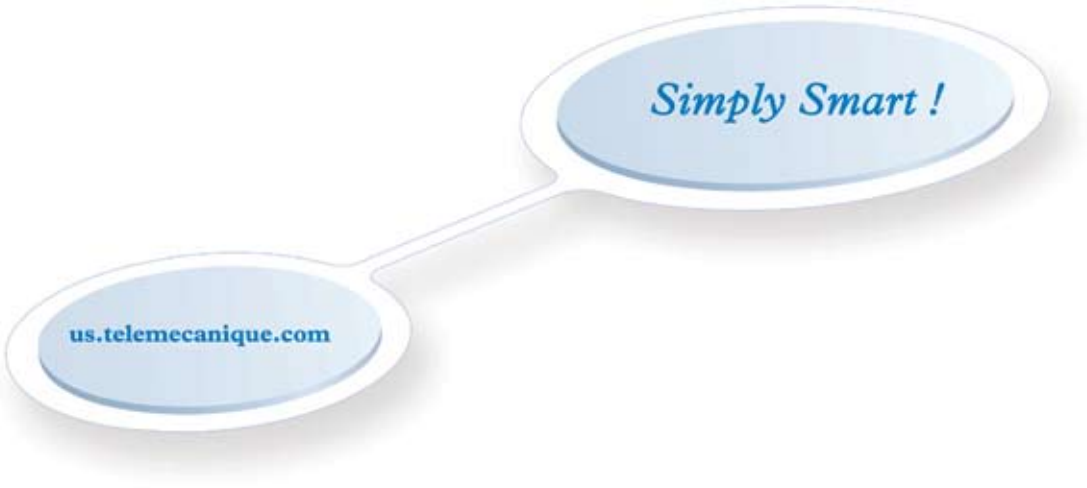
TeSys® T Motor Management System

Catalog

2008

Schneider Electric



This site allows you to access all the Telemecanique® products in just 2 clicks via comprehensive range data-sheets, with direct links to:

- Complete library: technical documents, catalogs, certificates, FAQs, brochures...
- Selection guides from the e-catalog.
- Product discovery sites and their Flash animations.

You will also find illustrated overviews, news you can subscribe to, a discussion forum, the list of country contacts...
Live automation solutions every day!

Flexibility

- Interchangeable modular functions, to better meet the requirements for extensions
- Software and accessories common to multiple product families

Compactness

- High functionality in a minimum of space
- Freedom in implementation

Ingenuity

- Auto-adapts to its environment, “plug & play”
- Application functions, control, communication and diagnostics embedded in the products
- User-friendly operation either directly on the product or remotely

Openness

- Compliance with field bus, connection, and software standards
- Enabling decentralized or remote surveillance via the web with Transparent Ready® products

Simplicity

- Cost effective “optimum” offers that make selection easy for most typical applications
- Products that are easy to understand for users, electricians and automation specialists
- User-friendly intuitive programming

TeSys T controllers and expansion modules

Protection components
Motor and machine protection

Introduction

Exceeding the operating limits of an electric motor will eventually lead to destruction of the motor itself as well as the mechanisms it drives. Exceeding these limits can be the cause of electrical or mechanical faults.

■ Electrical faults:
□ overvoltage, voltage drop, imbalance and phase failure which cause variations in the current drawn,
□ short-circuits which can cause the current to reach levels capable of exceeding the operating limits.

■ Mechanical faults:
□ locked rotor,
□ brief or prolonged overload which leads to an increase in the current drawn by the motor, and therefore overheating.

The cost of these faults includes loss of production, loss of raw materials, repair of the production tool, poor quality of production and delays in delivery.

These faults can also result in possible dramatic consequences to the safety of people in direct or indirect contact with the motor.

To prevent these faults, protection measures are necessary.
They make it possible to isolate the equipment to be protected from the main supply, by measuring electrical values such as voltage, and current.

Each motor starter must have:

■ **short-circuit protection**, to quickly detect and break abnormal currents generally greater than 10 times the rated full load current (FLC).

■ **overload protection**, to detect increases in current up to about 10 times the full load current (FLC) and to switch off the starter before overheating of the motor and conductors damages the insulation.

This protection is provided by specific devices such as fuses, circuit breakers and thermal overload relays, or by more integrated devices offering several types of protection.

Causes, effects and consequences of detected faults

There are two types of detected faults:
- Internal conditions within the motor.
- External conditions: these are located outside the electric motor but their consequences can lead to damage inside the motor.

