

Smart Controller for Smart Factory



i **MMR**

Intelligent Motor Management Relay

ABOUT US



Switchgear Factory, Navi Mumbai



Switchgear Factory, Ahmednagar



Switchgear Factory, Vadodara

L&T Electrical & Automation (E&A) is a market leader for electrical distribution, monitoring and control solutions in the low voltage category.

Popular among customers as L&T Switchgear, E&A offers a wide range of low and medium voltage switchgear, motor starters, electrical systems, industrial automation, building electrical solutions, energy management solutions, electrical modernization solutions and metering solutions. Its products and solutions cater to key sectors of economy like industries, utilities, infrastructure, building and agriculture.

E&A's manufacturing operations at Navi Mumbai, Ahmednagar, Vadodara, Coimbatore and Mysuru in India adhere to global practices of excellence and receive support from well-equipped in-house design and development centres as well as tooling facilities that contribute to precision in manufacturing.

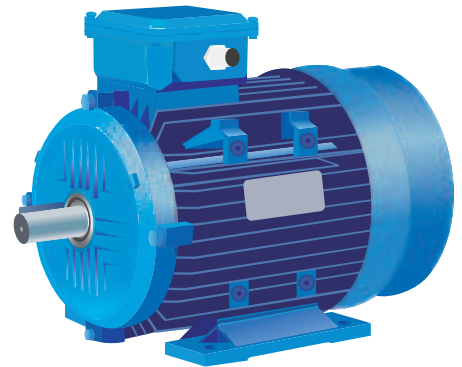
Brought to you by L&T Electrical & Automation-India's largest manufacturer of LT Switchgear - the new iMMR series offers comprehensive Motor Protection along with Control and Monitoring features.

The smart algorithm ensures complete flexibility in manufacture and configuration of Intelligent MCC's.



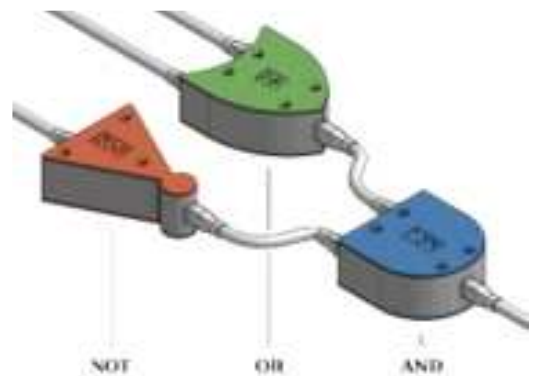
Protection

- Comprehensive Current based or Current + Voltage based protections
- Overload with thermal memory - based on IEC 60947
- Earth fault protection based on inbuilt residual current
- Optional sensitive Earth fault with help of external CBCT and an EF module
- Locked and Stall rotor protection
- Inbuilt Over current and short circuit protection for better relay coordination



Control

- Preprogrammed Starter logics reduce manufacturing and commissioning time
- Exhaustive Control features like reacceleration and anti-back spin to keep factory downtime low
- Modbus RTU, Profibus DP, Modbus TCP/IP Communication protocol for seamless integration with SCADA



Monitoring

- Real time monitoring, recording and service/ diagnostic data
- 20 nos. of last trip records, 100 event records and IRF records are available in iMMR
- Advanced fault detection and warning - Detects faults before they strike - Reduces factory downtime
- This correct and transparent information from manufacturing process ensure informed decisions and helps to innovate and improve
- Analyzing this data helps to understand the patterns and provides insights for optimization of resources



iMMR Main Unit

- Intelligent motor protection relay with control and monitoring functions.
- 4 DI + 3DO available to take care of DOL, Star-Delta and RDOL Starters
- LED indication available for diagnostics
- Inbuilt Modbus RTU, Profibus DP & Modbus TCP/IP protocol.



Modbus RTU



Modbus TCP/IP



Profibus DP

HMI

- A self-powered display module provides easy interface for monitoring and configuration of iMMR
- Display module also works as a memory module to copy/ paste the relay setting chart for ease of commissioning and replacement of relays



LCD Display - 128 * 64

CT / CTVT Unit

- A extremely compact CT or CTVT unit available upto 70 Ampere



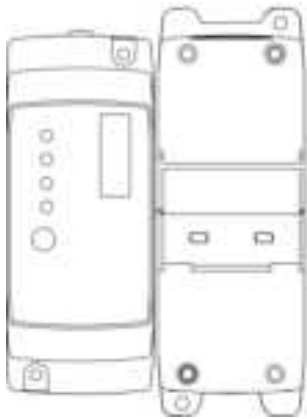
iMMR suite

- Easy and effective software for Configuration and monitoring of iMMR
- User friendly commissioning tools make it an ideal interface

