



Electrical & Automation



SMART CONTROLLER FOR **SMART FACTORY**

*i*MMR

Intelligent Motor Management Relay

ABOUT US

Lauritz Knudsen Electrical & Automation, formerly known as L&T Switchgear, is a leading player in the electrical industry owing to its 70+ years of strong legacy and commitment to the nation's growth. The brand is dedicated to providing a wide range of electrical and automation products and solutions to vital sectors of the economy, including industries, utilities, infrastructure, buildings, and agriculture. Our extensive portfolio includes low-voltage and medium-voltage switchgear, automation solutions, tailored software, and services.

With manufacturing operations in Ahmednagar, Vadodara, and Coimbatore, we adhere to global standards of excellence. Our operations are supported by well-equipped, in-house design and development centers, as well as tooling facilities, ensuring precision in manufacturing.

We proudly operate six Switchgear Training Centers (STCs) across Pune, Lucknow, Coonoor, Vadodara, Delhi, and Kolkata. These centers offer tailor-made classroom courses and lab learning experiences for technicians, customers, engineers, professionals, and students.

With a deep national presence and one of the largest electrical distribution networks, comprising over 1500 partners across the country, we are committed to driving excellence and delivering superior products and solutions that power India's growth journey.

Brought to you by Lauritz Knudsen 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.



Introduction to Intelligent Motor Control Centre (iMCC)

Motors play an important role in any industry and impact plant's efficiency and energy consumption. It is, therefore, vital to protect your Motor installations. The electrical system such as Motors, Switchgear shall be robust, fail proof in nature so that the downtime can be minimised to no downtime. Failures of induction Motors cause production downtime and

may generate large losses in terms of maintenance and lost revenue. Timely detection of incipient Motor faults is of great importance. To optimize electrical power consumption and enable data-driven and predictive maintenance, plant engineers are working to tailor various Motor installations with specific types of protection.



An Intelligent Motor Control Center (iMCC) is a modular and communicable Motor control centre that ensures comprehensive protection, monitoring & smart control of electric Motors. Implementing iMCC in Industries brings

numerous benefits, including enhanced system reliability & increased production output. It also facilitates seamless integration of the electrical system with the Plant Control System leading to greater sustainability of your operations.

Advantages of iMCC



› Seamless integration

iMCC is a modular and communicable Motor Control Centre which facilitates seamless integration of the Electrical Panels with Control Room.



› Cost Saving

Huge reduction in control cabling helps to reduce the project cost and commissioning time. iMCC also helps to reduce the maintenance cost without degrading the performance and increases the Motor life.



› Increased efficiency

It optimizes the performance of the system, reduces the energy consumption resulting to increased efficiency



› Security

Role based access control and Password protection allows only the authorized person to have access to the system and data.

iMMR – Intelligent Motor Management Relay

iMMR, the brain of intelligent MCC, is designed for effective protection and management of Motors.

iMMR provides detailed information about operational and diagnostic data in real-time that allows to take corrective actions and avoid unexpected production downtime, losses, and breakdowns. Motor failures can be predicted by monitoring voltage, current, sensing temperature and vibration of the Motor in the operating conditions.

The variables related to this parameter can help in indicating upcoming Motor failure. The compact design with built-in pre-programmed starter logic reduces manufacturing and commissioning time.

With open communication protocols like Modbus RTU, Modbus TCP/IP and Profibus-DP; iMMR assures seamless integration of the Electrical Panels with Control room PLC/DCS.



Benefits of using iMMR



› Real-time Data Monitoring

The iMMR ensures real-time monitoring of crucial Motor parameters. Continuous monitoring helps prevent potential breakdown.



› Reacceleration Protection

In the event of temporary electric supply interruption, the reacceleration feature automatically restarts the Motor in Industry, thus reducing the production losses and improving plant stability.



› Control

As it is a communicable relay, it allows operators to remotely monitor and control Motors from various locations.



› Fault Detection

iMCC incorporates fault detection capabilities to ensure the safety of operator and valuable assets in industries.



› Data logging

It facilitates fault detection, enabling better decision-making and optimized maintenance planning.



› Advanced diagnostics

Enabling quick troubleshooting and system restoration. This feature helps minimize downtime.



› Protections

It helps prevent Motor failures, reducing costly repairs and improving overall operational reliability.



› Seamless Integration

The solutions provide scalability, allowing industry to expand production capacity, and integrate additional equipment seamlessly.

Product Details

iMMR Main Unit

- › Auxiliary power supply of 85 TO 265V AC/DC
- › 4 Digital Input and 3 Digital Output.
- › LEDS for diagnostic purpose
- › Available with different communication protocols.
 - » Profibus-DP
 - » Modbus RTU
 - » Modbus TCP/IP
- › One Temperature Input is available.



Profibus-DP



Modbus TCP/IP



Modbus RTU

CT & CTVT Unit

- › Extremely compact CT and CTVT Unit is available upto 70A.
- › CT Unit: for Current based protection and monitoring.
- › CT-VT Unit: for Current and Voltage based protection and monitoring.



CTVT Unit



CT Unit

Expansion Unit

- › Variants available: 4DI+2DO, 6DI, 2AI+1AO, Earth leakage+2DI+2DO available.
- › Up to 5 Expansion Unit can be connected to Main Unit of iMMR.



