M30

MOTOR PROTECTION RELAY

TECHNICAL REFERENCE GUIDE VOLUME 1.2

FIGURE 1 M30 MOTOR PROTECTION RELAY

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1. Introduction

About this manual

This manual was prepared to aid the engineer in the configuration, setup and implementation of the M30 in electrical systems with easy to understand terms and procedures.

About the M30

The M30 motor protection relay is the most advanced motor protection and motor management relay on the market to date. It is a fully configurable relay and offers true RMS voltage measurement up to 2500Vac phase to phase and true RMS current measurements up to 6500.0 Amps per phase. Sensitive earth leakage protection measures 30mA to 6A. One amp secondary current transformer inputs are software selectable. The last 16 events are logged with date and time stamp. Live line indication will indicate if there is any voltage present on the phases, even if the M30 is powered down. Earth lockout protection will detect an earth fault before the motor is started. Automatic earth leakage self-test is logged with date and time stamp.

The M30 offers:

- Three true RMS voltage channels
- Two true RMS Current channels
- Three binary NO/NC inputs
- Four voltage free relay contacts
- USB communication
- Sensitive earth leakage protection
- Earth fault lockout protection
- Live line indication
- Remote controlled Infra-red port
- Infra-red data download
- Real time clock

The M30 is locally manufactured to international standards utilizing the best components available. We offer 24/7 toll free technical support, backup service and training.

The M30 has all the following protection functions available.

- Accurate true RMS voltage and true RMS current measurement
- Over/under voltage protection
- Three-phase thermal overload protection (IEC255-8) or definite time trip
- Under current protection with definite time trip
- Voltage and current unbalance protection
- Phase loss and phase rotation protection
- Startup protection thermal stress calculation
- Sensitive earth leakage protection with definite time trip
- Earth fault lockout protection
- Contactor failure protection
- Short circuit protection
- Lock rotor protection
- Real time clock for event logging with date and time stamp
- Cumulative startup counter with starts per hour protection
- Data logging of all events including Stop, Start and Power up
- Live line indication

M30 HMI (human machine interface)

The M30 operates as a user friendly device with real time data available to the operator. All the data is available on the 8x2 LCD display and all parameters are adjustable via personal computer or handheld infra-red remote control. Download date and time stamped history via USB or Infra-red I Link (Ex ia I/IIC).

The easy to use handheld infra-red remote control is used to Stop/ Start or navigate through the menu and adjust any of the settings.

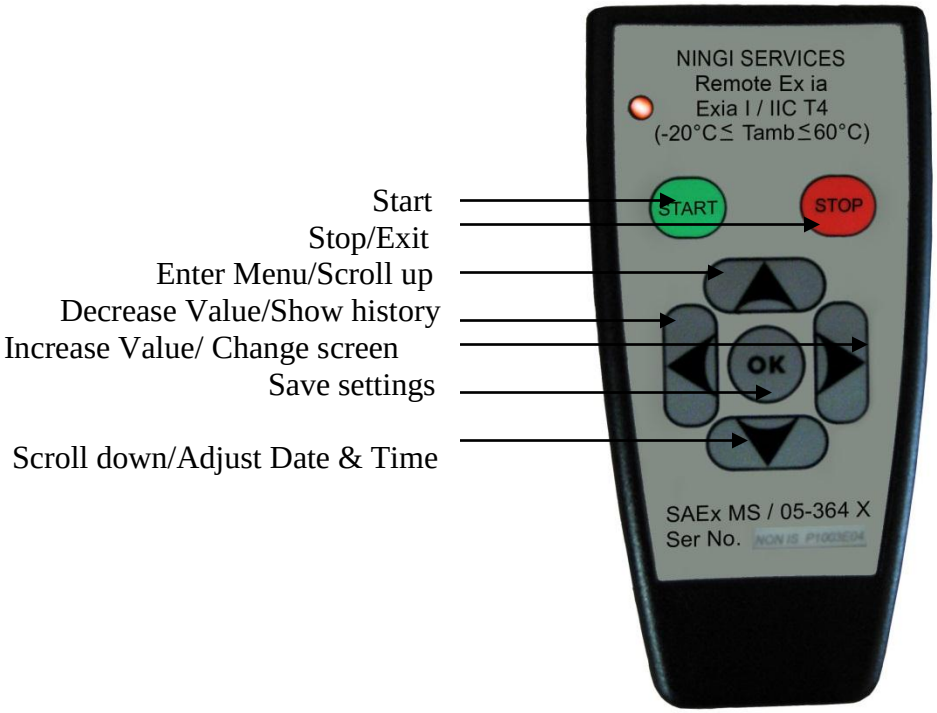


FIGURE 2 INFRA RED REMOTE CONTROL

Warranty

The M30 carries a one year limited warranty on all parts and labor.

2. Safety information

- Dangerous voltages can occur on the connectors, even if the auxiliary voltage has been disconnected.
- Only a certified electrician is allowed to carry out the electrical installation.
- Breaking the seal on the fixing screws of the device will result in loss of warranty.
- Electrical safety regulations must always be followed.

3. M30 Configuration

About the configuration

The M30 is a fully configurable motor protection relay. The M30 can be configured with the configuration program **M30Config.exe** (available free of charge www.tech4000.com). The program is a windows based GUI (graphical user interface) program to configure the M30 via USB as required.

With the configuration cleared no inputs, outputs or relays are connected.

The configuration allows the engineer:

- THREE INPUTS A,B and C WHICH CAN BE CONFIGURED AS NORMALLY OPEN OR NORMALLY CLOSED INPUTS
- FOUR VOLTAGE FREE CONTACT RELAYS WHICH CAN BE CONFIGURED TO OPERATE FROM ANY INPUT OR MOTOR PROTECTION FUNCTION (LATCH OR MOMENTARY)
- AN INTERNAL BUZZER ON ANY EVENT
- ONE RED LED ON ANY EVENT
- ONE BLUE LED ON ANY EVENT

Any combination of inputs can be connected to Stop or Start the M30 or operate one or more relays with or without intervention from the motor protection block. The design engineer is free to configure the M30 at will.

Note: The M30 comes standard with the default configuration loaded into memory.

Configuration:

Default configuration

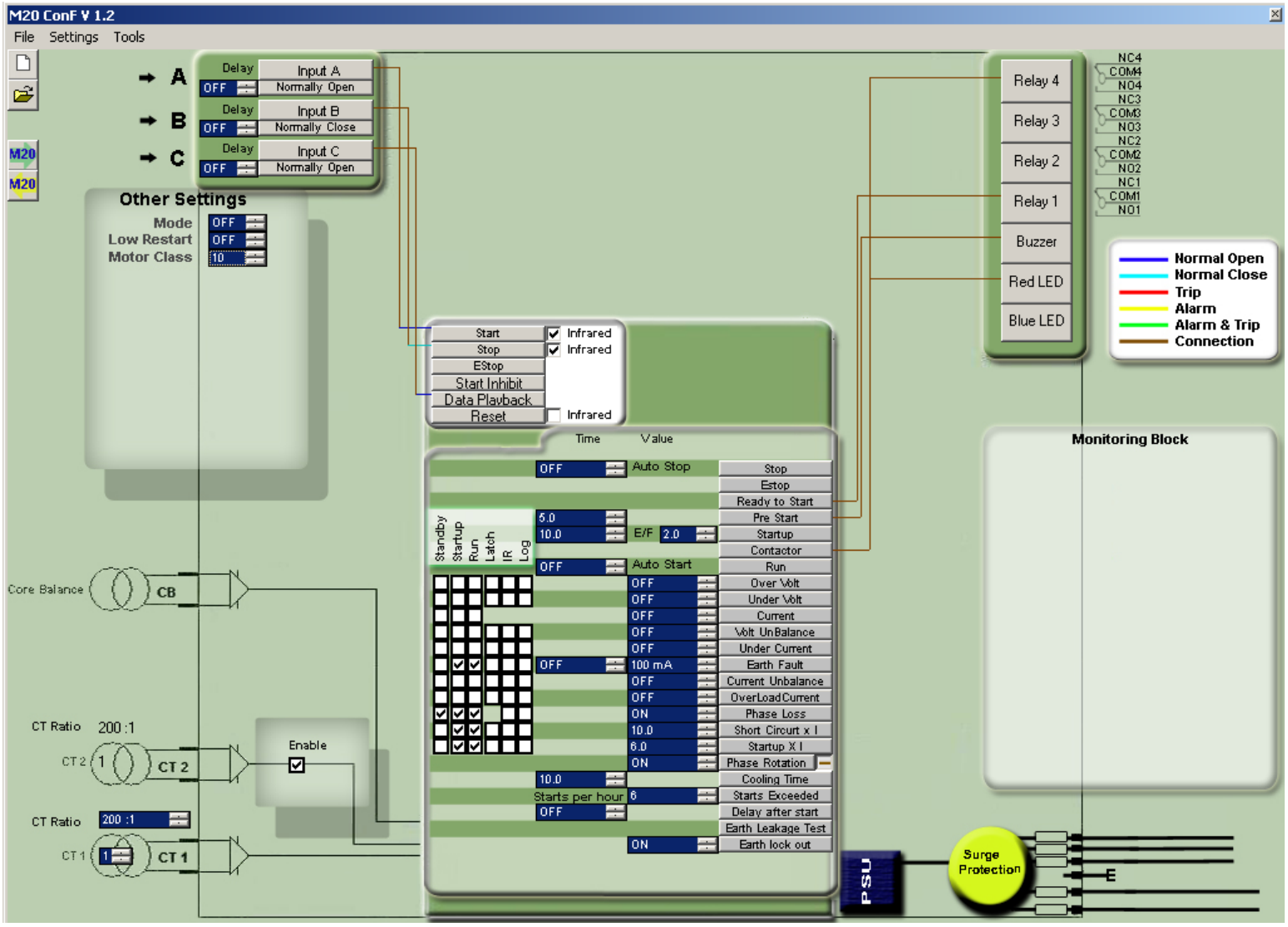


FIGURE 3 M30 DEFAULT CONFIGURATION

Configuration cleared

When the M30 configuration is cleared, all inputs are disconnected from the outputs leaving the design engineer free to connect any input to the motor protection block and relays

