

M440

**MOTOR PROTECTION,
EARTH FAULT LOCKOUT
&
MANAGEMENT RELAY**

VERSION 3.5

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Presenting the M440 Motor Manager

Performs the functions of up to eight individual units.

BACKGROUND

The M440 Motor manager was designed to control and protect pumps and related units such as motors. Through effective management systems, the unit save lives and electricity. The motor will only operate when necessary thus also saving on wear and tear.

Impressive examples of saving on repairs and downtime, increased reliability and safety enhancements are available from all our satisfied customers.

Why is the M440 unique?

The M440 is based on the M400, an earlier model, which has a proven track record through extensive exposure during the last couple of years. Improvements from the M440 include the stopping and starting of either the motor or pump with Infrared remote control.

With this new remote function, with the on-board infrared receiver, parameters can be set and changed by the customer according to its own individual needs. Data can now readily be download or retrieved. This data represents a history printout directly to a printer. An earth leakage and earth fault lock out protection facility makes the M440 a worldwide leader in pump and motor protection.

Safety

The M440 saves LIVES as it can be operated without any human intervention whatsoever during healthy working conditions, with full remote control functionality. (No physical contact to operate).

A Safety start, Press-release action, is available and changeable via the remote control for pumps working from level control switches. A customer specified Earth Leakage threshold limit.

Protection offered:

- Phase loss detection
- Phase sequence detection
- Dry run/Under current (Selectable level and time)
- Pump blockage/Over current protection (Selectable level)
- Over voltage protection (Fixed level and time)
- Under voltage protection (Fixed level and time)
- No load detection/Ct open circuit
- Single phase protection between motor and contactor
- Motor short circuit protection (Fixed curve)
- Earth leakage protection (Fixed level)
- Earth fault lock out (Fixed level)

Manage

The M440 manages systems by means of:

- An auto start function after all faults are clear (Adjustable)
- A manual safety start feature
- An auto start after a Dry run
- A connection to a PLC. or Telemetry system (Optional)
- 2 x On board hour meters
- On screen display of the history data

Brief description of the operation

The M440 checks the three phases(Incoming and motor), CT, Core balance, Stop and Start switches. When all is OK and AUTO start is programmed, the M440 will start the motor/pump after the preset time. When the motor exceed the load limits the M440 will stop the motor, restart (if programmed) the motor/pump after the set time. Any other faults as Earth fault of Phase loss will stop the motor immediately.

Features

- Self test facility, including Circuit test
- Alpha numeric display to indicate state of pump/circuit
- Timer functions to start/re-start the motor
- Remote Stop/Start
- Remote adjustments u/c, o/c, timers etc
- Number of starts per minute
- Data logging (Hour meters & History)
- On board hour meters
- Run low/high indications
- Auto start off or count down
- Auto stop after preset time
- Dry run count down
- Over current count down
- All parameters adjustable via infrared remote control
- Toll free technical support line 0800 000 400

Advantages

- Protects the equipment, saving on down time, and therefore increases reliability
- The system is installed inside the starter panel of the equipment and fits onto a standard “Din Rail” mounting
- 11 Pin plug in unit
- Easy installation and initial set-up, there after no further operation adjustments required
- Easy calibration/Check calibration
- Low voltage on the Stop and Start button
- Added safety offered is the auto start and Earth leakage protection
- Start button activates when released
- Auto start after fault detection, even after total power loss
- Difficult to bypass unit
- User friendly

Typical applications

Our units are suitable for a wide range of applications, these include the mining, agriculture, food, chemical, and shipping industries, and more specifically the following:

- Pumps located in remote areas
- Mining dewatering pumps
- Irrigation pumps
- Pump control for pipe line systems
- Crude oil and fuel pumps
- Sewerage and sludge pumps
- Compressor pumps
- Air conditioning and cold room pumps
- Conveyor belt drive systems
- Fan motors

M440 Quality means

- Five year limited warranty
- State of the art surface mount technology
- Highest quality components available in the world
- Vibration resisted printed circuit boards
- Self diagnostic software
- High speed RISC type micro controller

Remote control settings

The M440 is programmable via the aid of a preset remote control that allows total flexibility and complete personalization of each and every unit.

M440 Accessories

- M440 Auxiliary relay
- DL77 data logger and printer for download of data
- Current transformer
- Core balance (30mA, 100mA, 250mA or 375mA)
- Din rail mount for CT regulator and voltage converter

Quick Start

1. Connect the M440 as per drawing
2. After power up the display should read Auto/Off or Auto/60. The led on the M440 and voltage converter must flash. (If not refer to faultfinding)
3. Push the start button and release after 1 second. The M440 will now start the motor. Press and hold the start button.
4. The reading on the display should read 100%. If the load is less than 100% turn the CT regulator clockwise until the load is 100%. If the CT regulator reaches it's limit increase the number of turns through the CT.
5. If the load is more then 100% turn the CT regulator anti-clockwise until the reading is 100%. If the CT regulator reaches it's limit, decrease the number of turns trough the CT.
6. Should the motor trip before the setting is obtained, push the STOP button, or switch the power off and on, then restart the motor as in 3.