2AI+1AO



6DI



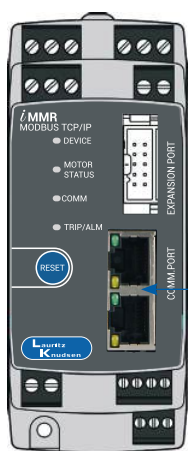
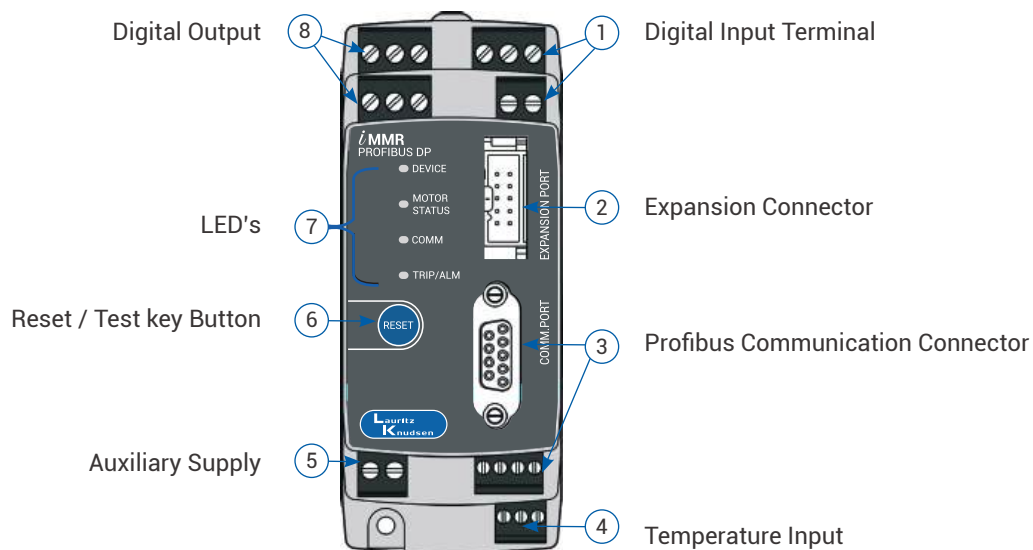
4DI+2DO

Display Unit

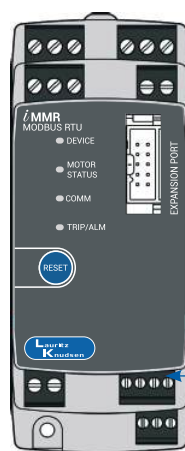
- › A self-powered Display Unit provides easy interface for monitoring and configuration of iMMR.
- › Display Unit also works as a memory module to copy/paste the relay setting chart for ease of commissioning and replacement of relays.



Terminal Description of iMMR unit



9 Modbus TCP/IP Ports



10 Modbus RTU terminal

System Overview

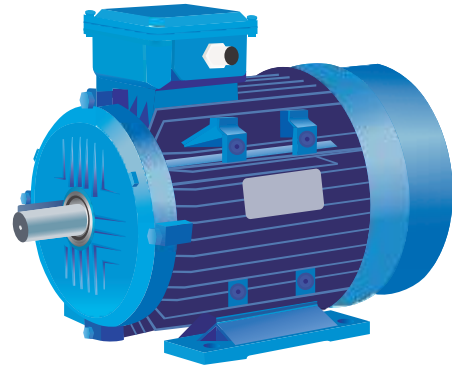


Note: Expansion module to be mounted on Right side of Main Unit.

Features of iMMR

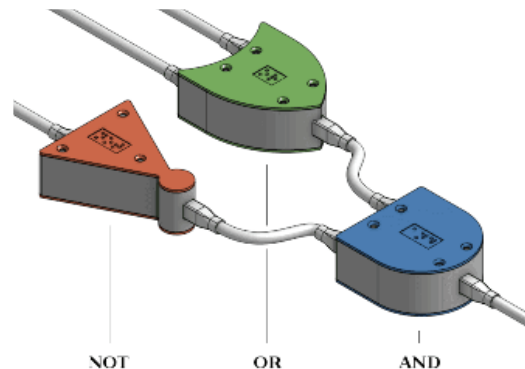
Protection

- › 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

- › Motor can be controlled from multiple locations such as DCS, Local station, HMI, Display Unit, Control Room.
- › Starter functions configurable: Overload relay, DOL, RDOL, Star-Delta starter.
- › Logic functions can be built using 2, 3 & 5 input Truth Table, Timers, Counters and Signal conditioners.
- › Communication protocols for seamless integration with SCADA system.
- › Exhaustive Control features like reacceleration and anti-back spin to keep factory downtime low.



Monitoring

- › Real time monitoring, recording and service/diagnostic data
- › 20 nos. of IRF
- › 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 Suite

iMMR Suite is a software suite accompanying with intelligent Motor Management Relay (iMMR). It eases out the time consuming and hectic work of relay configuration through its Serial/Ethernet connectivity and intuitive Graphical User Interface (GUI). The software is used for monitoring, configuring diagnostics, and analysis functionality of the relay.

Feature:

- › Motor specific data which includes total number of Motor runs hours, no of starts, total number of trips and the running time of Motor, etc.
- › Status and indication of Digital inputs & Digital Outputs Protection setting indications, etc can be observed.
- › The relay provides 100 Event records, 20 Trip records and 20 IRF records, all the data related to this faults and events can be downloaded into excel file for analysis purpose.
- › It is possible to import and export the settings of the Main Unit in case the same setting is required for any project.
- › In Graphical Logic Builder, by using various types of logic gates we can develop multiple interlocks to control the Motor.



Applications



Chemical Industry

iMMR is a One Stop Solution for comprehensive Motor Management.

Conformally coated PCBs are resistive to corrosive environments in chemical plants.

Availability of trip record in field, ensure significant reduction in the plant downtime.



Oil & Gas

Reduction in discrete components improves the system reliability Inbuilt reacceleration function for System restart is available.