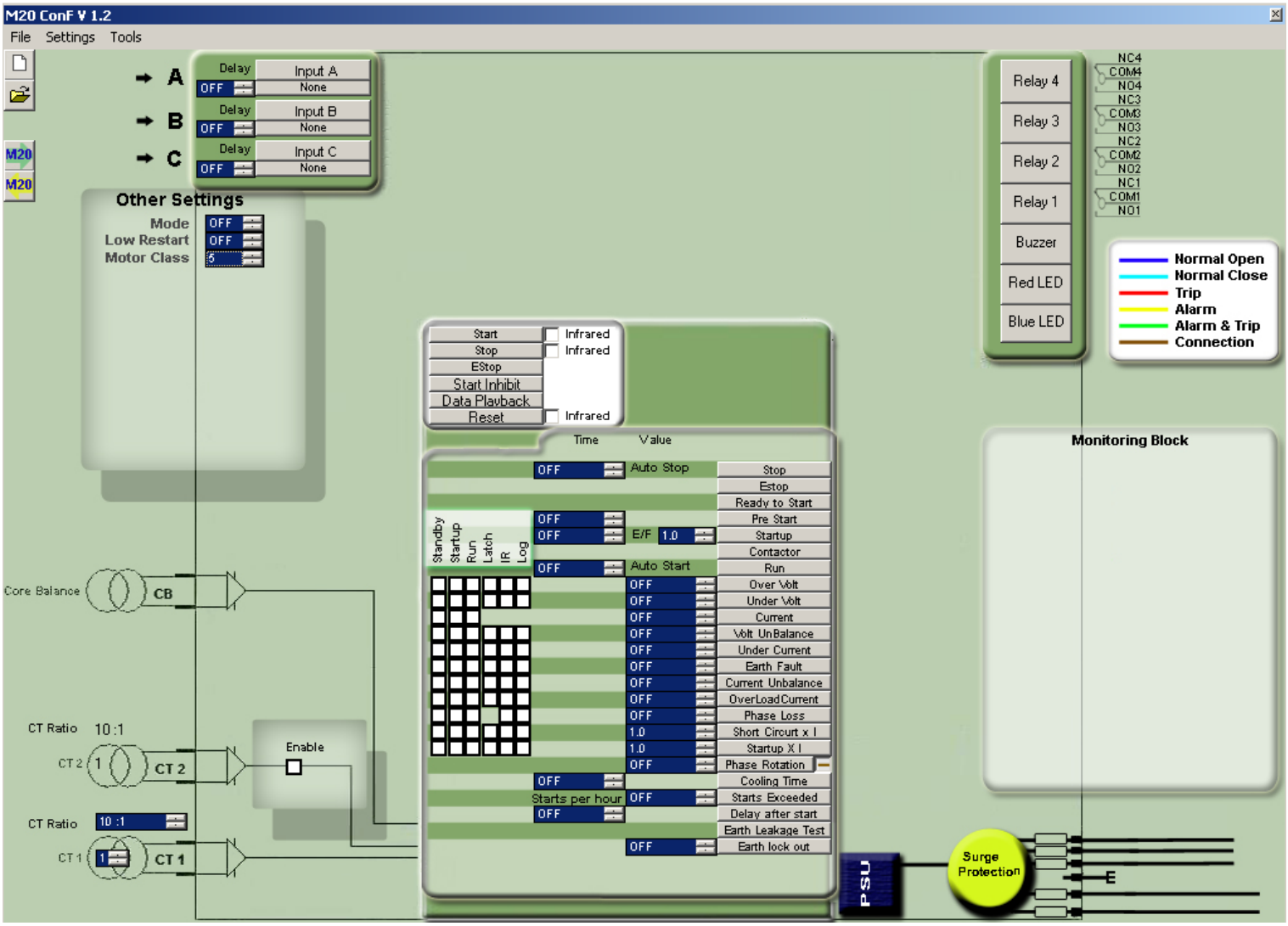


FIGURE 4 M30 CONFIGURATION CLEARED

Example 1:

Requirement: Input A to start the M30, Input B to Stop the M30. Main contactor connected to relay 4 and Pre start alarm connected to Buzzer.

Connect input A to Start. Click on INPUT A, select the input normally open.

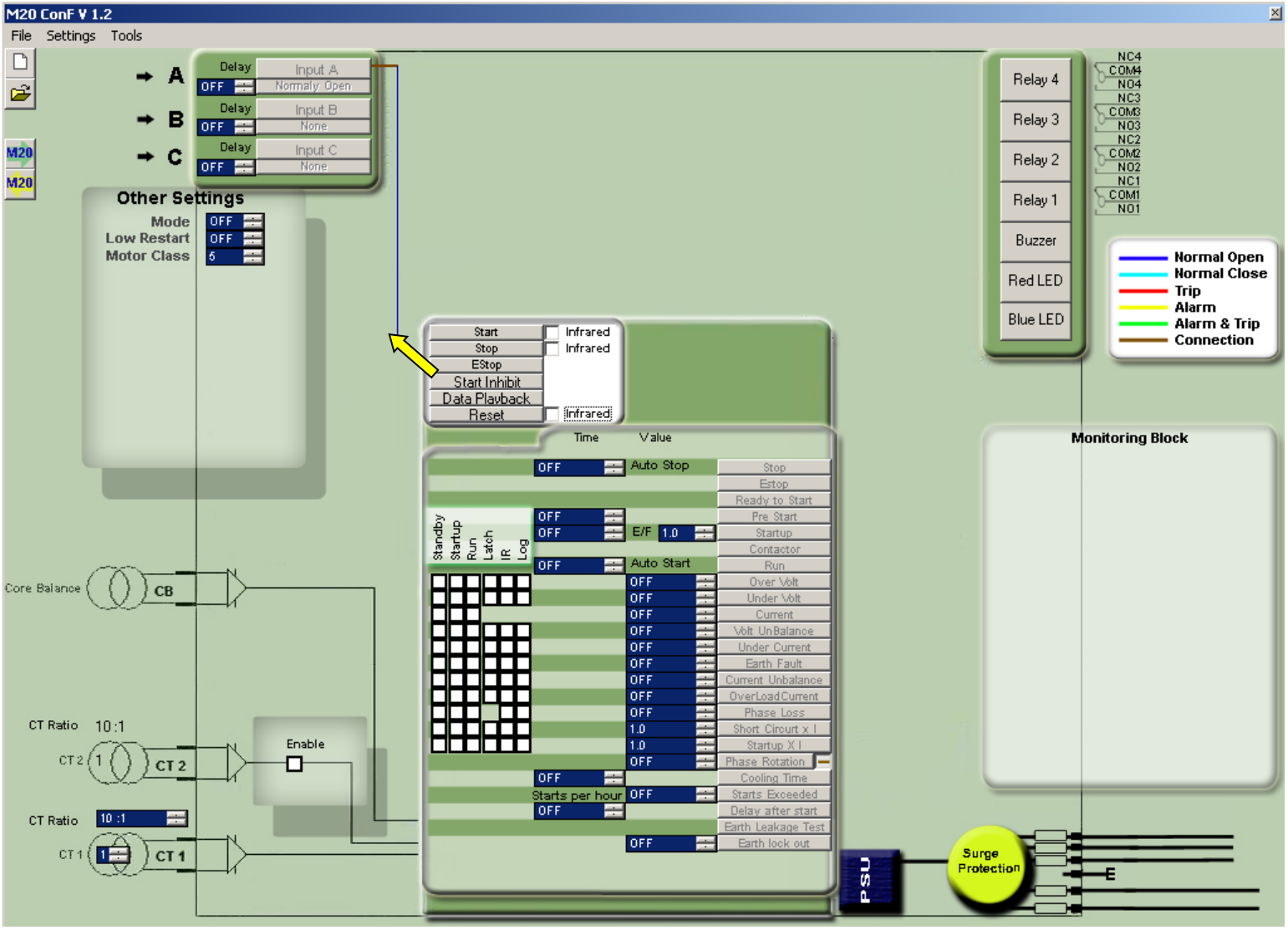


FIGURE 5 EXAMPLE 1 CONFIGURATION

Click on input B and select the Stop button as normally closed and connect to stop on the motor protection block. Connect the Contactor relay output from the motor protection block to relay 4 and the pre start output from the motor protection block to buzzer.

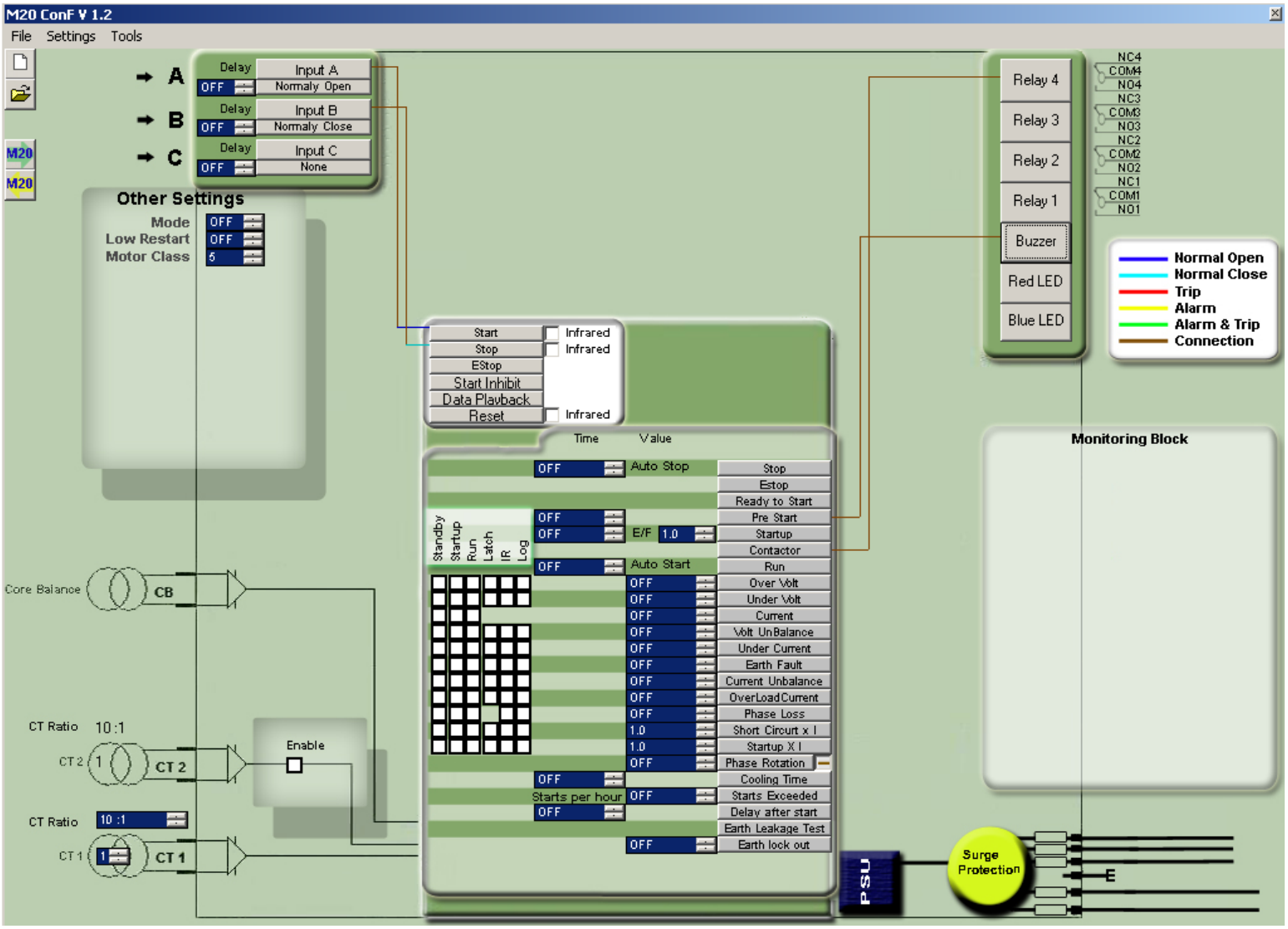


FIGURE 6 EXAMPLE 1 CONFIGURATION

To remove a connection, right click on the connection. Select the connection, then click remove. The line is now removed.

