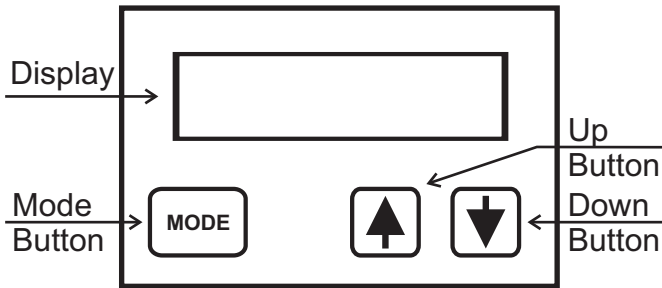


# THE 32 DIGIT OPTIMIZER



**Supplier:**  **N I S T**  
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## THE MODES OF THE OPTIMIZER

The **OPTIMIZER** has 23 different **MODES**, excluding the **Programming Key (M 0)**. To get to a specific mode, press and hold "MODE", then press "▲" or "▼" until the desired mode number (**M 0** to **M23**) is displayed.

To change a specific value, change the **Programming Key** to "Enabled", then go to the desired **MODE**, then press "▲" or "▼".

### DISPLAY

M0: Programming Disabled
M1: Power 1689 Watt
M2: Voltage Ph.1 396 Volt
M3: Voltage Ph.2 405 Volt
M4: Voltage Ph.3 399 Volt
M5: Current 3.35 Amp
M6: Phase Angle 43 Degrees
M7: Error None
M8: Delay Timer 2 Minutes
M9: Aux. Type Normally Closed
M10: CT-Ratio 1
M11: U/L Timer 1:00 (h:m)
M12: Startup Tmr. 3 Seconds

### DESCRIPTION

#### Programming Key:

This MODE should be changed to "Enabled" (Press "▲" or "▼"), to allow you to change the red values.

#### Present Power Consumption: (DEFAULT DISPLAY)

This MODE displays the present power consumed by the motor in Watts.

Range: 0 to 9999W or 10.00 to 999.9kW.

#### Voltage of Phase 1:

The peak voltage is measured, then converted and displayed as a phase to phase value. Press and hold "▲" and "▼" for 3 seconds to get the RMS value.

#### Voltage of Phase 2:

The peak voltage is measured, then converted and displayed as a phase to phase value. Press and hold "▲" and "▼" for 3 seconds to get the RMS value.

#### Voltage of Phase 3:

The peak voltage is measured, then converted and displayed as a phase to phase value. Press and hold "▲" and "▼" for 3 seconds to get the RMS value.

#### Motor's Present Current Usage:

The amount of current used by the electric motor at present, displayed in Amps.

Range: (1-15Amp) x C.T. Ratio (M10).

#### Motor's Present Phase Angle (Phi):

cos(phi) is the present power factor.

Range: 0 to 90 degrees.

#### Error Display Mode:

This mode displays all controller specific errors. See reverse side for more information on controller and control errors.

**Motor Restart Delay Timer:** The motor may only be started a certain number of times per hour. The default value is  $T_r = 2\text{min} \times \text{C.T. Ratio (M10)}$ . Press and hold "▲" and "▼" for 3 seconds to disable. **GUARANTEE EXPIRES IF DISABLED!**

**Auxiliary Type:** This is the state of the external relay contact. The default value is **Normally Closed** (thus the **MOTORSCOPE** runs when contact is closed), but can be changed to **Normally Opened**.

**C.T. Ratio:** Please refer to the **C.T. Ratio Table** on the other side, to obtain the correct C.T. Ratio, in order to display the correct consumed power and limits.

Range: 1 to 64. **When using an external C.T. use correct shunt resistance.**

**Underload Restart Timer:** This timer allows for a bore-hole to fill up after a run-dry condition before the motor is restarted. To change, press "▲" or "▼" or turn the **pot** on the **MOTORSCOPE**. Range: Off or 4min - 59min or 1.00 to 17.00hrs.