Cement Industry

Multi master support on Modbus TCP/IP ensures seamless integration with control room and analytics software.



Mining, Minerals & Metals

OL protection along with backup DT Overcurrent protection for complete Motor protection and coordination.

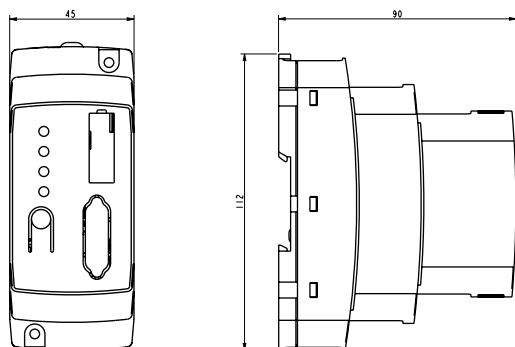


Water Segment

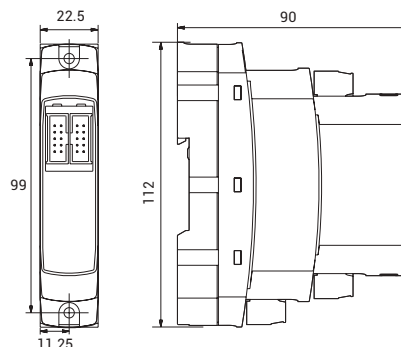
iMMR offers precise and flexible protection for Pumps including Dry Run and Anti-back spin.

Compact and modular form factor

› iMMR Main Unit



› Compact and modular Expansion Unit



Dimensions in mm [W x H x D]

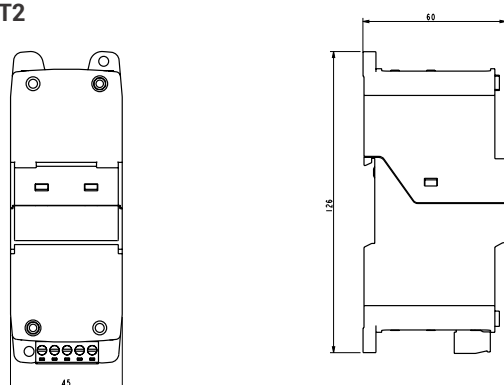
| | |
|----------------|-----------------|
| iMMR Main Unit | 45 x 112 x 90 |
| Expansion Unit | 22.5 x 112 x 90 |

All Dimensions are in mm

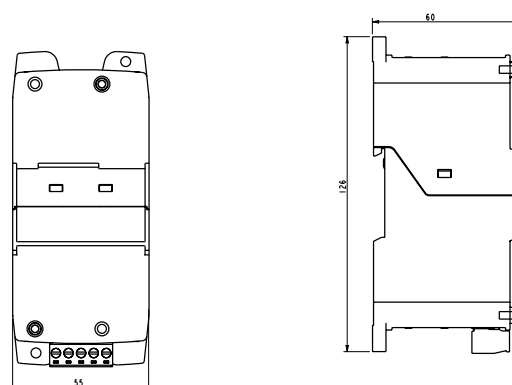
Compact CT/CTVT Unit

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

› CT1/CT2



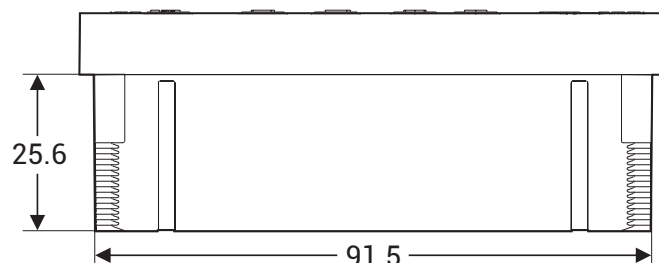
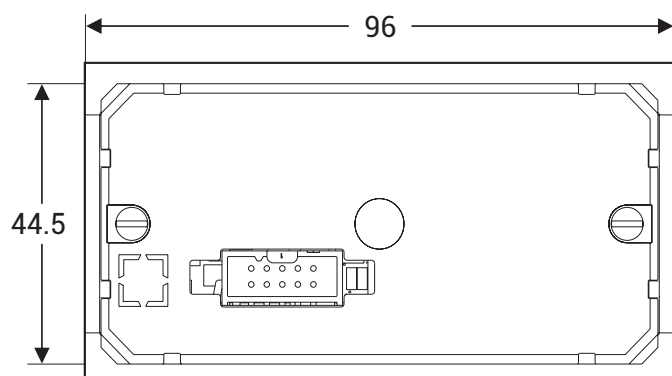
› CT3



Dimensions in mm [W x H x D]

| 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 | |

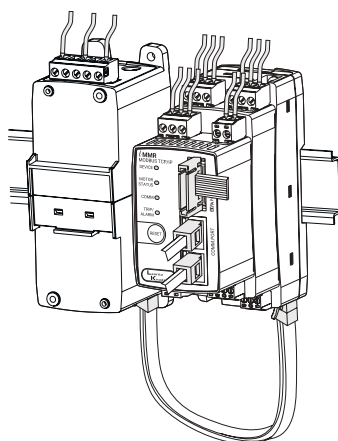
Compact Display Unit



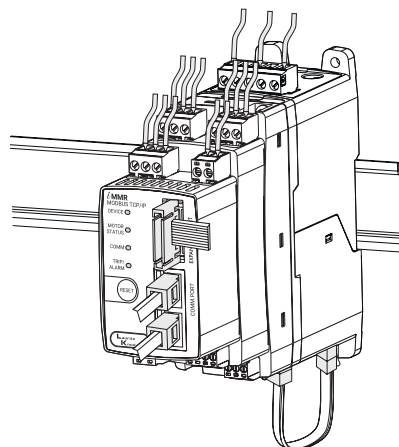
Cutout Dimensions (H x W x D)