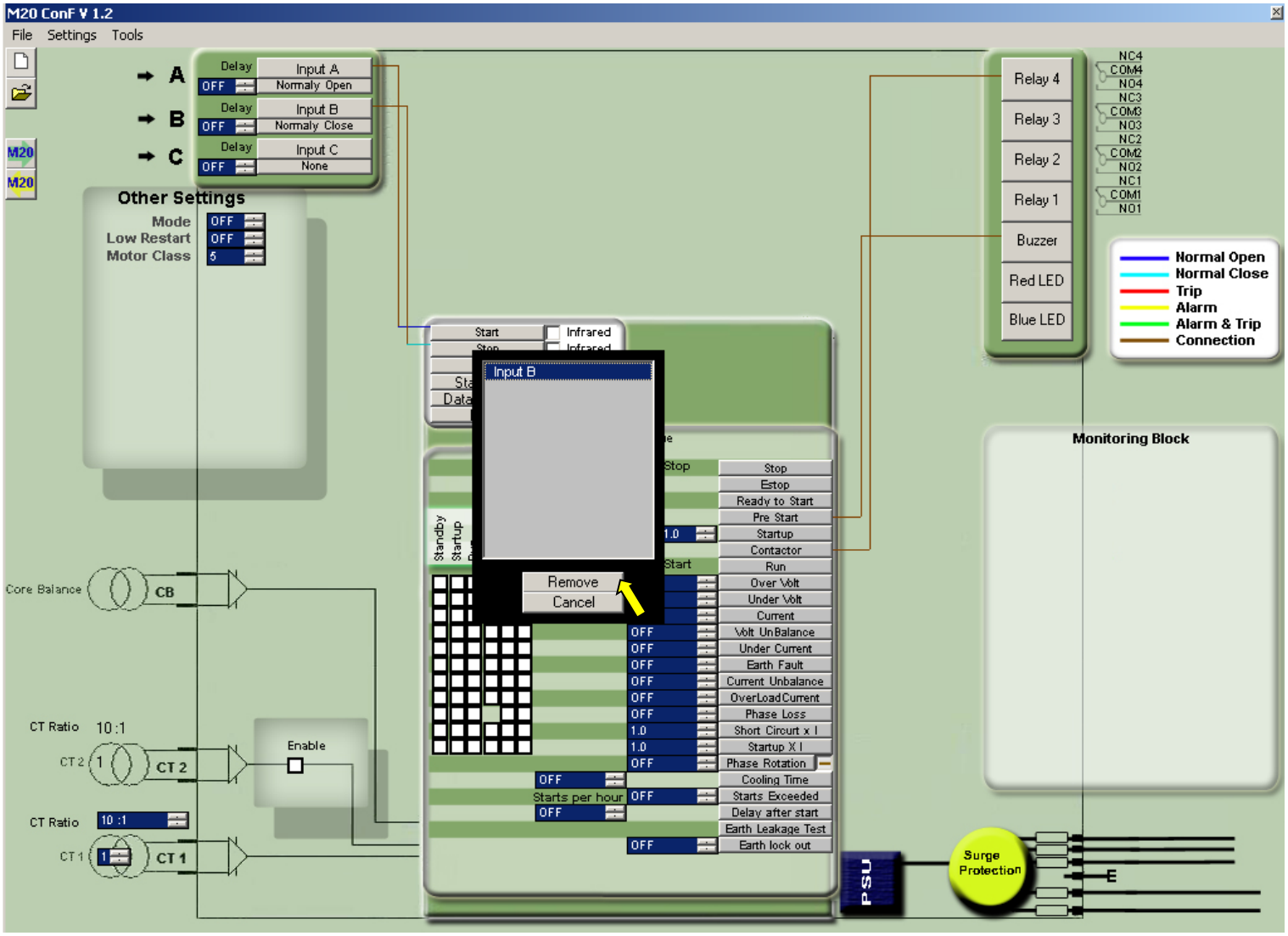
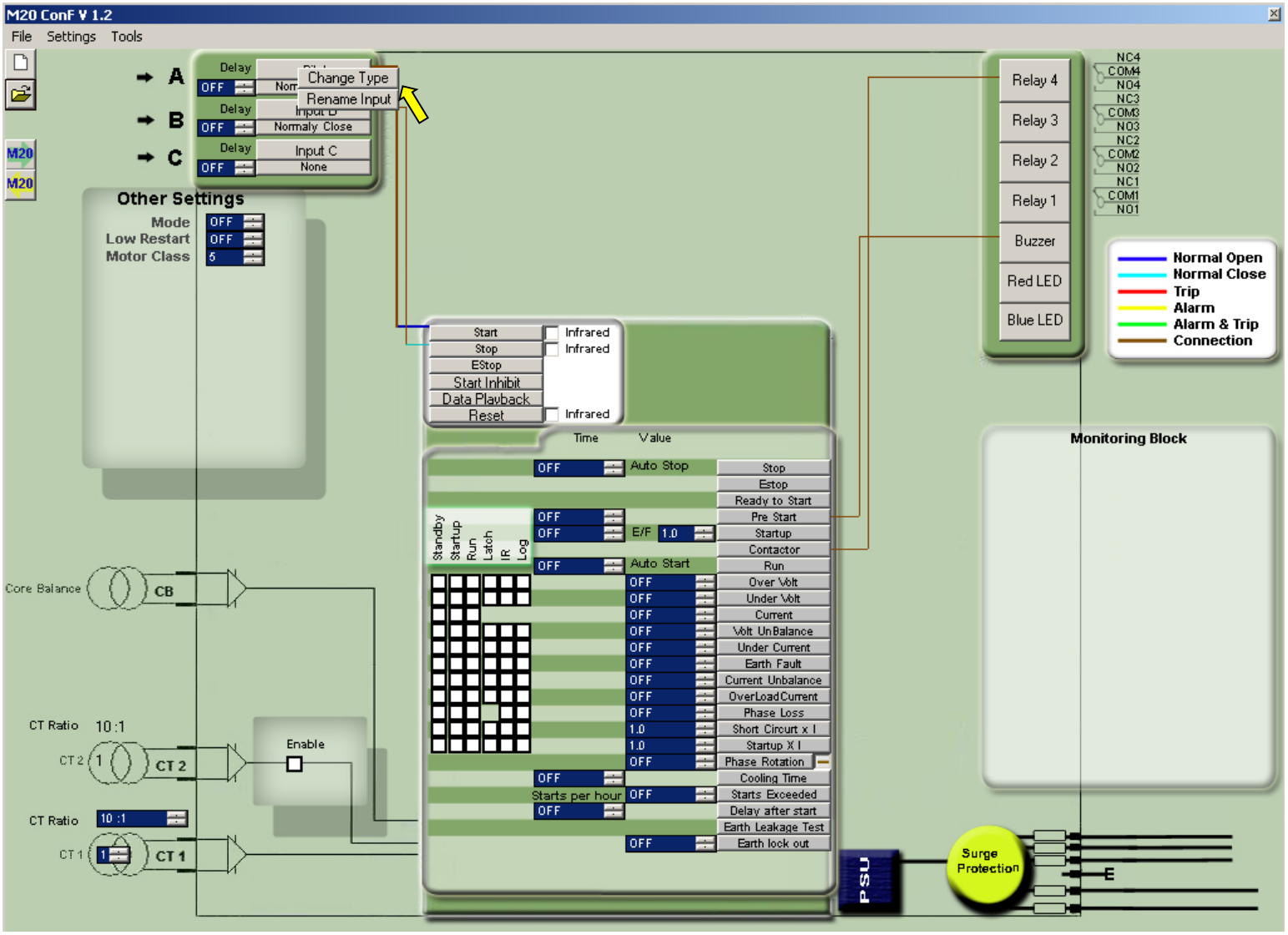


FIGURE 7 EXAMPLE 1 CONFIGURATION

Customize the inputs to user preference. Right click on the input and select rename. Type the required name and enter.



The event recorder will save the renamed input when the input causes an event.

FIGURE 8 EXAMPLE 1 RENAMING

Connect the M30 via the USB cable to the PC. Use the shortcut key to update the M30.

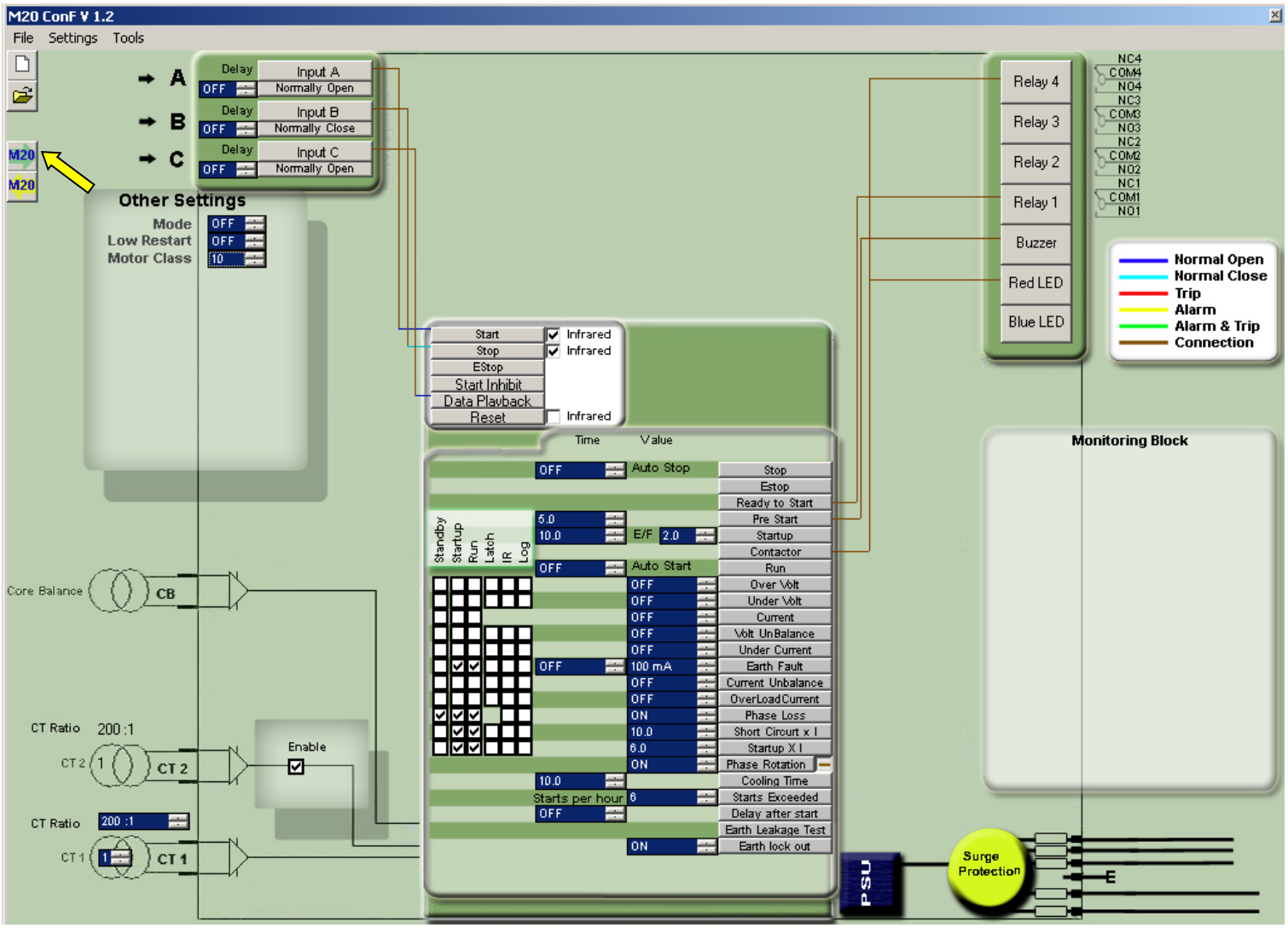


FIGURE 9 EXAMPLE 1 CONFIGURATION

The M30 is now configured. The configuration can be saved and retrieved at any time by using the shortcut key.