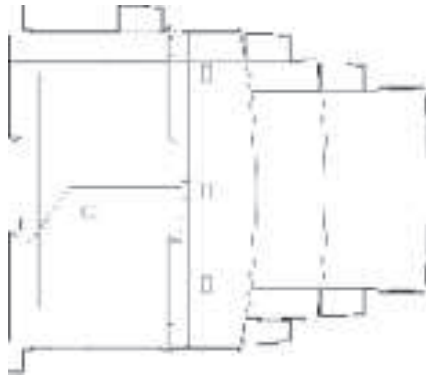


Compact and modular form factor

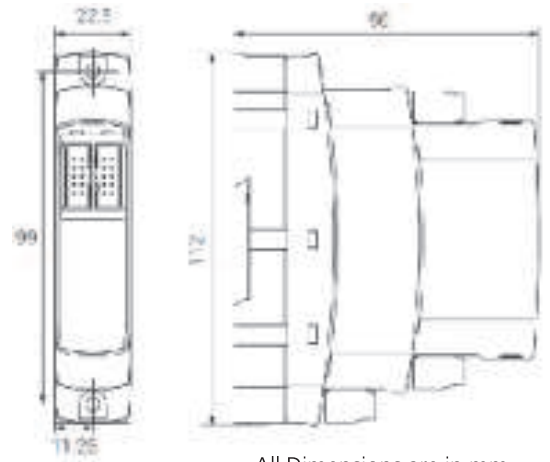
- Main Relay Mounted adjacent to the CT unit



- Main Relay Mounted on the CT unit



- Compact and modular Expansion Unit



All Dimensions are in mm

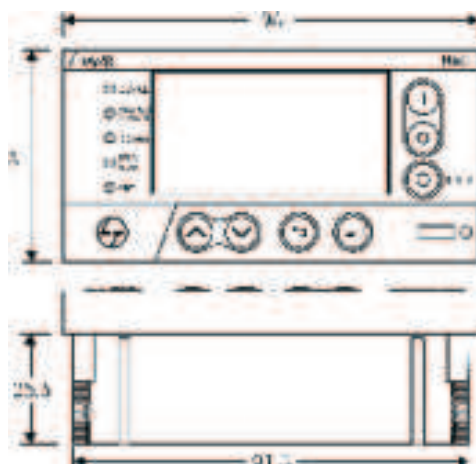
Compact CT / CTVT Unit

- Identical CT enclosure offers flexibility during modifications in the panel and also help in standardization of the feeders



Dimensions in mm [W x H x D]		
CT1 Module	0.3 to 3A	45 x 126 x 55
CT1 + VT Module	60-690V AC	
CT2 Module	2.5 to 25A	
CT2 + VT Module	60-690V AC	
CT3 Module	7-70A	55 x 126 x 56
CT3+VT Module	60-690V AC	

Compact Display Unit



Cutout Dimensions (H x W x D)

45 x 92.5 x 45

Setting Range Chart for Protections

Protection Function	Variable	Range
Thermal Overload	Alarm	80-100% of TM
	Thermal reset level	30-95% of TM
	Cool down time	0.0 – 6000.0 Sec
Under Current	Pick up	15 - 100% Iflc
	Alarm	100-115%
	Trip Delay	0.100 –6000 Sec
NI Over Current	Pick up	20 - 1000%Iflc
	Alarm	25-100 % of Pick up
	Trip Delay	0.100 - 200 Sec
Stalled Rotor	Pick up	50 - 1000% Iflc
	Alarm	25-100 % of Pick up
	Trip Delay	0.100 – 6000.0 Sec
DT Over current	Pick up	50 - 1000% Iflc
	Alarm	25-100 % of Pick up
	Time During Start	0.100 – 6000.0 Sec
	Time During Run	0.100 – 6000.0 Sec
Locked Rotor	Pick up	150 - 1000% Iflc
	Alarm	25-100 % of Pickup
	Trip Delay	0.100 - 6000.0 Sec
Short Circuit	Pick up	100 - 1000% Iflc
	Alarm	25 - 100% of Pick up
	Trip Delay	0.050 - 10 Sec
Current Phase Loss	Time Delay	0.100 – 6000.0 Sec
Earth Fault (Internal) Or External)	Pick up	10 - 500% Iflc
	Alarm	25-100 % of Pick up
	Trip Delay	0.5 - 10 Sec
	Pick up	0.030 - 40A
	Alarm	25-100%
	Trip Delay	0.100 - 6000 Sec
Under Volatge	Pick up	25 - 100% Vn
	Alarm	110% of Pick up
	Trip Delay	0.100-6000 Sec
Over Volatge	Pick up	101 - 130% Vn
	Alarm	25-100 %
	Trip Delay	0.1000-6000 Sec
Current Phase Reversal	Time Delay	0.100 – 6000.0 Sec
Voltage phase unbalance	Pick up	5-50%
	Alarm	Equal to Pickup level
	Trip Delay	0.100 – 6000.0
Voltage phase reversal	Time Delay	0.100 – 6000.0 Seconds
Voltage phase loss	Time Delay	0.100 – 6000.0 Sec
Over Frequency	Pick up	100-110%
	Alarm	99% of Pickup
	Trip Delay	0.100 – 6000.0 Sec
Under Frequency	Pick up	90-100%
	Alarm	101% of Pickup
	Trip Delay	0.100 – 6000.0 Sec
Over Power	Pick up	20-1000% of Pn
	Alarm	20-1000% of Pn
	Trip Delay	0.100 – 6000.0 Sec
Under Power	Pick up	20-1000% of Pn
	Alarm	20-1000% of Pn
	Trip Delay	0.100 – 6000.0 Sec
Over PF	Pick up	0.4 – 1.00
	Alarm	0.4 – 1.00
	Trip Delay	0.100 – 6000.0 Sec