Faults	Cause	Effects	Consequences on the motor and on the machine
Short-circuit	Contact between several phases, or between one phase and neutral or between several turns of the same phase.	■ Current peak ■ Electrodynamic forces on the conductors	Destruction of windings
Overvoltage	■ Lightning ■ Electrostatic discharge ■ Operation	Dielectric breakdown in the windings	Destruction of the windings due to loss of insulation
Phase imbalance and phase failure	■ Opening of a phase ■ Single-phase load upstream of the motor ■ Short-circuit between the turns of the same winding	■ Reduction of usable torque, efficiency and speed ■ Increase in losses ■ Starting impossible if phase failure	Overheating *(1)*
High starting frequency	■ Failure of the automation system ■ Too many manual control operations ■ Numerous fault trips	High stator and rotor temperature rise due to the frequent start current	Overheating *(1)* Consequences on the process
Voltage variations	■ Instability of the mains voltage ■ Connection of heavy loads	■ Reduction of usable torque ■ Increase in losses	Overheating *(1)*
Harmonics	Pollution of the mains supply by variable speed drives, inverters, etc...	■ Reduction of usable torque ■ Increase in losses	Overheating *(1)*
Long starting time	■ Resistive torque too high (load too heavy) ■ Voltage drop	Increase in starting time	Overheating *(1)*
Jamming	■ Mechanical problem (crusher) ■ Seizures	Overcurrent	Overheating *(1)* Consequences on the process
No-load running	■ Pump running empty ■ Mechanical break in drive to the load	Drop in current drawn	Consequences on the process
Frequency fluctuations	■ Overload of a supply powered by limited independent sources ■ Faulty alternator speed regulator	■ Increase in losses ■ Interferes with synchronous devices (clock, recorder, ...)	–
Overload	■ Increase in resistive torque ■ Voltage drop ■ Drop in power factor	Increase in current consumption	Overheating *(1)*
Loss of machine excitation	■ Significant drop in excitation current ■ Break in rotor winding	■ Increase in active power ■ Drop in power factor	Significant overheating of rotor and cage

(1) Then, in the longer term, depending on the seriousness of the fault and/or its frequency, short-circuit and destruction of the windings.

Protection components
TeSys® T Motor Management System

Applications	**Multifunction motor and machine protection**				
					
Device type	**Controllers**				
For network/bus	Modbus® protocol	CANopen	DeviceNet	Profibus DP	Ethernet TCP/IP
Current range	0.4…100 A (with internal current transformer) 100…1000 A (with external current transformer)				
Control voltage	⎓ 24 V ∿ 100…240 V				
Number of I/O	6 inputs 4 outputs				
Measurements	- Current between phases - Ground fault. - Motor temperature.				
Functions	**Protection and monitoring functions:** - thermal overload - motor temperature monitoring - phase imbalance and phase failure - locked rotor - long start times - phase reversal - ground fault				
Device type	**LTM R••M••**	**LTM R••C••**	**LTM R••D••**	**LTM R••P••**	**LTM R••E••**
Pages	8				

Input extension modules, for all LTM R controllers		**Operator control unit**
–		–
–		–
⎓ 24 V *(1)*	∿ 100…240 V *(1)*	Powered via the LTM R controller or via the LTM E extension module.
4 independent inputs		–
Voltage between phases		–
Monitoring functions: - voltage, - power, - Cos φ (power factor)		**Display functions:** - measurements, - faults and alarms, - statistics, etc...
LTM EV40BD	**LTM EV40FM**	**LTM CU**
9		9

(1) Input control voltage. The electronics are powered via the controller.

Protection components
TeSys® T Motor Management System

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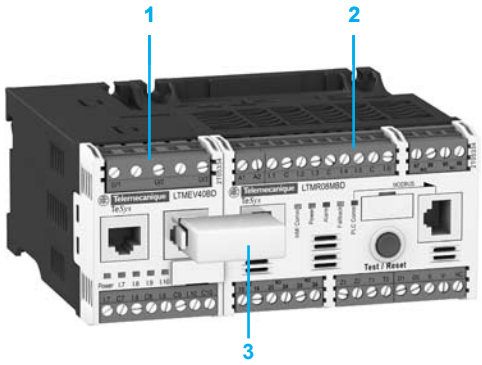


1 LTM EV40BD expansion module
2 LTM R08MBD controller
3 LTMCC004 connector

Presentation

The TeSys T motor management system provides protection, metering and monitoring functions for single-phase and 3-phase, constant speed, AC motors up to 1000 A.