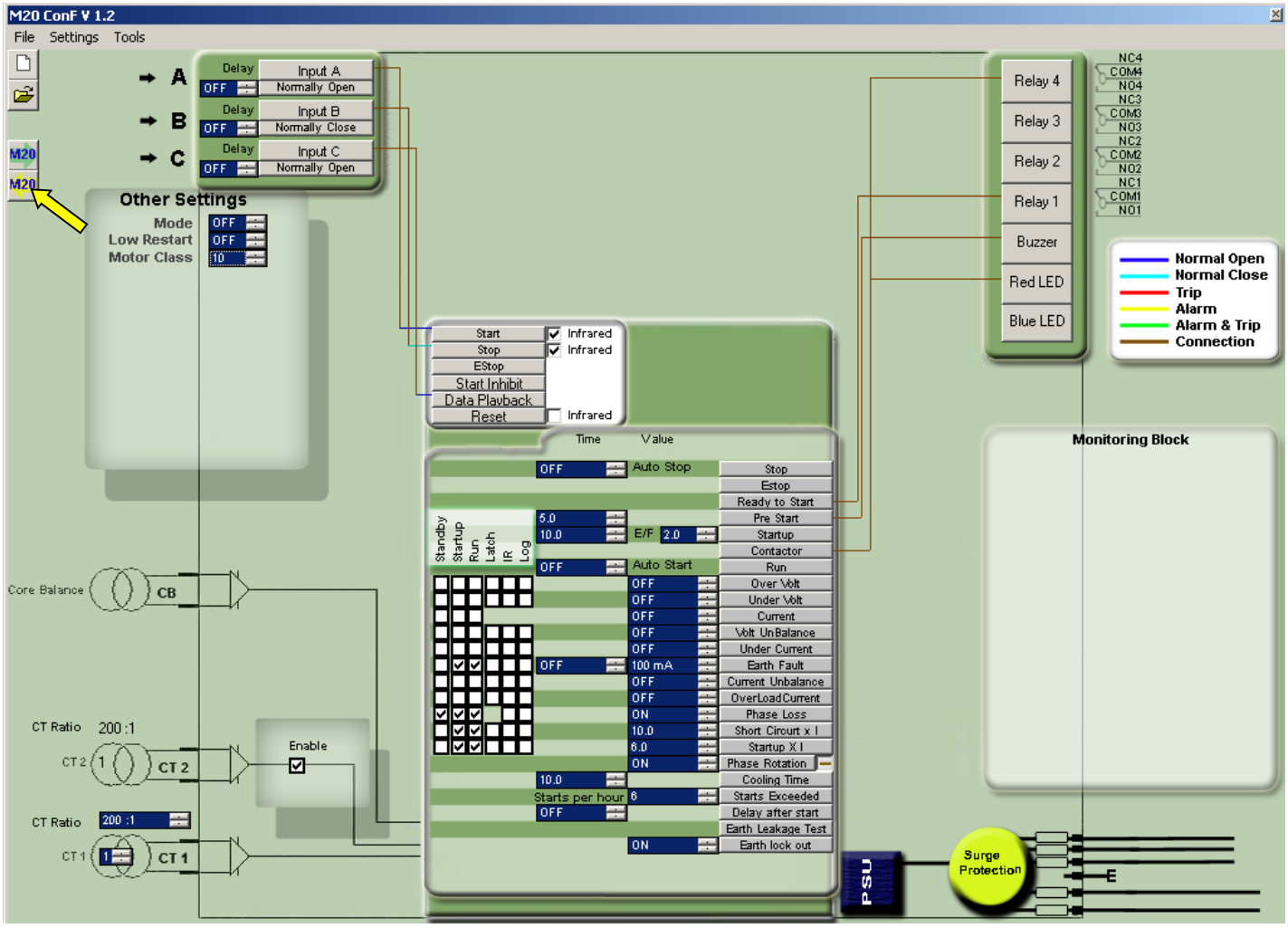


FIGURE 10 EXAMPLE 1 CONFIGURATION

A descriptive name can be given to the file for later identification.

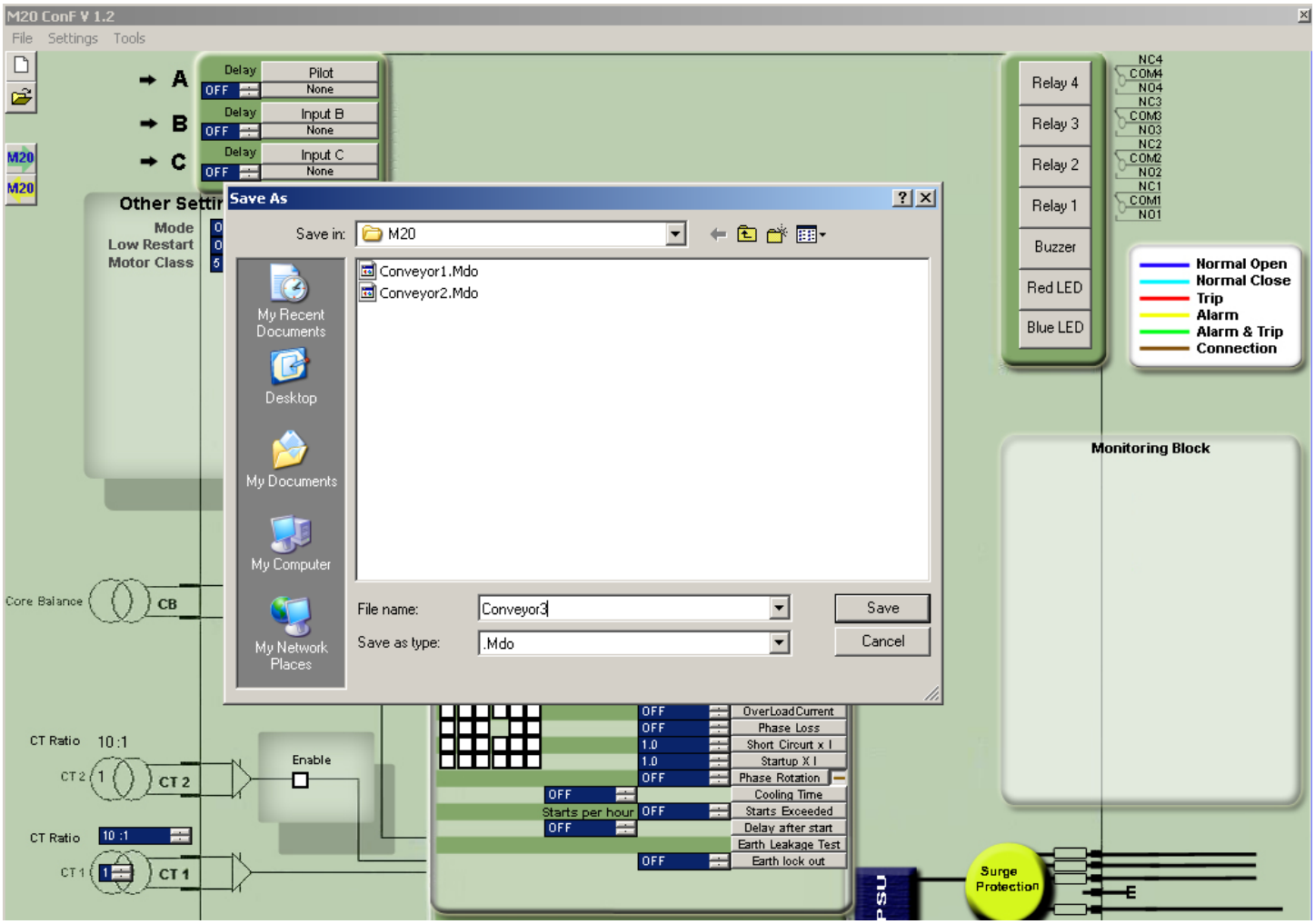
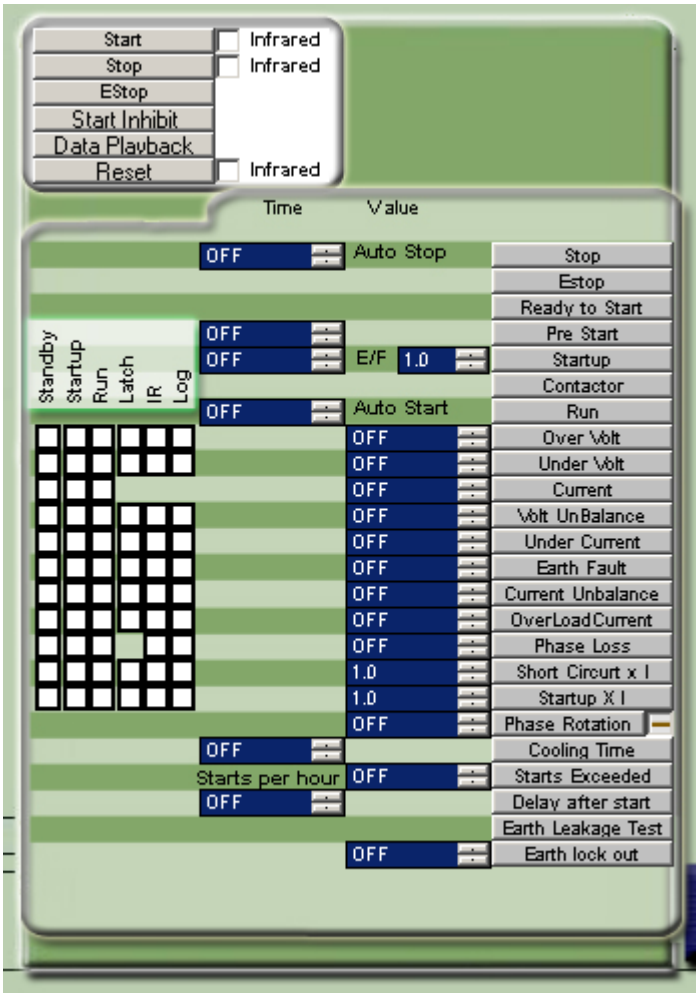


FIGURE 11 SAVE OR LOAD CONFIGURATION

PROTECTION BLOCK

INPUT



OUTPUT

FIGURE 12 PROTECTION BLOCK

INPUT

START

This input starts the motor.

STOP

This input stops the motor.

E/STOP

This input stops the motor.

START INHIBIT

This input prevents the motor from starting.

DATA PLAYBACK

This input plays back the logged events on the LCD screen.

RESET

This input resets the M30 when latch on last trip is active.

OUTPUT

STOP

Active when the STOP input is active.

E/STOP

Active when the E/STOP input is active.

READY TO START

Active when the M30 is ready to start.

PRE START

Pre start alarm. Can be configured to activate the internal buzzer and/or any relay.

STARTUP

Active when the motor is running during startup time.

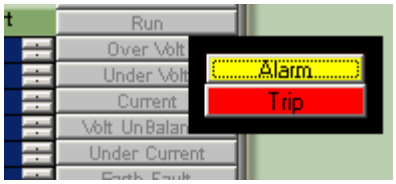
CONTACTOR

Active when the motor is running.