**Startup Timer:** The number of seconds after power on, in which the **MOTORSCOPE** won't trip for any fault. This allows for the initial energy surge, which could be up to 5 times normal energy consumption. Range: 0-10sec.

M13:O/L Allow T.  
1 Seconds

M14:U/L Allow T.  
1 Seconds

M15:Min.Ph.Angle  
27 Degrees

M16:Log Function  
None

M17:Max. Current  
4.92 Amp

M18:Max Rec Pwr  
1747 Watt

M19:Min Rec Pwr  
1535 Watt

M20:Pwr H. Limit  
2103 Watt

M21:Pwr L. Limit  
1247 Watt

M22:Rem. Request  
None

M23:Real T.Clock  
Date and Time

Programming  
Controller Data

M7:ControllerErr  
(specific error)

M7:Error  
(specific error)

#### Overload Allow Timer:

The number of seconds an overload condition is allowed before the **MOTORSCOPE** stops the motor. **Range:** 1 to 10 seconds.

#### Underload Allow Timer:

The number of seconds an underload condition is allowed before the **MOTORSCOPE** stops the motor. **Range:** 1 to 241 seconds.

#### Minimum Phase Angle:

The minimum phase angle (phi) allowed. **Range:** 1 to 85 degrees.

#### Log File Handler:

In this mode you can copy up to **16 MOTORSCOPE**'s last **43 trips** to the **OPTIMIZER** (select "uPLd"), clear the **OPTIMIZER**'s memory (select "clr"), or view the trip data of the last uploaded **Log File**.

**Maximum Current Allowed:** This value is set to normal consumed current + 37.5% during the automatic calibration process, but can be manually altered. **Range:** 1 to 15 Amps x C.T. Ratio.

#### Maximum Recorded Power:

This is the maximum value of the consumed power (M 1) since last power up. To reset, press and hold "▲" and "▼" for 3 seconds.

#### Minimum Recorded Power:

This is the minimum value of the consumed power (M 1) since last power up. To reset, press and hold "▲" and "▼" for 3 seconds.

#### Power High Limit:

During automatic calibration, this value is set to consumed power + 25%, but may be manually altered. **Range:** 0 to 9999W or 10.00 to 999.9kW.

#### Power Low Limit:

During automatic calibration, this value is set to consumed power - 25%, but may be manually altered. **Range:** 0 to 9999W or 10.00 to 999.9kW.

#### Calibration / Uncalibration:

In this mode, the **MOTORSCOPE** can be (re-)calibrated (select "CAL") or it can be uncalibrated (when the motor is not running) (select "uCAL").

#### Real Time Clock (RTC):

If the **MOTORSCOPE** has an onboard RTC, the year, month, day, hour and minutes may be read or set in that sequential order.

#### Programming Result:

When a changed value is successfully implemented, "PASS" is displayed, else "FAIL" is displayed.

## M 7 ERROR MESSAGES

#### Controller Errors:

The controller errors consist various "(specific error)" values, which include: memory read or write errors, interrupt errors and other controller specific errors.

#### Control Errors:

- ☞ **Ph. Imbalance** - This is when the supply voltages differ more than 20%.
- ☞ **Ph. Sequence** - This is when two of the supply power's phases are swapped.
- ☞ **No Current** - No electrical current is flowing to the motor. Check motor leads.
- ☞ **Serial Port** - The serial connection between the **OPTIMIZER** and **MOTORSCOPE / PC** is defective. Try again.  
If problem persists, contact supplier.
- ☞ **Insulation Test** - On some of the **MOTORSCOPE**s an insulation test (similar to an earth leakage test) is performed on the motor before startup. If an insulation failure is detected, the motor is not started up and this error is displayed.
- ☞ **Voltage Freq.** - This error is displayed if the frequency of supply voltage is outside of the allowable range (40 - 70Hz).

## C.T. RATIO TABLE

MOTOR CURRENT:	1 to 14 Amp	10 to 28 Amp	20 to 56 Amp	40 to 112 Amp
C.T. RATIO:	1	2	4	8
LOAD RESISTANCE:	32Ω	16Ω	8Ω	4Ω