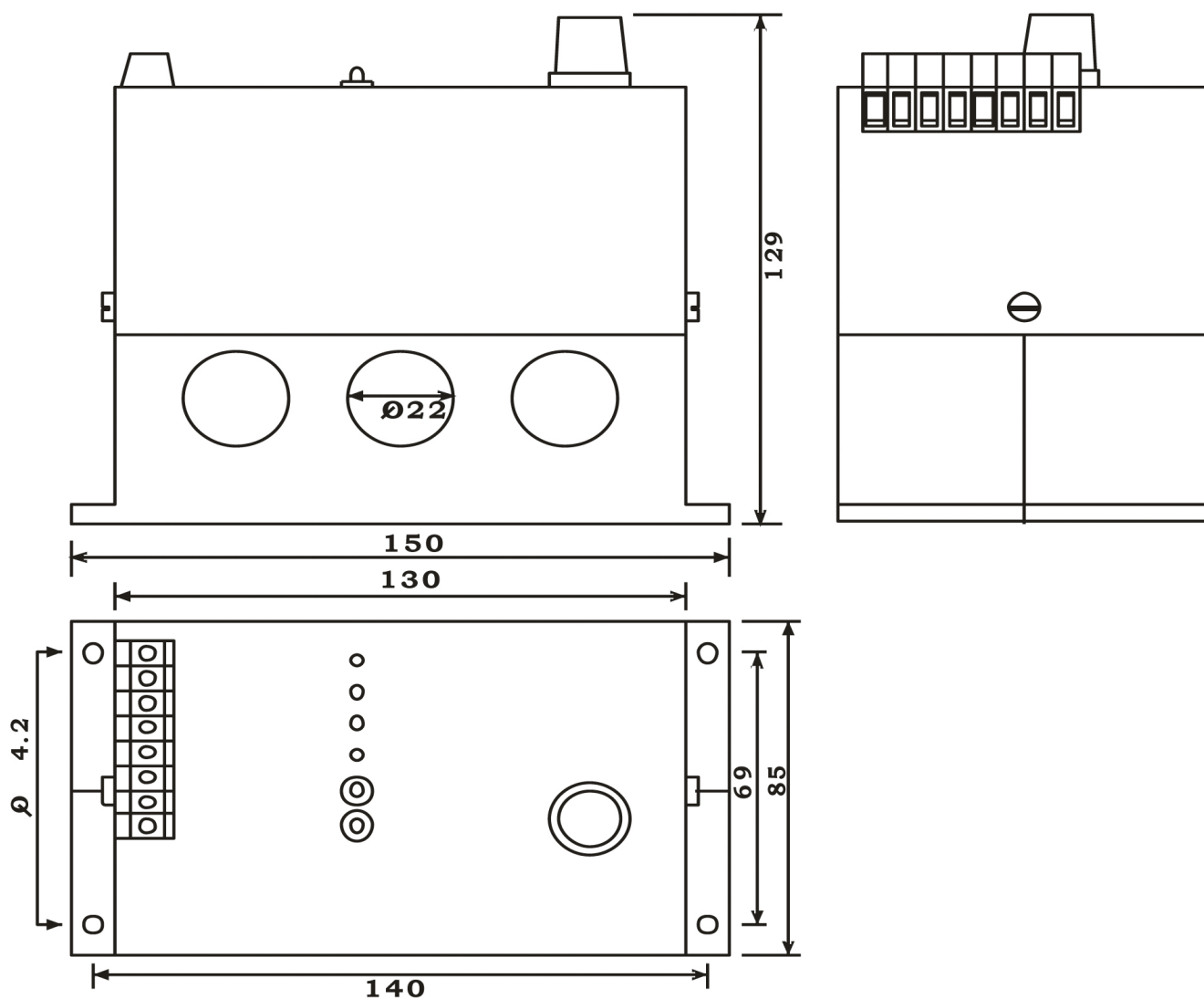
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Thermal Trip Curves