45 x 92.5 x 45

Mounting Options



1. Side-wise mounting

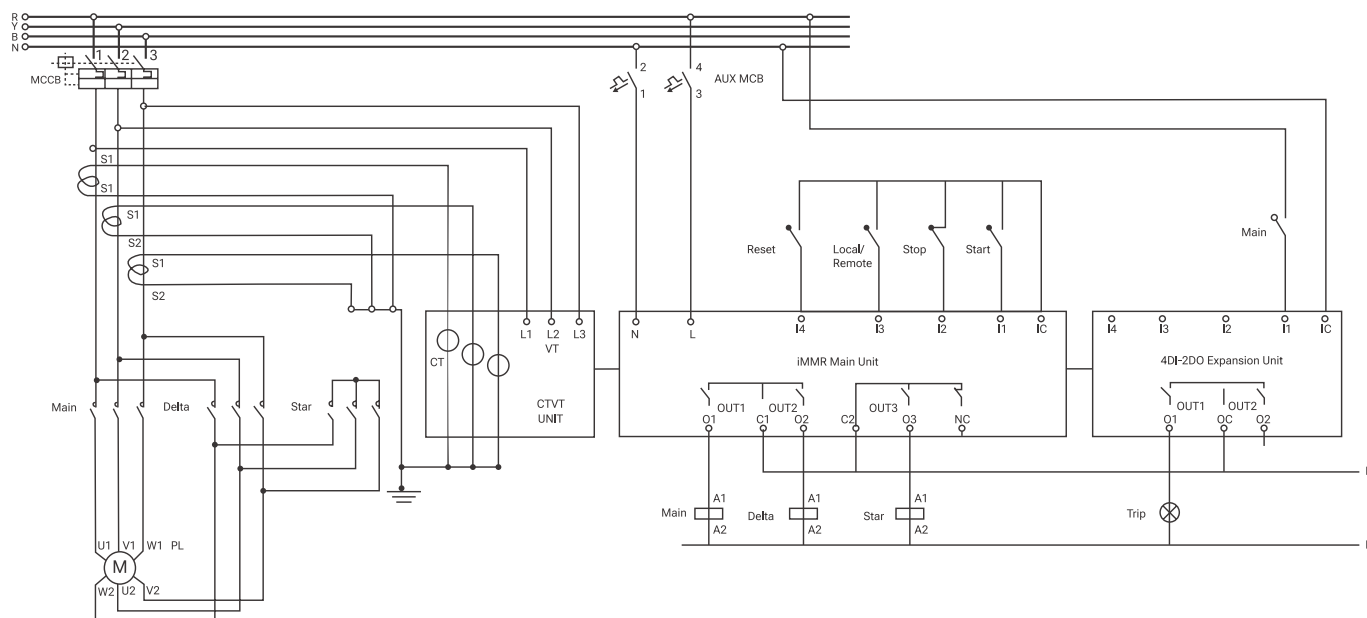


2. Mounting above CT unit

Note:

1. CT/CTVT unit should be mounted on the left side of the main unit.
2. Main unit of iMMR can be placed on the CT/CTVT unit.