RUN

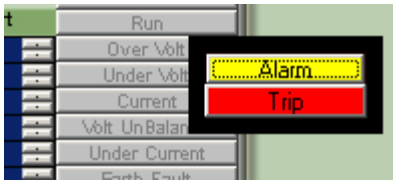
Active when the motor is running after the startup time.

OVER VOLTAGE



Alarm is active immediately when the level exceeds the over voltage setting.
Trip is active when the level exceeds the over voltage setting and after the definite time delay expired. If latch on last trip is selected the output will stay active until the M30 has been reset.

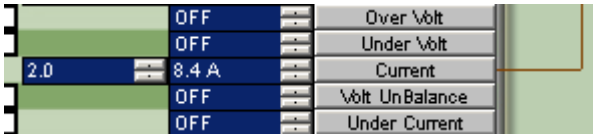
UNDER VOLTAGE



Alarm is active immediately when the voltage level drops below the under voltage setting. Trip is active when the voltage level drops below the under voltage setting and after the definite time delay expired. If latch on last trip is selected the output will stay active until the M30 has been reset.

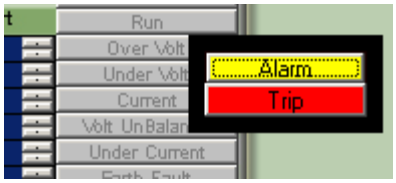
CURRENT

Active when any phase of the motor current exceeds the setting. This output is useful to indicate when a certain motor load is exceeded.



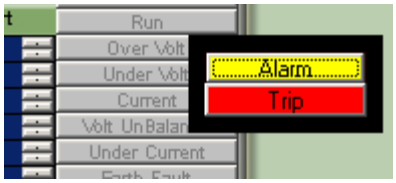
In this example the output is active after 2 seconds when any phase exceeds 8.4Amp.

VOLTAGE UNBALANCE



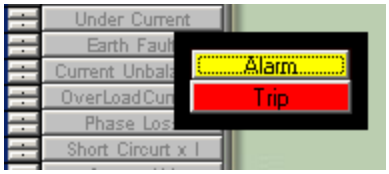
Alarm is active immediately when the level exceeds the voltage unbalance setting. Trip is active when the level exceeds the voltage unbalance setting and after the definite time delay expired. If latch on last trip is selected the output will stay active until the M30 has been reset.

UNDER CURRENT



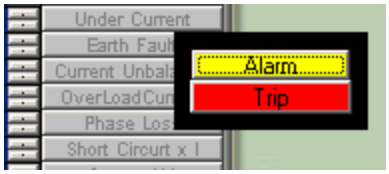
Alarm is active immediately when the current level drops below the under current setting. Trip is active when the current level drops below the under current setting and after the definite time delay expired. If latch on last trip is selected the output will stay active until the M30 has been reset.

EARTH FAULT



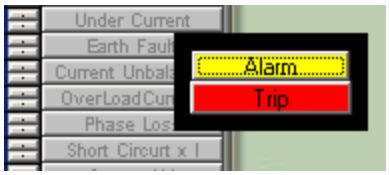
Alarm is active immediately when the level exceeds the earth fault setting.
Trip is active when the level exceeds the earth fault setting and after the definite time delay expired. If latch on last trip is selected the output will stay active until the M30 has been reset.

CURRENT UNBALANCE



Alarm is active immediately when the level exceeds the current unbalance setting.
Trip is active when the level exceeds the current unbalance setting and after the definite time delay expired. If latch on last trip is selected the output will stay active until the M30 has been reset.

OVER CURRENT



Alarm is active immediately when the level exceeds the over current setting.
Trip is active when the level exceeds the over current setting and after the definite time delay expired. If latch on last trip is selected the output will stay active until the M30 has been reset.

PHASE LOSS

Active when one or more phases are below 40V.

SHORT CIRCUIT x I

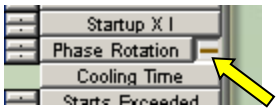
Instantaneous when the current on any phase exceeds the "*over load current"* setting multiplied by the "*short circuit x I"* setting.

STARTUP x I

Active instantaneous when the current on any phase exceeds the *over load current* setting times the *startup x I* setting.

PHASE ROTATION

Active when the direction is reversed on the incoming phases. Select the button to invert the output (Active when the direction is normal on the incoming phases).



COOLING

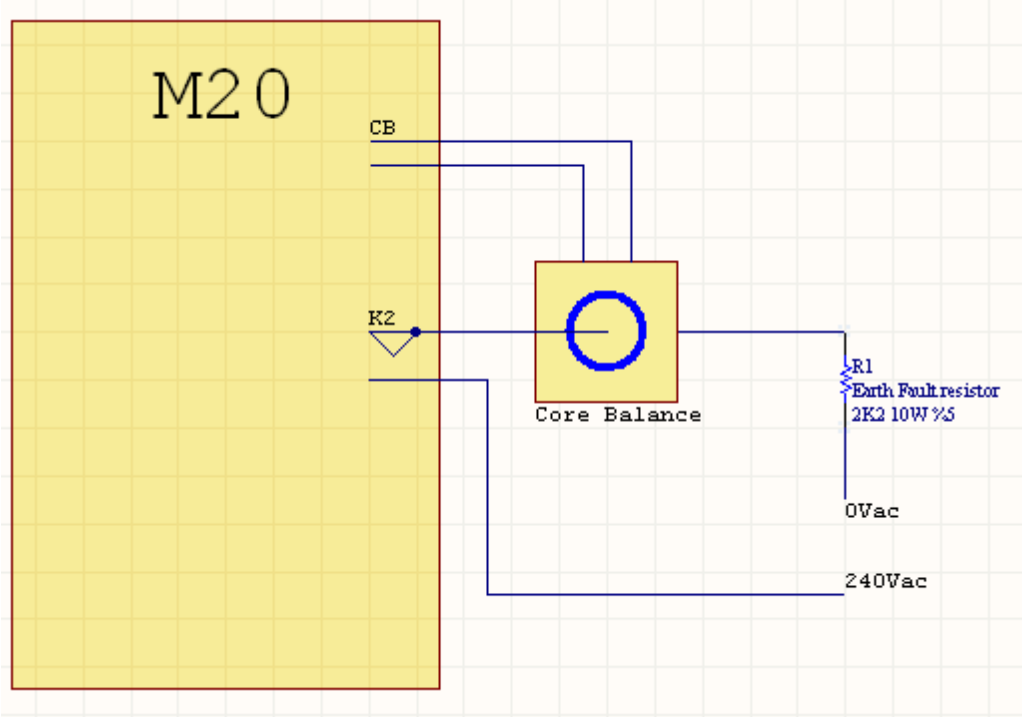
Active when the motor tripped after an overload condition or when the starts per hour has been exceeded.

DELAY AFTER START

Active after motor startup and *delay after start* setting has expired. This output is useful to bypass a speed switch or deco wheel after startup.

EARTH LEAKAGE TEST

This output is used for auto earth leakage test.



Example: To perform an auto earth leakage test, *Earth Leakage test* is connected to a relay in the configuration. Before startup the relay is energized and an earth fault is momentary induced into the system. If the induced earth fault is detected the motor will start after the test. If no earth fault is detected the LCD will display E/F FAIL and the start will not be allowed. This test is logged in the event logging with date and time stamp.

EARTH LOCKOUT

Enable Earth Lockout protection and connect Earth Fault Lockout detection to any relay.

M30 Menu

About the Menu

The M30 menu contains all the settings for the trip levels, timer functions and trip delays. The menu settings are located in a nonvolatile memory. The M30 menu settings can be changed by personal computer (USB), infra-red remote control or I Link (handheld IRDA device).

Note: The menu can only be accessed when the motor is not running.

How to change the settings

Press the  button on the infra-red remote control to enter the menu. Then press  or  to scroll up or down through the menu.  or  will decrease or increase the value for that specific setting.

Press the  button to exit the menu. To save the settings press the  button again within 10 seconds. When saving the new settings the event (menu access) is logged in the nonvolatile memory with date and time stamp.

List of Menu Settings

REGISTER	SETTING	LCD / Screen	MIN	MAX	DEFAULT	UNIT
40001	Mode	Mode	OFF	5000	OFF	
40002	Pre Start	PreStart	OFF	5000.0	5.0	sec
40003	Auto Start	Auto ON	OFF	5000.0	OFF	sec
40004	Auto Stop	Auto OFF	OFF	5000.0	OFF	sec
40005	Low Restart 1	Low on 1	OFF	9999	15	min
40006	Earth Fault Lockout	E/F LOCK	OFF	ON	ON	
40007	Cooling Time	Cooling	OFF	9999	10	min
40008	Phase Loss	PhaseLos	OFF	ON	ON	
40009	Phase Rotation	Rotation	OFF	ON	ON	
40010	Under Voltage	Low Volt	OFF	1999	OFF	volt
40011	Under Voltage Delay	U/V Del	OFF	999.9	OFF	sec
40012	Over Voltage	OverVolt	OFF	1999	OFF	volt
40013	Over Voltage Delay	O/V Del	OFF	999.9	OFF	sec
40014	Voltage Unbalance	V Unbal	OFF	99	OFF	%
40015	Voltage Unbalance Delay	V/U Del	OFF	999.9	OFF	sec
40016	Starts per hour	Starts/H	OFF	99	6	starts
40017	Startup	Startup	OFF	999.9	10.0	sec
40018	Startup x I	Start xI	OFF	20.0	6.0	x I
40019	Short Circuit x I	Short xI	OFF	20.0	10.0	x I
40020	Under Current (Amps)	UCurrent	OFF	5000.0	OFF	amps
40021	Under Current Delay	U/C Del	OFF	999.9	OFF	sec
40022	Overload Current (Amps)	OCurrent	OFF	5000.0	OFF	amps
40023	Overload Current Delay	IDMT	OFF	999.9	OFF	sec
40024	Motor Class	M Class	ON	30	10	class
40025	Current Unbalance	IUnbalan	OFF	99	OFF	%
40026	Current Unbalance Delay	IUnb Del	OFF	999.9	OFF	sec
40027	Multiples of E/F @ Startup	E/F@Strt	OFF	10	2	x E/F
40028	Earth Fault @ Run	E/F@Run	OFF	9999	250	mA
40029	Earth Fault @ Startup Delay	E/FDelay	ON	999.9	0.3	sec
40030	CT Quantity	CT Qty	1	2	2	Quantity
40031	CT Ratio	CT Ratio	ON	10000	200	Ratio:1or5
40032	CT Input	CT Input	1	1	1	amp
40033	Start Delay	StartDel	OFF	999.9	OFF	sec
40034	Amp Relay	AmpRelay	OFF	999.9	OFF	amp
40035	Amp Delay	AmpDelay	OFF	999.9	OFF	sec
40036	A Delay	A Delay	OFF	999.9	OFF	sec
40037	B Delay	B Delay	OFF	999.9	OFF	sec
40038	C Delay	C Delay	OFF	999.9	OFF	sec

Mode

This setting is used for special functions. .

The following modes will display:

Mode 5	Display Phase to Phase voltages
Mode 6	Display Phase to Neutral voltages

The following modes will:

Mode 20	Download data via USB (Use vbterm.exe supplied on CD)
Mode 31	Format event recording (Erase history)
Mode 32	Clear cumulative start counter
Mode 33	Clear hour meter 2
Mode 255	Default the menu settings to factory values

Pre Start

This setting will activate the relay or buzzer (as connected in the configuration) prior to starting for the set time in seconds to act as a pre start warning.