Metering Specifications

Monitoring	Specifications
Event & Trip Records	Stores last 20 trip records with the date and time stamp
	Stores last 100 Event records with the date and time stamp
Hour Meter	Records and Stores last operational stops and total operational hours
Start, Stop, Trip Counter	Records and stores number of starts, stops and trip of the motor
Starting Curve	Records and stores starting characteristics of motor
Starting Time	Records and stores the Start time of the motor
Starting Peak current	Record the peak current during starting of the motor
DI/DO Status	Displays real time status (high or low) of digital input and output of the relay

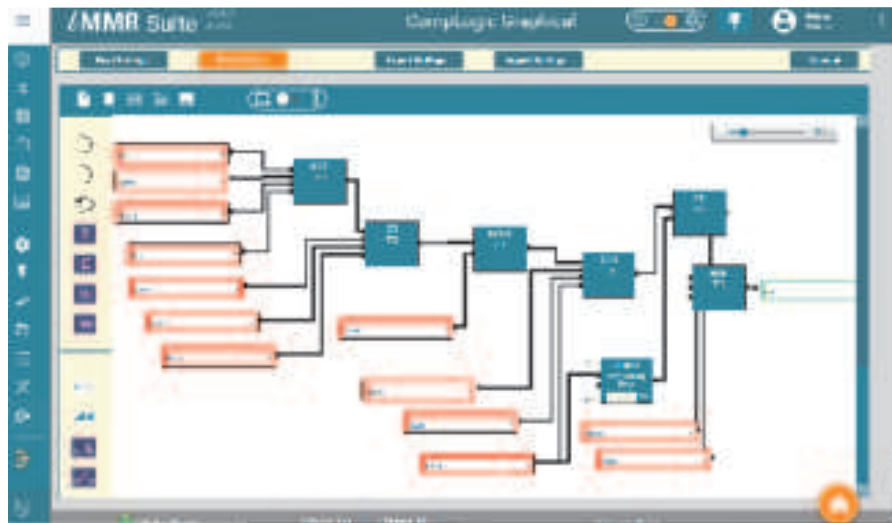
Product Dimensions

iMMR Module Name	Dimensions (H x W x D) in mm
Main Module	112 x 45 x 90
CT1, CT1VT module	126 x 45 x 55
CT2, CT2VT module	126 x 45 x 55
CT3, CT3 VT Module	126 x 55 x 56
Expansion Unit	112 x 22.5 x 90
Display Module	51 x 96 x 36

Product specification sheet

Current Measurement	
Range	Type 1 : 0.3 - 3A AC Type 2 : 2.5 - 25A AC
Accuracy	+/- 1% in nominal range
Voltage Measurement	
Range	60 - 690V AC
Accuracy	+/- 1% in nominal range
Frequency Measurement	
Range	45Hz - 65Hz
Accuracy	+/- 1% in nominal range
Power Measurement	
Active Power Accuracy	+/- 2% in nominal range
Power Factor Range	0.4 - 1.0
Power factor Accuracy	+/- 0.03

Graphical Logic



Functions and Protections

Metering Data:

- Current - R, Y, B, EF, Unbalance
- Voltage, Frequency, KW, KVAR, KVA, PF, KWh, KVARh, KVAh
- Voltage and Current THD,
- Thermal Memory, Motor status, Starting current and time
- Thermal time to trip, time to cool, Run hours.