Adjustment

1. At any time when the motor is running and the START button (Manual or remote) is pressed, the M440 will display the load.
2. Timers for various functions are available.

Fault Finding

Dead

-Check the supply voltage, M440 connections 2 and 3

Phase loss line

-Check the Three incoming phases, M440 connection 9,10 and 11

Phase rotation

-Incoming phases in the wrong direction

CT open circuit

-Check the wiring from the CT; check the Ct, M440 connection 4 and 5

Core balance open circuit

-Check the wiring from the Trans core; check the Trans core, M440 connection 4 and 6

Stop

-Stop switch open circuit or pressed.

Stop with red led on

-Earth fault on cable or motor

Auto or off latched

-Start switch closed or pressed

Phase loss load after start

-Excessive or no current drawn by motor

Remote control settings

Button definition

<i>Button</i>	<i>Function</i>
CH+	Enter menu, move up in menu
CH-	Move down in menu
V+	Increase the value
	Data playback
V-	Decrease the value
	Reset the REST time
	Clear the data.
Enter	Save the altered information
Start	Start the M440
	Display the load
Stop	Stop the M440

How to enter the Menu

Press CH+ on the remote control to enter the program

Which TYPE to use

Type	40	Limited access to program
Type	29	Advanced settings
Type	44	Show "RUN" on screen
Type	46	Show "%" on screen
Type	63	Lock out after over current
Type	255	Default the M440

Use V+ or V- to move to the required TYPE then press CH+ to move up in the program.

Menu structure description

- AUTO:** M440 Relay closes motor contact automatically after set time elapsed.
- PRIM:** Time from start-up of motor to the condition where the load current is between the settable limits of OCP and UCP (Graph 1)
- AOFF:** M440 Relay opens the motor contact automatically after the set time elapsed.
- DRY1:** M440 Relay restarts the motor automatically by closing the motor contact after the first under current condition.
- DRY2:** M440 Relay restarts the motor automatically by closing the motor contact after the second under current condition.
- UCDT:** Timer to delay under current trip condition.
- SUDT:** Settable time for start-up of the motor until the start current level reduce to a level less than 255% of load current.(Graph 2)
- OCC:** Amount of restart allowed after the M440 relay stopped due to over current conditions.(Type 63 to block function)
- OCWT:** Settable value in minutes for the M440 relay to wait before restart the motor after an over current trip.
- UCP:** Settable level for under current level. (Full load current of motor =100%)
- OCP:** Settable level for over current conditions of motor. (Full load current of motor =100%) (Graph 3)
- MPS:** Settable value in minutes to allow the motor to rest between starts.
- SAFE:** When the setting is "on" the start push button must be pushed and released before the motor will start.
When the setting is "off" the start button must stay picked up.
- PHSE:** When the setting is "on" the M440 relay needs all three phases to operate.
When the setting is "off" the M440 relay don't need any phases to operate. (Single phase motors)
- AUX:** For use with external relay. (Version 4.5,4.6.)
- CODE:** Access to internal operations. Not to be used by client except:
A:) Code 30 to multiply the leakage current level by two during start up conditions. This functions will automatically reset after the PRIM time elapsed after start up.
B:) Code 6 to block all protection functions for two minutes to set up relay.

This is what you can set on TYPE 40

<i>Menu Structure</i>	<i>Setting</i>	<i>Unit</i>	<i>Description</i>
TYPE	0-255		
AUTO	Off-255	Minutes	Auto start timer
PRIM	2-255	Seconds	Allow pump to prime
AOFF	Off-255	Minutes	Auto off timer
DRY1	Off-255	Minutes	Restart after first dry run
DRY2	Off -255	Minutes	Restart after second dry run

This is what you can set on TYPE 29

<i>Menu Structure</i>	<i>Setting</i>	<i>Unit</i>	<i>Description</i>
TYPE	0-255		
AUTO	Off-255	Minutes	Auto start timer
PRIM	2-255	Seconds	Allow pump to prime
AOFF	Off-255	Minutes	Auto off timer
DRY1	Off-255	Minutes	Restart after first dry run
DRY2	Off -255	Minutes	Restart after second dry run
UCDT	1-15	Seconds	Under current delay timer
SUDT	.1-5.0	Seconds	Start up delay timer
OCC	1-5	Starts	Restart after over current trip
OCWT	Off- 255	Minutes	Wait time after over current trip
UCP	10-100	Percent	(Under current trip 100%= Full load)
OCP	100-255	Percent	Over current trip 100%= Full load)
MPS	Off-255	Minutes	Minutes between start
SAFE	ON-OFF		Safe start on/off
PHSE	ON-OFF		Phase detection on/off
AUX	0-255	Number	Use with external relay
CODE	Level3 access to internal operation. Refer page *		