iMMR Schematic with External CT's



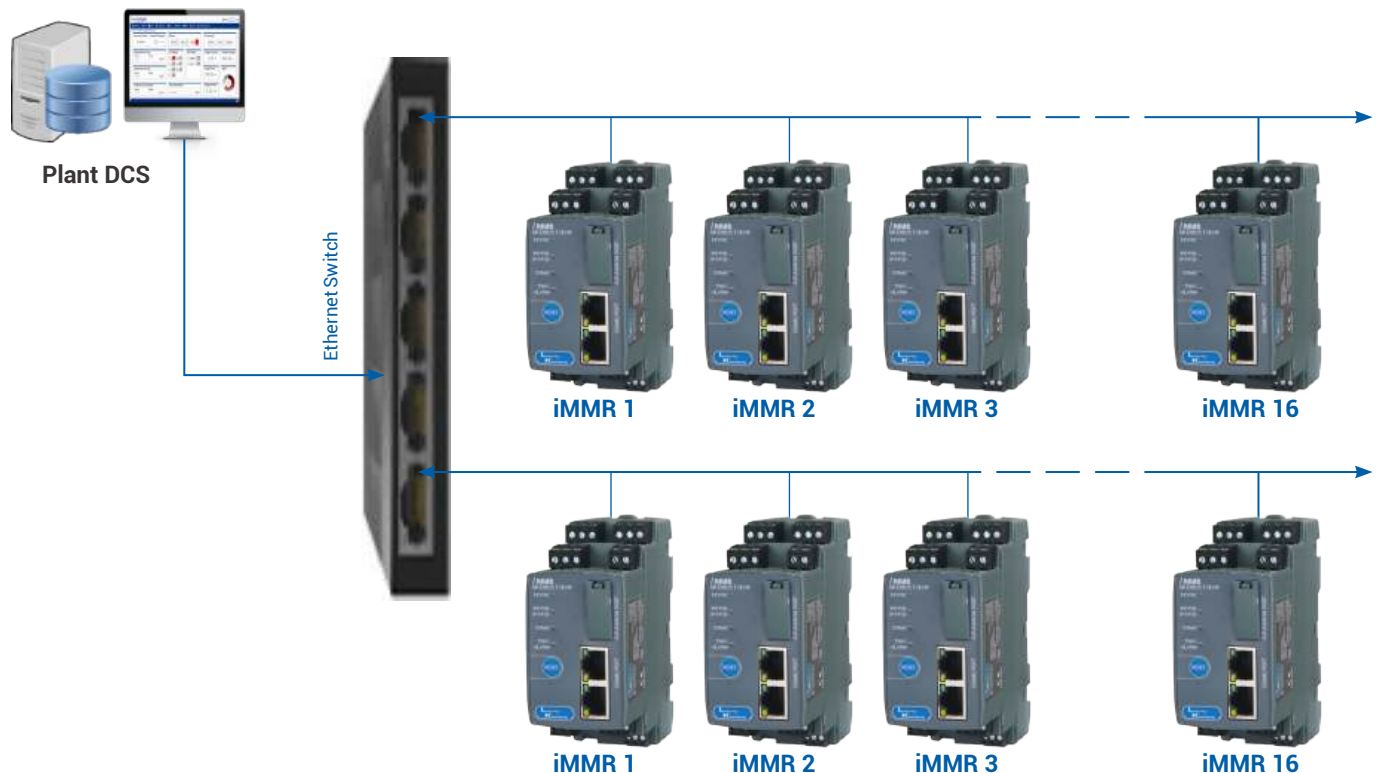
Detailed specifications

| Operating Parameters | |
|--|--|
| Power Supply | 85- 265 V AC |
| Operating Frequency | 50/ 60 Hz |
| VA rating | 10 VA |
| Power On period | 100msec |
| Transparency Period | 20msec |
| Operating Temperature range | 0°C to +60°C |
| Storage Temperature range | -40°C to +80°C |
| Product Details | |
| Digital Input | 4 (Type 1 as per EN61131-2 (Only for Potential Free contacts)) |
| Digital Output | 03 (2 N/O +1C/O) |
| Temperature Input | 01 (2 wire) |
| Current / Current + Voltage based unit range | CT1: 0.3 – 3A AC CT2: 2.5 – 25A AC CT3: 7 – 70A AC |
| Communication protocols available | Modbus RTU Modbus TCP/IP Profibus-DP |

| | |
|--|---|
| Expansion Unit | 4DI+2DO 6DI 2AI+1AO Earth leakage module+2DI+2DO |
| Digital Input | |
| Parameter | Description |
| Number of inputs | 4 |
| Input Type | (Type 1 as per EN61131-2 (Only for Potential Free contacts)) |
| Cable Length | 30m |
| Isolation | Non isolated |
| Digital Output | |
| Parameter | Description |
| Number of outputs | 3 |
| Output Type | Relay contact (1FormA: 2 no's & 1FormC: 1 no) |
| Switching Capacity | AC-15: 250VAC/10A |
| Isolation | DC-13: 30VDC/3A |
| | ±4Kv (Coil to contact) |
| Life expectancy | Mechanical:10,000,000 operation min. (At 18,000 operations/hr under no load) Electrical: 100,000 operations average. (At 1,800 operations/hr under rated load) |
| Digital Output Operating life | Pickup time: 4.8 ms Drop off time: 4.4 ms |
| Temperature Input | |
| Parameter | Description |
| Number of inputs | 01 (2wire) |
| Type of input | RTD (PT100) / PTC |
| Maximum input capacity | RTD: 250Ω PTC: 4000Ω |
| Measurement Accuracy | RTD: ± 2°C PTC: |
| Technical Specification of CT/CTVT Module | |
| Current Input | |
| Parameter | Description |
| Current input range (IFLC) | CT1: 0.3 – 3A AC CT2: 2.5 – 25A AC CT3: 7 – 70A AC |
| Type of current | Three phase |
| Measurement Frequency | 50/60Hz ± 5Hz |
| Current measurement accuracy | 0.3 – 25A AC: ±1% (Class 1) 7 – 100A AC: ± 5% (Class 5) |
| Voltage Input | |
| Parameter | Description |
| Voltage input range | 60-690 V AC |
| Measurement Frequency | 50/60Hz ± 5Hz |
| Voltage measurement accuracy | ± 1% of input voltage (Class1) |
| Frequency Input | |
| Parameter | Description |
| Frequency range | 45 – 65Hz |
| Voltage measurement accuracy | ± 0.01Hz |
| Power Factor | |
| Parameter | Description |
| Power factor range (PF) | 0.4 – 1 |
| Power factor resolution | 0.01 |
| Technical specification for Communication | |
| iMMR Main Unit Communication | Supported Masters |
| Modbus RTU | Supports 1 Master |
| Profibus-DP | 1 Class1 Master and 2 Class 2 masters |
| Modbus TCP/IP | 5 Masters |

Communication Topologies supported

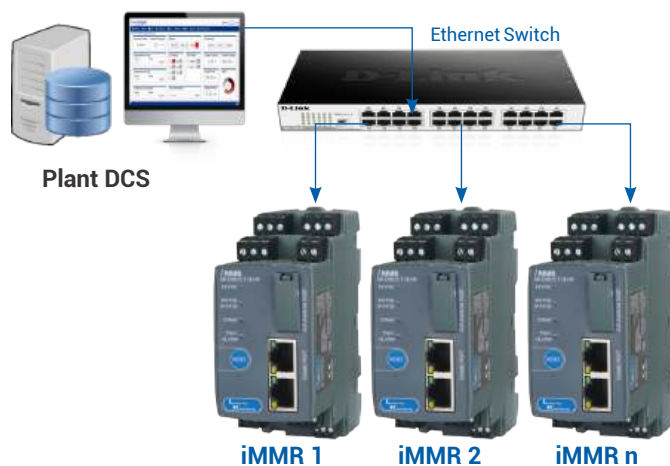
Daisy / Bus



iMMR with Modbus RTU, Profibus-DP and Modbus TCP/IP

- › Complete range of iMMR offers solution with Daisy Chain Topology.
- › Most of times Daisy Chain Topology is used to form Industrial Automation networks.