Logic Functions:

- Truth tables
- Timers, Counters
- Volatile / Non-volatile signal conditioners
- Flashing / Flickering

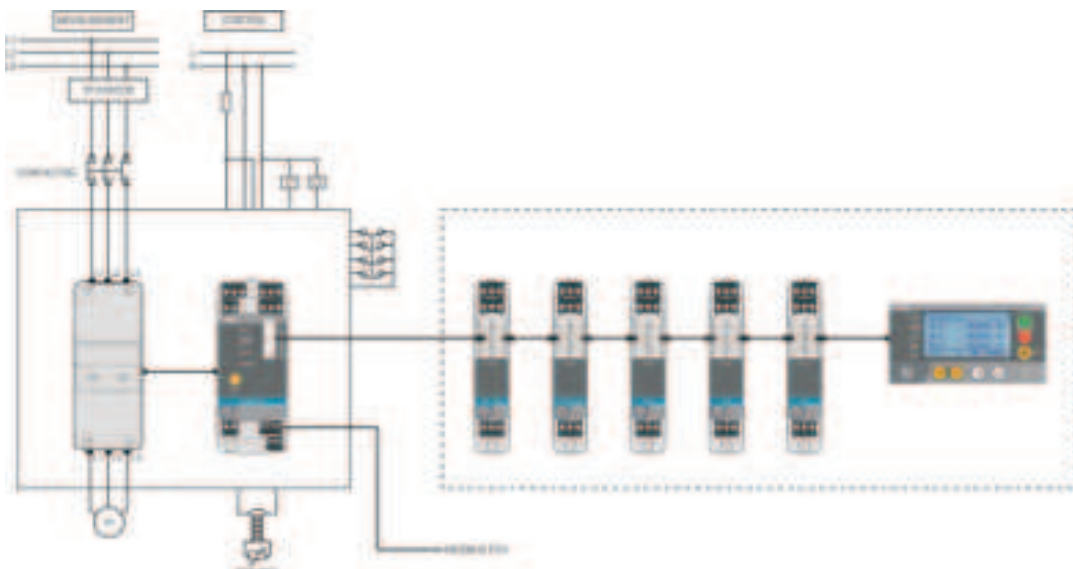
Control Functions / Starters:

- Re-acceleration
- Maximum number of starts
- Anti-back spin timer
- Starters:
 - Overload Relay
 - DOL
 - RDOL
 - Start Delta Starter

Communication:

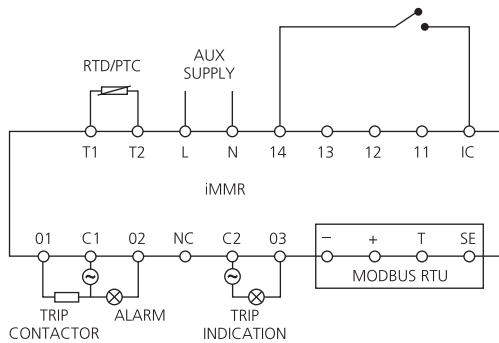
- Modbus RTU
- Profibus DP
- Modbus TCP/IP

Wiring Diagram



Standard Schematic

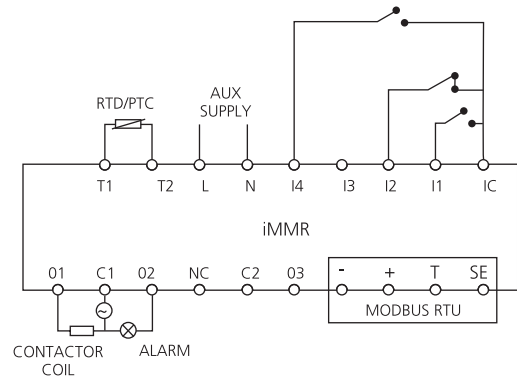
OVERLOAD



DI/DO	TERMINAL NO.	FUNCTION/SOURCE	ACT.TYPE	APPLICATION
DO1	O-C1	TRIP	ACT.LOW	CONTACTOR CONTROL
DO2	O2-C1	ALARM	ACT.HIGH	ALARM INDICATION
DI4	IC-44	TRIP RESET	ACT.HIGH	TRIP RESET
DO3	O3-C2	TRIP	ACT.HIGH	TRIP INDICATION