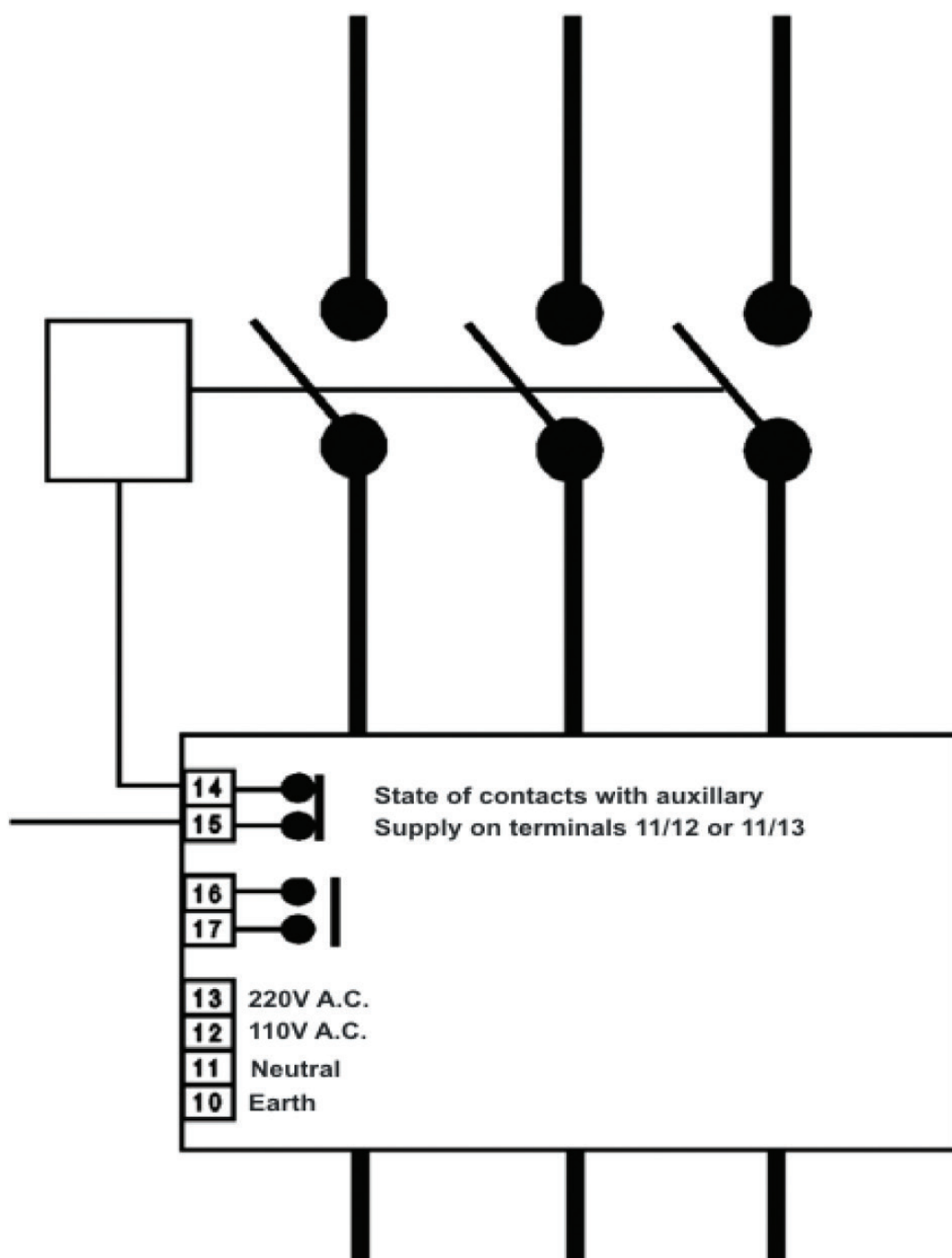
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Dimensional Diagram



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Wiring Diagram



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Ordering Information

MODEL	AMPERAGE RANGE
LA 10	1 to 10 Amp
LA 50	5 to 50 Amp
LA 100	10 to 100 Amp
LA 250	25 to 250 Amp