Auto Start

This function will auto start the M30 when all conditions are met.

Auto Stop

This function will auto stop the M30 after the preset time.

Low Restart 1

If the M30 has tripped on an under current condition (dry run) the M30 will auto restart after the set time has lapsed. Should the Auto start function be enabled the Low Restart 1 will override the Auto start function. If Low restart 1 is enabled (set to any value) the M30 will not latch on last trip in case of an undercurrent trip.

Earth Fault Lockout

Select to “ON” to enable earth fault lockout protection. This protection sets the M30 apart from most protection relays in the market today. This test is performed to determine if there is an earth fault present on the load before the contactor is energized.

Cooling Time

If the M30 trips on an overload condition the cooling time comes into effect. No starts are allowed during cooling time. Cooling time is also utilized for the starts per hour.

Phase Loss

Phase loss detection is active when this setting is ON. Phase loss detection may be selected in the configuration setup to be active during Standby and/or Run.

Phase Rotation

Phase rotation detection is active when in standby and the setting in ON.

Under Voltage

The under voltage detection level is determined by this setting.

Under Voltage Delay

The setting allows for a delayed trip in the event of an under voltage.

Over Voltage

The over voltage detection level is determined by this setting.

Over Voltage Delay

The setting allows for a delayed trip in the event of an over voltage.

Voltage Unbalance

The reason why unbalanced phase voltages require disconnection from the load is that any unbalance in the voltage results in a negative phase sequence current component which produces a rotating field in the opposite direction to the rotating field produced by the applied system voltage. This counter-rotating field will cause induced currents in the rotor of almost twice the normal system frequency, resulting in overheating and possible damage. This result is derived from the negative phase sequence component in a three-phase system. If the voltage unbalance exceeds the set limit and time delay the M30 will trip. The voltage unbalance is derived from the formula:

Unbalance phase 1 = ((V1 – V average) /V average) * 100
Unbalance phase 2 = ((V2 – V average) /V average) * 100
Unbalance phase 3 = ((V3 – V average) /V average) * 100

Where:

V average = (V1 + V2 + V3) / 3

The M30 will trip on any phase that exceeds the set limit.

Voltage Unbalance Delay

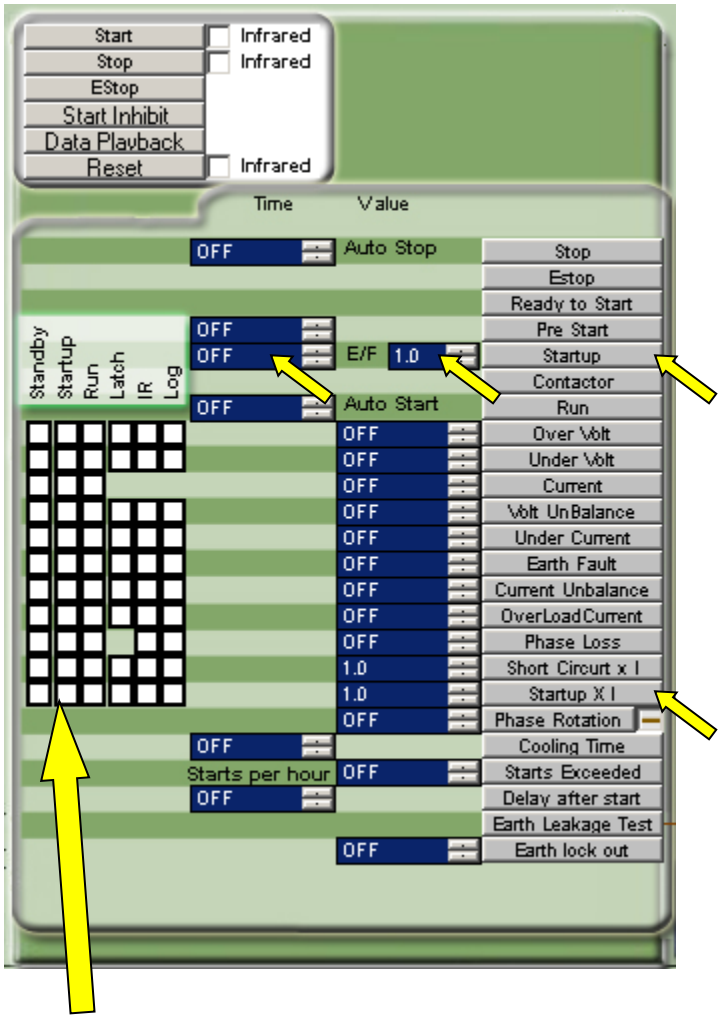
This setting is the time allowed in an unbalanced situation.

Starts per hour

Example: Setting is 6 starts per hour. The M30 will allow up to 6 starts per hour. If 6 starts are exceeded in one hour the M30 will not allow starts for the time set in the Cooling Time.

Startup

During startup time different protection levels are used to allow for motor startup currents. The startup setting is the time allowed for the motor to start.



Select the protection required in startup

FIGURE 13 STARTUP PROTECTION

Startup x I

This is the multiples of the overload current that is allowed during the startup time.
Example:
Overload current setting = 30.0A
Startup x I = 6

Maximum startup current allowed =180A

Short circuit x I

This is the multiples of the overload current setting that is allowed after the startup time has lapsed. Example: An overload current setting of 45A and a short circuit x I setting of 10 will trip on a short circuit fault if 450A is exceeded. If a relay is assigned to this fault the relay will trip 200ms before the main contractor.

Under Current (Amp)

If the current on any phase drops below this setting the M30 will trip after the Under Current Delay has lapsed. If the Low Restart 1 timer is enabled the M30 will restart after the Low Restart 1 timer has timed out.

Under Current Delay

This is the time that the motor is allowed to operate in an under current condition. If the alarm function is enabled the alarm relay will activate when the under current is detected.

Overload Current (Amp)

This setting is the selected current level when the motor enters an overload condition. See Overload Current Delay and Motor class for trip time characteristics.

Overload Current Delay

If the value is set to *curve* the M30 will trip according to the IEC 255-8 specification on an overload condition. Any other value will represent the definite time trip on an overload condition.