M440 History Record

ID NUMBER	BBGH	
TOTAL HOUR	207:58	HOURS
LAST HOUR	16:15	HOURS

TOTALS

DRY RUN TOTAL	18	EVENTS
OVER CURRNET	7	EVENTS
CT FAIL	2	EVENTS
EARTH FAULT	2	EVENTS
PHASE LOSS LINE	3	EVENTS
TOTAL STARTS	9641	

LAST TRIP FIRST	RUN TIME BEFORE TRIP	LOAD AT TRIP
Dry run 2	0:05	58%
Dry run 1	5:16	58%
Phase loss line	12:34	100%
Dry run 1	58:02	45%
Earth fault	45:45	102%
Earth fault	38:12	97%
Over current	12:09	156%

Current Settings

TYPE	40	
AUTO	1	MIN
PRIM	3	SEC
AOFF	OFF	MIN
DRY1	15	MIN
DRY2	60	MIN
UCDT	3	SEC
SUDT	0.8	SEC
OCC	3	TIMES
OCWT	5	MIN
UCP	60	%
OCP	120	%
MPS	4	MIN
SAFE	OFF	
PHASE	OFF	Phase Detection
AUX	18	Auxiliary Contacts

M440 Electrical Specifications

Control voltage	110v/220vAC
Power dissipation	2.8va
Phase voltage input	220v/380v/525v/1000v
Motor load size	0.25W-5MW
Relay output	10A@250vAC
Current Transformer	200:1 (0-50Amps)
Case Material	ABS Plastic
Operating temperature	-10°C to 65° C
Earth Leakage protection	30mA/100mA/250mA
Size	41x76x90 (WxHxDmm)

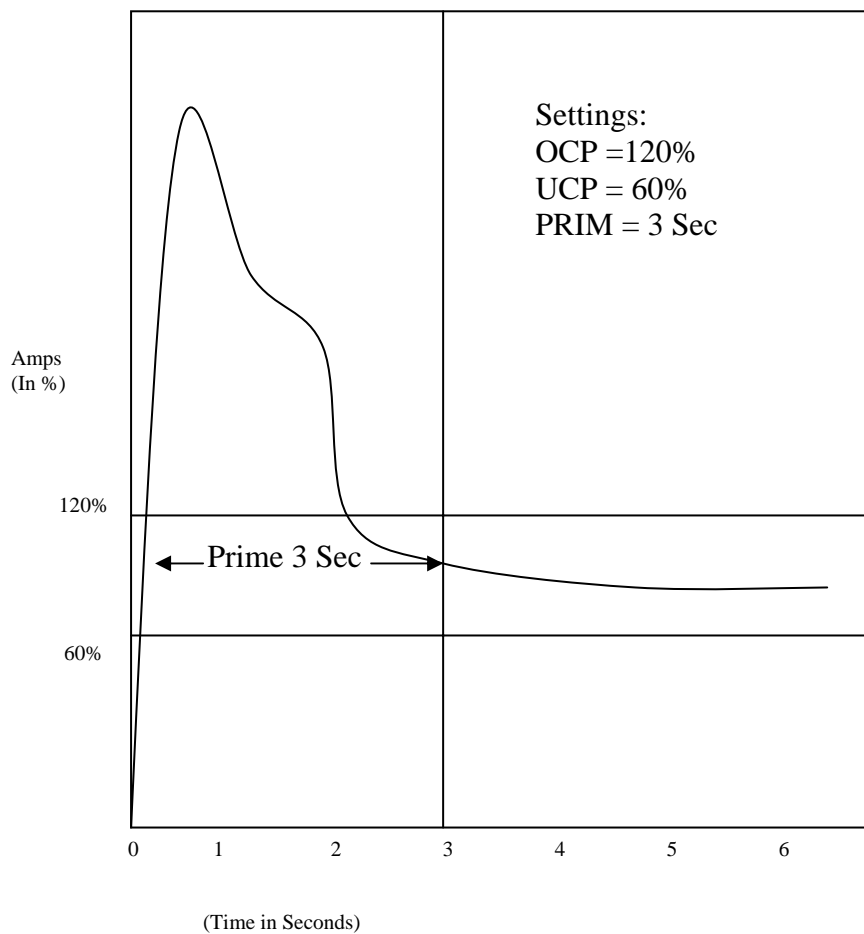
M440 Start-up

When starting the M440 relay the following will be displayed.