Star



STAR TOPOLOGY

iMMR with Modbus TCP/IP

- › Modbus TCP/IP range of iMMR offers solution with Star Topology.
- › Most of times star Topology is used in ethernet Industrial Automation networks.

Metering Parameters

| CT Module | CTVT module |
|--|--------------------------------|
| L1 RMS Current | |
| L2 RMS Current | |
| L3 RMS Current | |
| Calculated earth fault RMS Current (Main Unit) | |
| Average Current | |
| Current Unbalance | |
| Current Phase sequence | |
| Total Harmonic Distortion I L1 | |
| Total Harmonic Distortion I L2 | |
| Total Harmonic Distortion I L3 | |
| | L1 RMS Voltage |
| | L2 RMS Voltage |
| | L3 RMS Voltage |
| | Average Voltage |
| | Voltage Unbalance |
| | Voltage Phase sequence |
| | System Frequency |
| | System PF |
| | Total Active Power |
| | Total Reactive Power |
| | Total Apparent Power |
| | Total Active Energy |
| | Total Reactive Energy |
| | Total Apparent Energy |
| | Total Harmonic Distortion V L1 |
| | Total Harmonic Distortion V L2 |
| | Total Harmonic Distortion V L3 |

Monitoring Parameters

| Monitoring Parameters |
|-----------------------|
| Number of starts |
| Number of Stops |
| Last Motor Run Hrs |
| Total Motor Run Hrs |
| Starting Time |
| Thermal Memory |
| Starting Peak Current |
| Full Load Current |
| Last Stop Cause |
| Trip Counter |

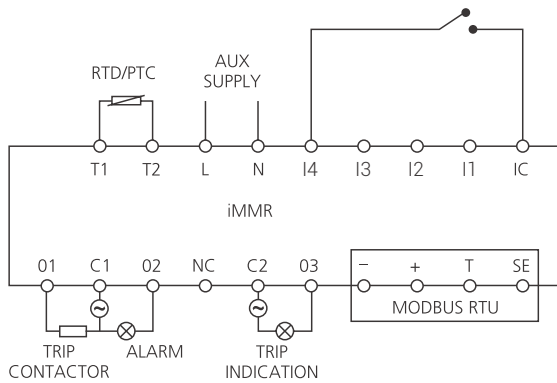
Setting Chart for Protection

| Protection Function | Description | Variable | Range | Available in CT module | Available in CTVT module |
|-------------------------|---|---------------------|---------------------|------------------------|--------------------------|
| Thermal Overload | Overload is a condition where current higher than the rated value flows to the Motor resulting in excessive heating of the Motor. | Alarm | 80-100% of TM | ✓ | ✓ |
| | | Thermal reset level | 30-95% of TM | | |
| | | Cool down time | 0.0-6000.0 Sec | | |
| Under Current | It is a condition where the current through the conductor (power circuit) reaches below its rated minimum value. Under Current is observed mainly during No-load. | Pick up | 15-100% Ifc | ✓ | ✓ |
| | | Alarm | 100-115% | | |
| | | Trip Delay | 0.100-6000 Sec | | |
| NI Over Current | A backup overcurrent protection is provided to detect increase in Motor current. Protection remains enabled during Motor START and RUN condition. Trip characteristics is Normal Inverse | Pickup | 20-1000%Ifc | ✓ | ✓ |
| | | Alarm | 25-100% of Pick up | | |
| | | Trip Delay | 0.100-200 Sec | | |
| DT Over Current | A backup overcurrent protection is provided to detect increase in Motor current. Protection remains enabled during Motor START and RUN condition. Trip characteristics is Definite Time. | Pickup | 50 - 1000% Ifc | ✓ | ✓ |
| | | Alarm | 25 - 100% of pickup | | |
| | | Time during Start | 0. 100 - 6000.0 sec | | |
| | | Time during Run | 0. 100 - 6000.0 sec | | |
| Locked Rotor | Locked Rotor is a condition where rotor of the Motor (during START condition) is not able to rotate. It occurs mainly due to excessive load or due to improper connection between rotor and the shaft | Pickup | 150 - 1000% Ifc | ✓ | ✓ |
| | | Alarm | 25 - 100% of pickup | | |
| | | Trip Delay | 0. 100 - 6000 sec | | |
| Stalled Rotor | Stalled Rotor is a condition where rotor of the Motor (during RUN condition) is not able to rotate. This condition occurs due to overload or the load jam. Stalled rotor protection is active only when the Motor is running | Pick up | 50 - 1000% Ifc | ✓ | ✓ |
| | | Alarm | 25 - 100% of pickup | | |
| | | Trip Delay | 0. 100 - 6000 sec | | |
| Short Circuit | iMMR provides the definite time short circuit protection. To be enabled in case of Breaker controlled Motors. | Pick up | 100 - 1000%Ifc | ✓ | ✓ |
| | | Alarm | 25 - 100% of pickup | | |
| | | Trip Delay | 0.050 - 10 sec | | |
| Current Phase Loss | It is a condition in the 3-phase power circuit where one phase of the supply is not available to the Motor terminals. It is usually due to internal causes like improper connections in the circuit, blowing of one of the fuses, failure in switch gear contacts and external causes like line breakages, etc. | Time Delay | 0. 100 - 6000 sec | ✓ | ✓ |
| Current Phase Unbalance | It is a condition where the current in the 3-Phases differs in magnitude and is usually caused due to load unbalance or improper Motor windings | Pickup | 5 - 100% Ifc | ✓ | ✓ |
| | | Trip Delay | 0. 100 - 6000 sec | | |
| Earth Fault Internal | Earth fault is detected with the help of 3 inbuilt CTs by residual calculations | Pickup | 10 - 500% Ifc | ✓ | ✓ |
| | | Alarm | 25 - 100% of pickup | | |
| | | Trip Delay | 0.050 - 600 sec | | |
| Earth Leakage | Earth leakage condition is detected by using a separate CBCT | Pickup | 0.030 - 40A | ✓ | ✓ |
| | | Alarm | 25 - 100% | | |
| | | Trip Delay | 0.100 - 6000sec | | |
| Current Phase Reversal | Detection of phase sequence reversal based on current sensing. | Time Delay | 0.100 - 6000sec | ✓ | ✓ |