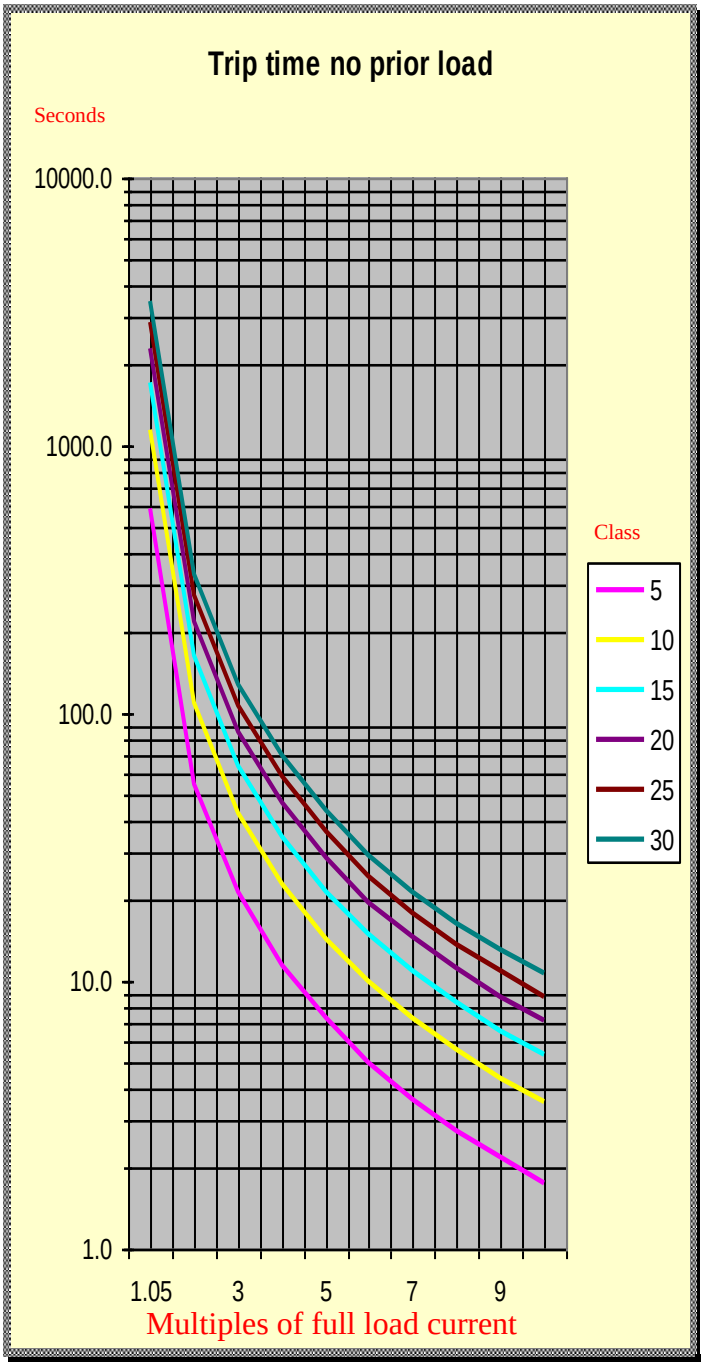


FIGURE 14 TRIP TIME NO PRIOR LOAD

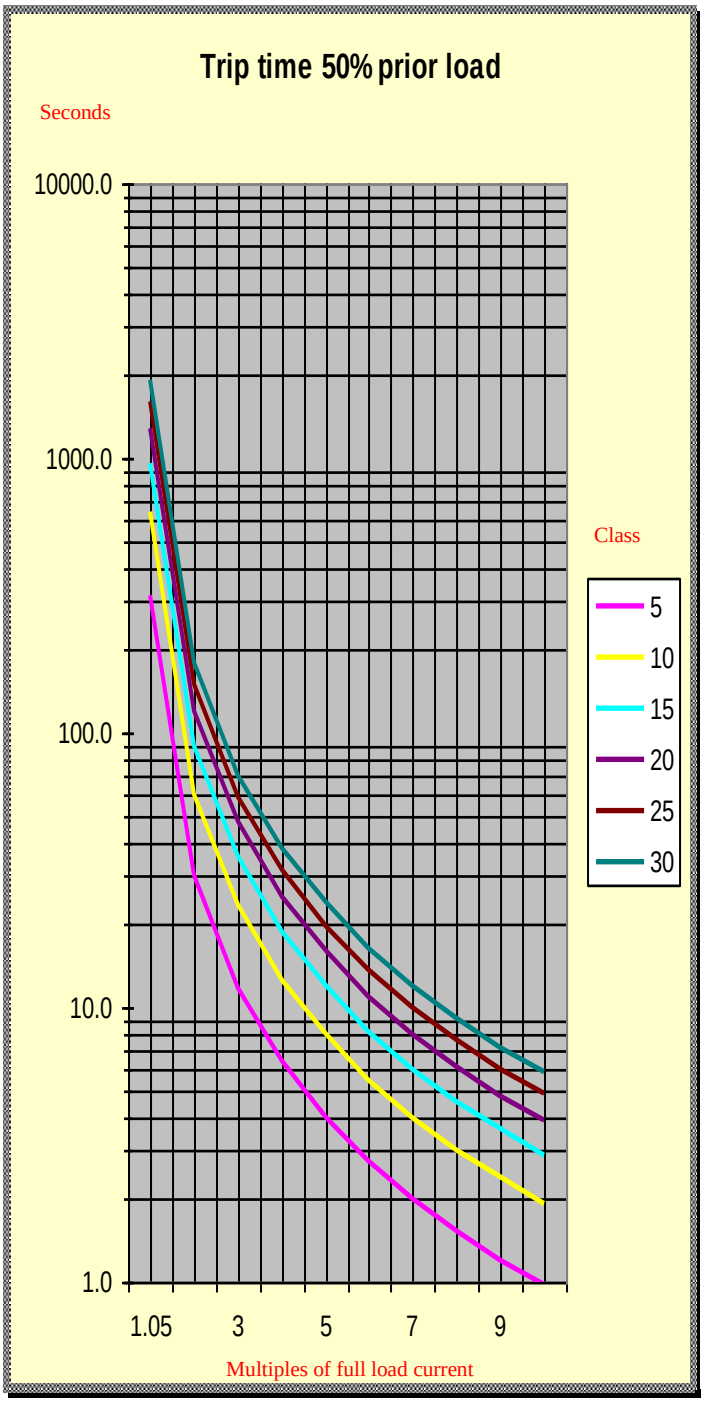


FIGURE 15 TRIP TIME 50% PRIOR LOAD

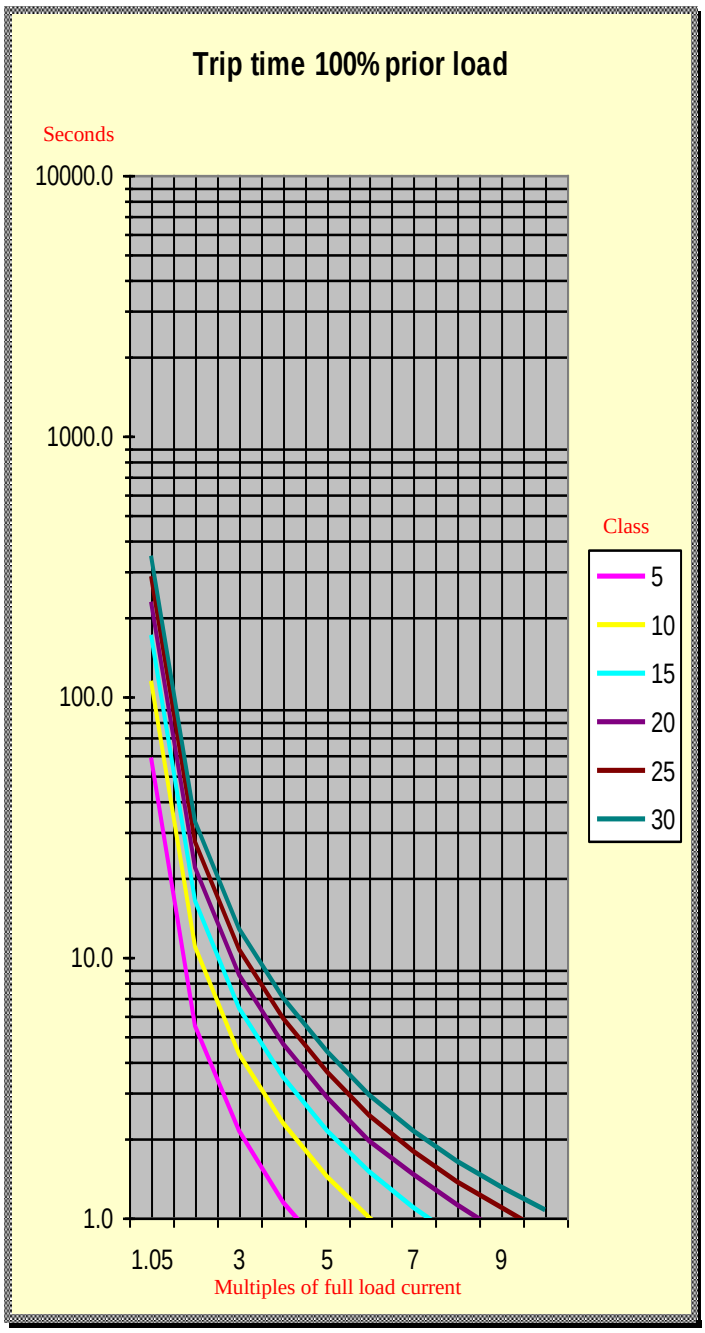


FIGURE 16 TRIP TIME 100% PRIOR LOAD

Motor class

This setting determines the motor class for the thermal overload curve. Refer to the overload current time for more detail.

Current Unbalance

The reason why unbalanced phase currents require disconnection from the load is because any unbalance in the current results in a negative phase sequence component which produces a rotating field in the opposite direction to the rotating field produced by the applied system voltage. This counter-rotating field will cause induced currents in the rotor of almost twice the normal system frequency, resulting in overheating and possible damage. This result is derived from the negative phase sequence component in a three-phase system. If the current unbalance exceeds the set limit and time delay the M30 will trip. The current unbalance is derived from the formula:

Unbalance phase 1 = ((I1 – I average) /I average) * 100
Unbalance phase 2 = ((I2 – I average) /I average) * 100

Where:

I average = (I1 + I2) / 2

The M30 will trip on any phase that exceeds the set limit.

Current Unbalance Delay

This setting is the time allowed in an unbalance situation.

Earth Fault at Start

The M30 will trip instantaneous if the earth leakage fault exceeds this setting at startup.

Earth Fault in Run

The M30 will trip if the earth leakage fault exceeds this setting and the delay time is exceeded (earth leakage time).

Earth Fault Delay

This is the delay time before trip in the event of an earth leakage fault.

CT Quantity

The M30 can operate on 1 or 2 current transformers. This setting is used to select the number of current transformers connected to the M30. If one CT is selected the CT must be connected to CT1. If two CT's are selected it must be connected to CT1 and CT2.

CT Ratio

The CT ratio can be selected in increments of 10. If the secondary is selected as 1A, the range is 10:1 to 10 000:1. The M30 can measure up to 5 times the CT ratio at motor start up with the specified accuracy. The current is displayed in 0.1A resolution. The M30 measures true RMS current by performing full signal analysis. This ensures true current readings even with distorted waveforms.

CT Input

The secondary CT input can be selected as 1A

Delay after start

The relay connected (in the configuration) will switch over after the set time has lapsed after startup. This contact can be used to allow the deco wheel or speed switch to come into operation.

Current Relay

This setting is the current at which the relay will switch.

Current Relay Delay

The current relay will switch after the delay expires.

1 Delay

Input A delay.

2 Delay

Input B delay.

3 Delay

Input C delay.

Live line indication

Three phase live line indication. This indication is fully operational even if the M30 is powered down. The indication is active above 80Vac on any phase.

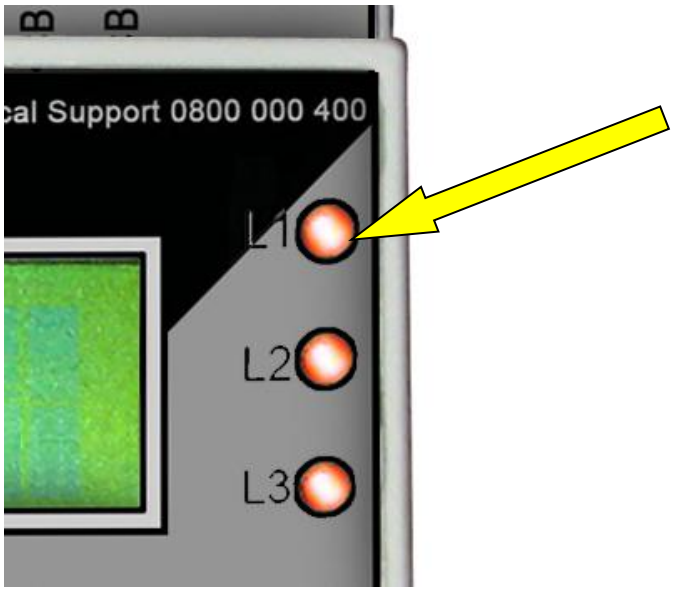


FIGURE 17 LINE INDICATION

4. Earth fault lockout

The M30 uses earth fault lockout protection to determine if there is an earth fault on the 3 phase load before the contactor is energized. If there is an earth fault the contactor will not energize and the LCD display will indicate the problem. The protection can be disabled if not needed. The default setting is ON.

5. Screen

The LCD screen displays the following information: The top line of the LCD displays the status of the M30. The bottom line of the LCD is user selectable.

LCD TOP LINE	DESCRIPTION	MOTOR RUN
ESTOP	ESTOP is active	NO
STOP	STOP is active	NO
READY	Motor is ready to start	NO
PreStart	Pre start alarm before start	NO
Start	Startup curve active (before run curve)	YES
RUN	Run curve (after startup curve)	YES
Cooling	Motor cool down time	NO
PhaseLos	One or more phases down	NO
PhaseRot	Phase direction wrong	NO
Low Volt	Under voltage	Alarm Yes Trip NO
OverVolt	Over voltage	Alarm Yes Trip NO
V Unbal	Voltage unbalance	Alarm Yes Trip NO
Start xI	Startup x I exceeded	NO
Short xI	Short circuit x I exceeded	NO
Low Amps	Under current	Alarm Yes Trip NO
Overload	Overload current	Alarm Yes Trip NO
AmpUnbal	Current unbalance	Alarm Yes Trip NO
E/Fault	Earth fault limit exceeded	Alarm Yes Trip NO
StartInh	Start inhibit (No starts allowed)	NO
E/F Lock	Earth Fault Lockout	NO
Restart	Under current restart timer	NO
Powerup	Event – M30 powered up	NO
E/F Test	Event – Auto earth fault test	NO
E/F Fail	Event – Auto earth fault test fail	NO
LCD BOTTOM LINE	DESCRIPTION	

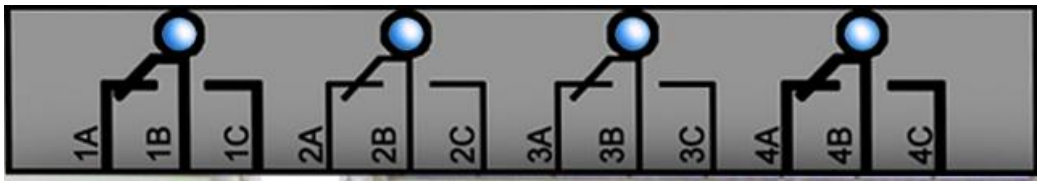
12:15	Time	Press  to change
1017V1	Voltage phase 1	Press  to change
1019V2	Voltage phase 2	Press  to change
1011V3	Voltage phase 3	Press  to change
23.5A1	Current phase 1	Press  to change
24.0A2	Current phase 2	Press  to change
67mA	Earth Fault	Press  to change
000015H1	Hour Meter 1	Press  to change
000015H2	Hour Meter 2	Press  to change

To change the bottom line on the LCD display press and hold the  button on the infra-red remote control.

6. Led

The Red and Blue LED is user selectable in the configuration. The LED's may be connected to indicate Motor RUN, ALARM and/or TRIP conditions.

LED indication on each relay indicates if the relay is energized.



7. Buzzer

The internal buzzer is user selectable in the configuration. The buzzer may be connected to indicate pre start, ALARM or TRIP conditions.