Note: DI - Potential Free Signal
DO - Potential Free Contact

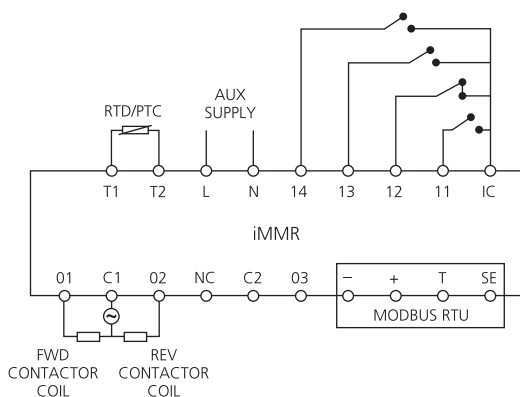
DOL



DI/DO	TERMINAL NO.	FUNCTION/SOURCE	ACT.TYPE	APPLICATION
DI1	IC-11	LSTRT>	ACT.HIGH	LOCAL START
DI2	IC-12	LSTOP	ACT.LOW	LOCAL STOP
DI4	IC-14	TRIP RESET	ACT.HIGH	TRIP RESET
DO1	O1-C1	CONTACTOR Q/P1	ACT.HIGH	CONTACTOR COIL
DO2	O2-C1	ALARM	ACT.HIGH	ALARM INDICATION

Note: DI - Potential Free Signal
DO - Potential Free Contact

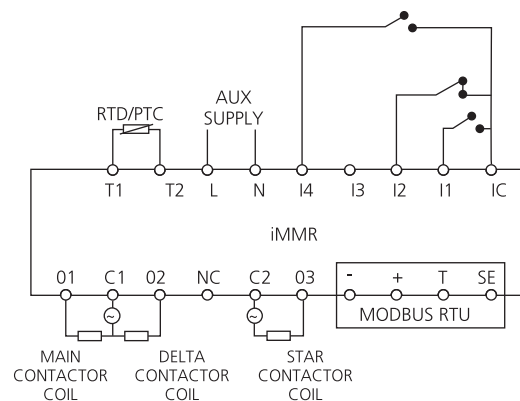
RDOL



DI/DO	TERMINAL NO.	FUNCTION/SOURCE	ACT.HIGH	APPLICATION
DI1	IC-11	L STRT >	ACT.HIGH	LOCAL START FWD
DI2	IC-12	L STOP	ACT.LOW	LOCAL STOP
DI3	IC-13	L STRT <	ACT.HIGH	LOCAL START REV
DI4	IC-14	TRIP RESET	ACT.HIGH	TRIP RESET
DO1	O1-C1	CONTACTOR O/P1	ACT.HIGH	FW CONTACTOR COIL
DO2	O2-C1	CONTACTOR O/P2	ACT.HIGH	REV CONTACTOR COIL

Note: DI - Potential Free Signal
DO - Potential Free Contact

STAR-DELTA



DI/DO	TERMINAL NO.	FUNCTION/SOURCE	ACT.TYPE	APPLICATION
DI1	IC-11	LSTRT>	ACT.HIGH	LOCAL START
DI2	IC-12	LSTOP	ACT.LOW	LOCAL STOP
DI4	IC-14	TRIP RESET	ACT.HIGH	TRIP RESET
DO1	O1-C1	CONTACTOR O/P3	ACT.HIGH	MAIN CONTACTOR COIL
DO2	O2-C1	CONTACTOR O/P2	ACT.HIGH	DELTA CONTACTOR COIL
DO3	O3-C2	CONTACTOR O/P1	ACT.HIGH	STAR CONTACTOR COIL

Note: DI - Potential Free Signal
DO - Potential Free Contact

iMMR components

Main Unit

Operational	Inputs/Outputs
• Supply Voltage: 1) 85-265V AC/DC, 2) 24V Dc$\pm$15% • Rated Frequency: 50-60Hz (For AC Input) • Power consumption: 10VA at Nominal Voltage • Operating Temperature: 0 - 60 °C	• Digital Input: 4DI (Type 1 in accordance with EN 61131-2) • Digital Input: 3DO (2N/O + 1 C/O) • Temperature: 1 RTD (PT100) or PTC



CT / CTVT Unit

Variants			
CT 1 0.3 - 3 Amp	CT1 + VT 60 - 690V AC	CT2 2.5 - 25 Amp	CT2+ VT 60 - 690V AC

Variants	
CT3 7 - 70A	CT3+VT 60 - 690V AC

CT's Will Be Supplied with 15 cm Cable



Display HMI

Variants	
With 1 meter cable	With 2 meter cable



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