| Protection Function | Description | Variable | Range | Available in CT module | Available in CTVT module |
|-------------------------|---|-------------|-----------------------|------------------------|--------------------------|
| Under Voltage | It is a condition where the voltage in the power circuit decreases below 90 percent of its normal voltage. This occurs during the heavy electrical demand (during peak hours). Under voltage fault heats up the Motor, it leads to winding insulation failure, this fails the Motor permanently | Pick up | 25 - 100% Vn | | ✓ |
| | | Alarm | 110% of Pickup | | |
| | | Block Level | 0 - 35% Vn | | |
| | | Trip Delay | 0.100 - 6000sec | | |
| Over Voltage | It is a condition where voltage in the power circuit rises above its preset value and occurs usually due to internal causes like switching surges, insulation failure, arcing ground, and Phase Loss. | Pickup | 101 - 130% Vn | | ✓ |
| | | Alarm | 25 - 100% | | |
| | | Trip Delay | 0.100 - 6000sec | | |
| Voltage phase unbalance | It is a condition where the voltage in the 3-phases power circuit differs in magnitude or phase, or both. Voltage unbalance condition occurs because of variation in the loads, unbalanced incoming supply, due to Earth Faults etc. | Pickup | 5 - 50% | | ✓ |
| | | Alarm | Equal to Pickup level | | |
| | | Trip Delay | 0.100 - 6000.0 | | |
| Voltage phase reversal | Detection of phase sequence reversal based on voltage sensing. | Time Delay | 0.100 - 6000.0 sec | | ✓ |
| Voltage Phase Loss | Detection of Phase Loss based on voltage sensing. | Time Delay | 0.100 - 6000.0 sec | | ✓ |
| Over frequency | The Over frequency protection trips the Motor if the measured frequency goes above the pickup level for the specified time delay | Pickup | 100 - 110% | | ✓ |
| | | Alarm | 99% of Pickup | | |
| | | Trip Delay | 0.100 - 6000.0 sec | | |
| Under Frequency | The under frequency protection trips the Motor if the measured frequency goes below the pickup level for the specified time delay. | Pickup | 90 - 100% | | ✓ |
| | | Alarm | 101% of Pickup | | |
| | | Trip Delay | 0.100 - 6000.0 sec | | |
| Over Power | Monitors and protects the Motor in case of increase in active power | Pickup | 20 - 1000% of Pn | | ✓ |
| | | Alarm | 20 - 1000% of Pn | | |
| | | Trip Delay | 0.100 - 6000.0 sec | | |
| Under Power | Detection of low active power condition. | Pickup | 20 - 1000% of Pn | | ✓ |
| | | Alarm | 20 - 1000% of Pn | | |
| | | Trip Delay | 0.100 - 6000.0 sec | | |
| Under PF | Detects low power factor condition | Pickup | 0.4 - 1.00 | | ✓ |
| | | Alarm | 0.4 - 1.00 | | |
| | | Trip Delay | 0.100 - 6000.0 sec | | |

Standard Schematic

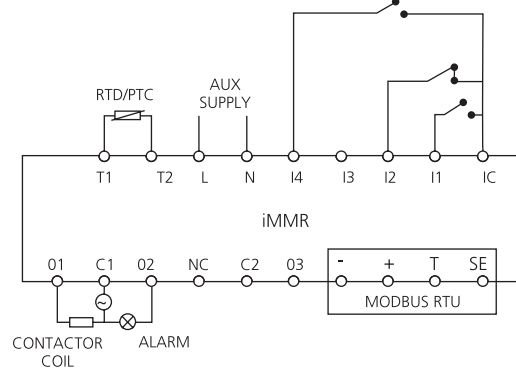
OVERLOAD



| DI/DO | TERMINAL NO. | FUNCTION/SOURCE | ACT.TYPE | APPLICATION |
|-------|--------------|-----------------|----------|-------------------|
| D01 | O-C1 | TRIP | ACT.LOW | CONTACTOR CONTROL |
| D02 | O2-C1 | ALARM | ACT.HIGH | ALARM INDICATION |
| DI4 | IC-I4 | TRIP RESET | ACT.HIGH | TRIP RESET |
| D03 | O3-C2 | TRIP | ACT.HIGH | TRIP INDICATION |