8. Terminal

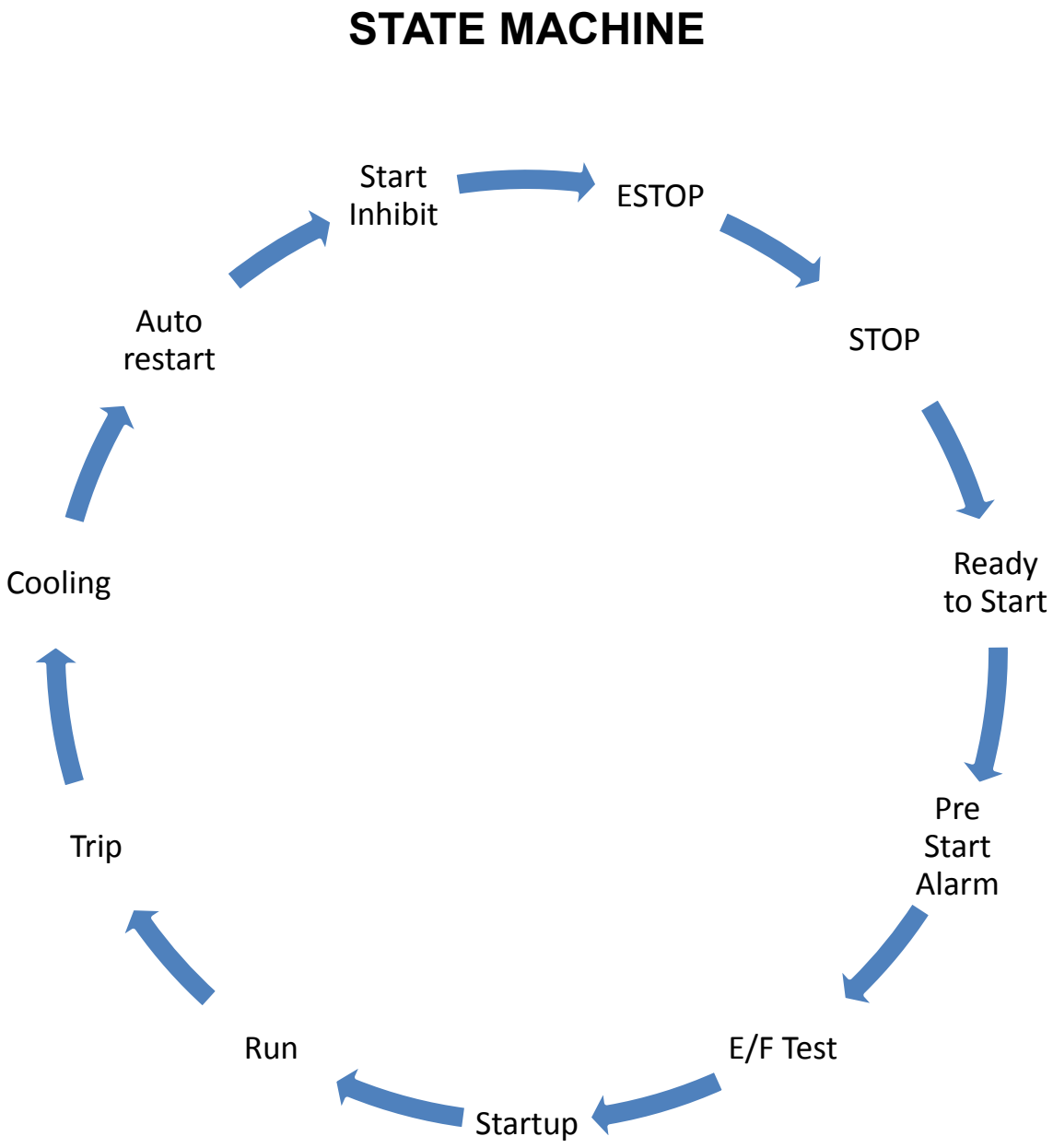
VBTERM.exe is a terminal program supplied on the CD. Alternative terminal programs such as hyper terminal available on windows can be used to send and receive information from the M30. Choose the correct COM port and set the baud rate to 115200bps. The following commands are recognized:

- *start* – Start the M30
- *stop* – Stop the M30
- *erase* – Erase the event logging recorder
- *data* – Download the recorded events from the M30

Note: Use only lowercase. The command is executed after the "ENTER" key is pressed.

9. M30 RTOS (Real time operating system)

The RTOS allows the M30 to process data and requests simultaneously ensuring high speed processing. The M30 operates at 7.372800 MIPS (Million instructions per second). The M30 operates as state machine and will always be in one of the following states.



10. Event Logging

About event logging

The M30 has a nonvolatile memory (retain memory in power down) to store events with date and time stamp. The M30 stores the last 16 events with date, time, three phase voltages, two phase currents, earth leakage reading, and event. Events include Stop, Start, Trips, Menu access, and Power up.
The data can be played back on the LCD display as screen shots, retrieved via USB or downloaded via IRDA with the *I*-Link handheld device for analysis on a personal computer.

Playback events on the graphic display

Press the button to display the history events. The event log displays the last event first. Pressing will display more events. Pressing STOP or OK will exit the event log. The event playback is operational in standby. Press the button to display the voltage, current and earth fault readings at the time of the event. See Screen

FIGURE 18 DATA PLAYBACK SCREENSHOT

11. Date & Time

About date & time

The real time clock operates from the internal lithium battery to ensure timekeeping when the M30 is powered down. The lithium battery should last for ten years but it is recommended that the battery be replaced every five years.

Setting the date & time

Press the  button to enter the date menu when the M30 is in standby mode.

Navigate through the menu with  and  buttons. Adjust the settings with  and  buttons.

Press the  button to enter the time menu. Navigate through the menu with  and  buttons. Adjust the settings with  and  buttons.

Press the  button to exit the date and time menu. To save the settings press the  button again within 10 seconds.

About the M30

- Version Ver 5.6 — Unique version number
- Serial no.10-07-17-11-54-10 — Unique serial number
- Hour1 Hour2 Starts — See ***X***
- NINGI SERVICES — Company
- www.ningi.com — Web site
- 0800 000 400 — 24/7 Toll free telephone technical support
- 082 556 7682 — Contact number (Tino)

X

Hour 1

First hour meter, non-resettable hour meter

Hour 2

Second hour meter, resettable hour meter (mode 33)

Starts

Total motor starts

The above information is available via USB. See #Communication

12. Communication

About communication

USB, infra-red and IRDA are standard on all M30 motor protection relays.

About USB

USB is standard on all M30 motor protection relays. USB implements the MODBUS RTU protocol for communication.
USB is used:

- To upgrade the firmware.
- To change the menu settings via the PC program
- To download the data logged events
- To communicate with SCADA or M30 PC program

About RS485

RS485 is standard on all M30 motor protection relays. RS485 implements the MODBUS RTU protocol for communication.
USB is used:

- To download the data logged events

To communicate with SCADA

Read input registers 30000

The real time voltage and current measurements and other important data are available on the input registers.

Below is a list of the available input registers. Any amount of data may be requested by the MODBUS RTU protocol.

REGISTER	NAME	DESCRIPTION	
30001	year	Year	
30002	month	Month	
30003	day	Day	
30004	hours	Hours	
30005	minutes	Minutes	
30006	seconds	Seconds	
30007	Status	The status of the M30 See – Status codes	
30008	V1	RMS voltage phase 1	
30009	V2	RMS voltage phase 2	
30010	V3	RMS voltage phase 3	
30011	I1rms	RMS current phase 1	
30012	I2rms	RMS current phase 2	
30013	EL	RMS Earth leakage level	
30014	E/F Lockout 1	Earth fault lockout level phase 1	
30015	E/F Lockout 2	Earth fault lockout level phase 2	
30016	E/F Lockout 3	Earth fault lockout level phase 3	
30017	VUB	Voltage unbalance	
30018	IUB	Current unbalance	
30019	HM1	Hour meter 1	
30020	HM2	Hour meter 2	
30021	Inputs	Bitwise status of the inputs	
30022	Relays	Bitwise status of the relays	
30023	Reserved	Reserved for future use	
30024	KW 1	Kilowatt phase 1	
30025	KW 2	Kilowatt phase 2	
30026	PF 1	Power factor phase 1	
30027	PF 2	Power factor phase 2	
30028	Reserved	Reserved for future use	
30029	V min	Lowest voltage (Phase 1,2,3)	
30030	I min	Lowest current (Phase 1,2)	

All input registers are 16 bit in length (high byte and low byte). Example: 800 volt equals 0320 hex and is sent as 0x03Hbyte & 0x20Lbyte.

Example – Read all input registers

M30 Slave address = 5

Read request

Slave Address	Function	Start Address Hi	Start Address Lo	No Points Hi	No Points Lo	CRC Lo	CRC Hi
05	04	00	00	00	1E	71	86

Read response

Slave Address	Function	Byte Count	Data Hi	Data Lo	……..	Data Hi	Data Lo	CRC Lo	CRC Hi
05	04	3C	XX	XX	XX	XX	XX	XX	XX

Example – Read Volts, Amps and Earth Leakage

Example – M30 address = 5

Read request

Slave Address	Function	Start Address Hi	Start Address Lo	No Points Hi	No Points Lo	CRC Lo	CRC Hi
05	04	00	07	00	06	C0	4D

Read response

Slave Address	Function	Byte Count	Data Hi	Data Lo	……..	Data Hi	Data Lo	CRC Lo	CRC Hi
05	04	0C	XX	XX	XX	XX	XX	XX	XX

Holding registers 40000

The menu settings are available for read and write and are located in the holding registers. See #List of Menu Settings

Example – Read all holding registers

Example – M30 address = 5

Read request

Slave Address	Function	Start Address Hi	Start Address Lo	No Points Hi	No Points Lo	CRC Lo	CRC Hi
05	03	00	00	00	26	C5	94

Read response

Slave Address	Function	Byte Count	Data Hi	Data Lo	……..	Data Hi	Data Lo	CRC Lo	CRC Hi
05	03	4C	XX	XX	XX	XX	XX	XX	XX

Example – Write to holding registers

Example – M30 address = 5

Write request

Slave Address	Function	Start Address Hi	Start Address Lo	No Registers Hi	No Registers Lo	Byte Count	Data Hi	Data Lo	CRC Lo	CRC Hi
05	10	00	00	00	XX	XX	XX	XX	XX	XX

Write response

Slave Address	Function	Start Address Hi	Start Address Lo	No of Registers Hi	No of Registers Lo	CRC Lo	CRC Hi
05	10	00	00	00	XX	XX	XX

13. Electrical specifications

	Min	Typical	Max	Unit
Control voltage	85		265	VAC
Power consumption		2	5	VA
Phase input voltage (with voltage converter)	0		2500	VAC
Phase voltage sample rate		64000		S/Sec
Phase voltage accuracy			0.5	%
Relay contacts (4)			250	VAC
Relay contacts(4)			30	VDC
Relay contacts (4 x CO)	0.1		16	A
CT input 1A selected continuous	0	1	25	A
CT input 1A selected 1 Sec			70	A
Current measurement sample rate		64000		S/Sec
Current measurement accuracy			0.5	%
Earth leakage input (core balance secondary)	0.001		5	A
Earth leakage measurement range	0.03		6	A
Input 1,2,3	0		24	VDC
Communication channel USB		115200		Bps
Communication RS 485		115200		Bps

14. Terms and conditions

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