Display	Meaning
^	SUDT Time
ON	Prime time
RUN	Motor run between set limits
RUN LOW	Motor run close to under Current limit
RUN HIGH	Motor runs close to over Current limit

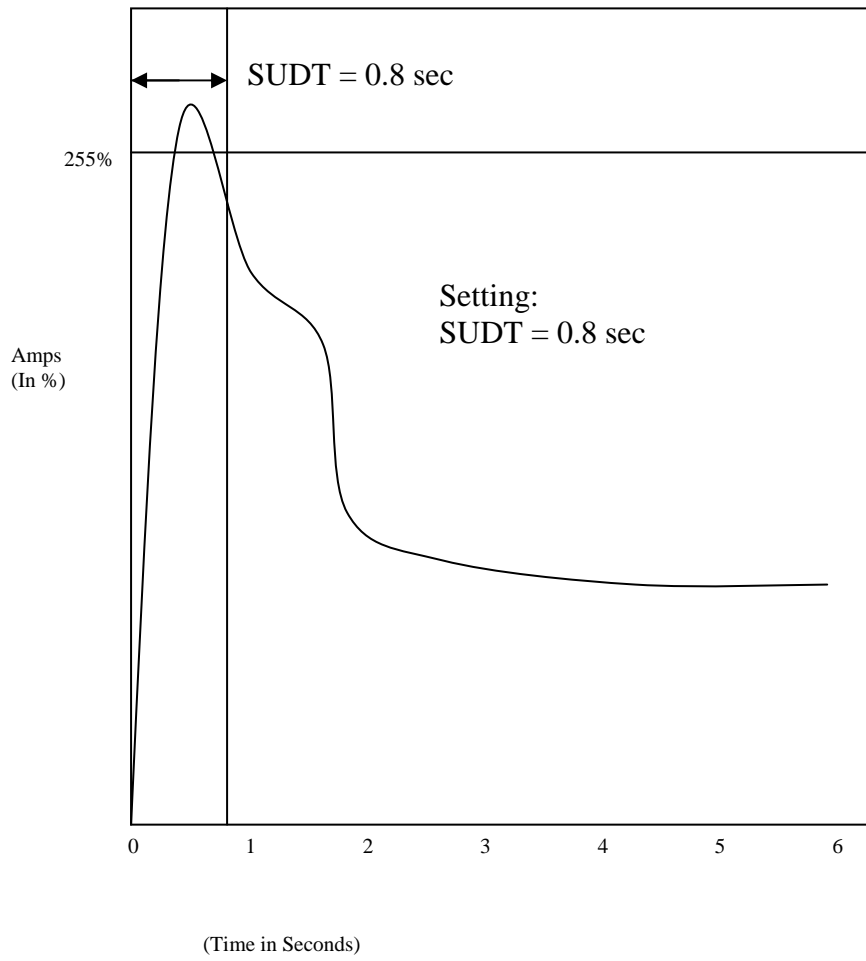
Graph 1

Start-up Curve



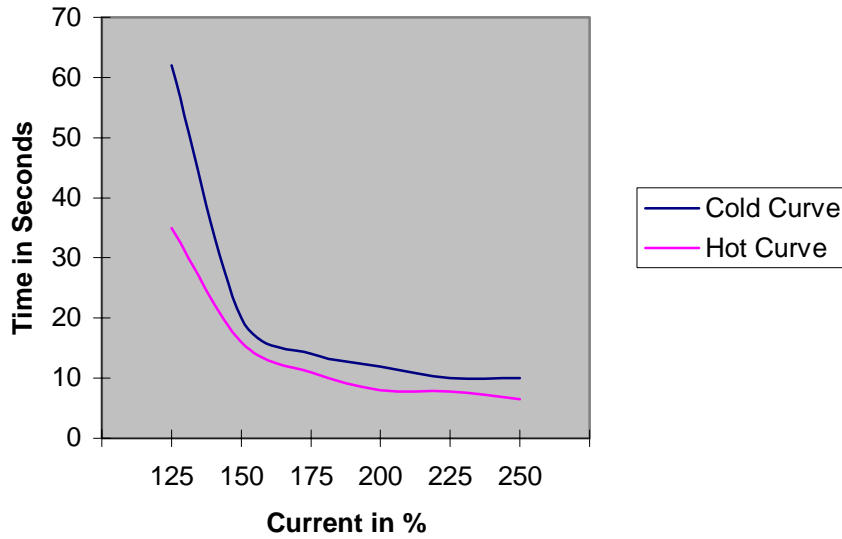
Graph 2

Start-up Curve



Graph 3

Thermal Over Current Curve



Setting: Prim = 3 Seconds

Cold Curve: Time from start-up to trip. When PRIM = 5 add 2 seconds to operating time. When PRIM = 11 add 8 seconds to operating time.

Hot Curve: Hot curve only activate 4 minutes after start-up