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

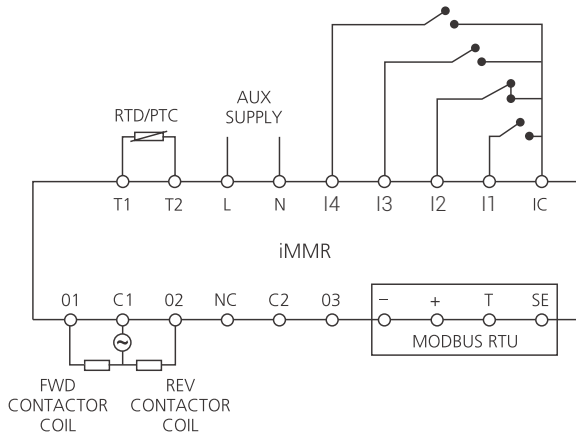
DOL



| DI/DO | TERMINAL NO. | FUNCTION/SOURCE | ACT.TYPE | APPLICATION |
|-------|--------------|-----------------|----------|------------------|
| DI1 | IC-I1 | LSTART> | ACT.HIGH | LOCAL START |
| DI2 | IC-I2 | LSTOP | ACT.LOW | LOCAL STOP |
| DI4 | IC-I4 | TRIP RESET | ACT.HIGH | TRIP RESET |
| D01 | O1-C1 | CONTACTOR O/P1 | ACT.HIGH | CONTACTOR COIL |
| D01 | O2-C1 | ALARM | ACT.HIGH | ALARM INDICATION |

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

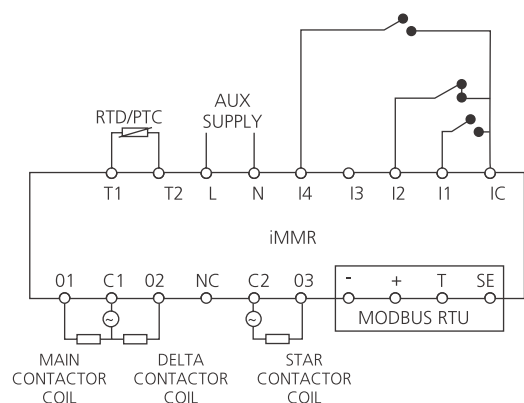
RDOL



| DI/DO | TERMINAL NO. | FUNCTION/SOURCE | ACT.TYPE | APPLICATION |
|-------|--------------|-----------------|----------|--------------------|
| DI1 | IC-I1 | LSTART> | ACT.HIGH | LOCAL START FWD |
| DI2 | IC-I2 | LSTOP | ACT.LOW | LOCAL STOP |
| DI3 | IC-I3 | LSTART< | ACT.HIGH | LOCAL START REV |
| DI4 | IC-I4 | TRIP RESET | ACT.HIGH | TRIP RESET |
| D01 | O1-C1 | CONTACTOR O/P1 | ACT.HIGH | FW CONTACTOR COIL |
| D02 | 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-I1 | LSTART> | ACT.HIGH | LOCAL START |
| DI2 | IC-I2 | LSTOP | ACT.LOW | LOCAL STOP |
| DI4 | IC-I4 | TRIP RESET | ACT.HIGH | TRIP RESET |
| D01 | O1-C1 | CONTACTOR O/P3 | ACT.HIGH | MAIN CONTACTOR COIL |
| D02 | O2-C1 | CONTACTOR O/P2 | ACT.HIGH | DELTA CONTACTOR COIL |
| D03 | O3-C2 | CONTACTOR O/P1 | ACT.HIGH | STAR CONTACTOR COIL |

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

Reference Standards

| Tests | Standards | Test Levels |
|----------------------------------|--------------------------------------|---|
| Cold | IEC 60068-2-1 | -20 °C, 72 Hours |
| Temperature Cycling | IEC 60068-2-14 | 0°C to 60°C, 3Hrs, 2cycles |
| Vibration | IEC 60068-2-6 | 10 to 150 Hz, 1G/2G |
| Dry Heat | IEC 60068-2-2 | 0°C to 60°C, 3Hrs |
| Damp Heat | IEC 60068-2-30 | 55°C, 6 cycles, 24 hrs/cycle, 95% relative humidity |
| Shock Resistance | IEC 60255-21-2 | 30G, 18shocks |
| Bump | | 25G,6000 bumps |
| Enclosure Protection | | IP 41 enclosed in a panel (IP 20 product) |
| Dielectric | IEC 60255-5:2000 (Cl. No 6.1.4) | 2kV, 1 min |
| Impulse | IEC 60255-5:2000 (Cl. No 6.1.3) | 4kV |
| Voltage Dip and Interruption | IEC 61000-4-11 (Edition 2.1.2011) | Class A |
| Insulation Resistance | IEC 60255-5:2000 (Cl. No. 6.2.2) | 500VDC, 5sec |
| Electrostatic Discharge Immunity | IEC 61000-4-2 (Edition 1.2, 2001 04) | 8kV air discharge 6kV contact discharge |
| Radiated RF Immunity | IEC 61000-4-3 | Severity Level 3 Field Strength 10V/m |
| Fast Transient, Burst Immunity | IEC 61000-4-4 | 4kV @ 5kHz |
| Surge Immunity | IEC 61000-4-5 (Edition 3.1, 2017) | Main Unit Differential: ± 2 kV Common: + Common: ± 4 kV |
| | | Expansion Unit Differential: ± 1 kV Common: + Common: ± 2 kV |
| Conducted RF Immunity | IEC 61000-4-6 (Edition 4.0, 2013) | Severity Level 3 Voltage Level: 10Vrms |
| Conducted Emission | CISPR 11 (Edition 5, 2010) | |
| Radiated Emission | CISPR-16-1-1 & 16-1-2 | |

Certifications

Certifications

ISO: Relay is designed and manufactured using ISO 9001 certified quality program.

CE: CE Mark- Low Voltage Directive, EMC Directive.

Environmental Conditions

Environmental Conditions

Typical conditions under which the Relay is designed to operate

| | |
|----------------------------|--|
| Temperature | 0°C to 60°C (Operating) -40°C to 80°C (Storage) |
| Supply Voltage Fluctuation | ± 10 % of nominal voltage |
| Relative Humidity | 5 to 95 % |

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Product improvement is a continuous process. For the latest information and special application, please contact any of our offices listed here. Product photographs shown for representative purpose only.



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