Suitable for harsh applications, this product range offers:
- high-performance multifunction protection, independent of the automation system,
- a local HMI control unit for reading, displaying and modifying the parameters monitored, diagnostics, etc.....
- configuration of the application using PowerSuite™ Version 2.5 software,
- connection to the automation system via a communication network (selection according to various protocols).

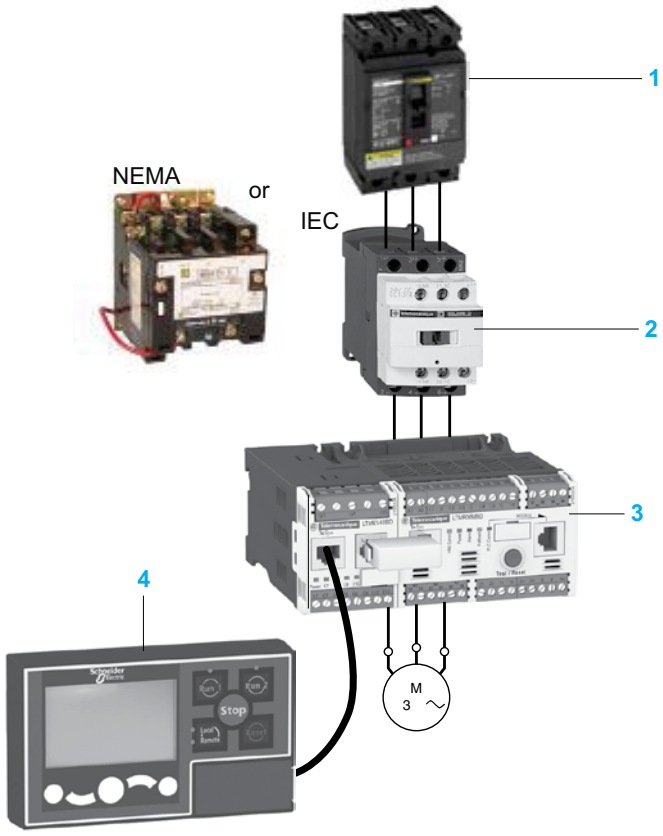
Application

The TeSys T motor management system is used for motor control and protection to avoid costly downtime in harsh industrial applications, such as oil and gas, the chemical industry, water treatment, metal, minerals and mining, pharmaceutical industry, microelectronics, tunnels, and airports.

With the TeSys T motor management system, untimely stoppages of a process associated with a motor are anticipated via predictive analysis of fault situations. Fault tripping is therefore reduced to a minimum.

Its use in motor control panels makes it possible to:
- increase the operational availability of installations,
- improve flexibility from project design through to implementation,
- increase productivity by making available all information needed to run the system.

The TeSys motor management system integrates perfectly with Schneider Electric low voltage equipment such as Model 6 and TDM2 switchgear.



1 Magnetic circuit breaker
2 Contactor
3 Controller with expansion module
4 Operator control unit

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LTM R08MBD

105846

LTM EV40BD

568605

LTM CU

Presentation (continued)

Composition of the motor management system

The system comprises:
- an LTM R motor management controller
  - with integral current transformer up to 100 A,
  - above 100 A, by external current transformer up to 1000 A,
- an LTM E expansion module,
- an LTM CU operator control unit,
- configuration software incorporated in the PowerSuite™ software version 2.5 application,
- accessories for system setup.

Communication

The LTM R controller is equipped with a communication interface to allow remote monitoring and control of the motor. All motor information is then available at automation system level.

The following networks are available:
- Modbus® , CANopen, DeviceNet, ProfiBus DP and Ethernet communication systems

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TeSys T system functions

The TeSys T system provides the following protection functions:
- thermal overload,
- phase imbalance and phase failure,
- thermal motor protection via PTC probes,
- phase reversal,
- ground faults,
- long starting times and motor stalling,
- automatic load shedding and restarting,
- load fluctuations (current, voltage, power)
- variations of Cos φ (power factor).

Metering functions
- Measurements (rms values):
  - current on the 3 phases,
  - voltage on the 3 phases (shedding),
  - motor temperature,
  - ground fault,
- Values calculated:
  - average current,
  - frequency,
  - Cos φ (power factor), power, power consumption...

Motor control functions

A motor managed by the TeSys T management system can be controlled:
- locally, using the logic inputs present on the product, or via the HMI terminal
- remotely, via the network (connection by terminal block or connector except for DeviceNet: terminal block only).,

Motor control modes

5 predefined motor control modes are incorporated into the controller:
- overload mode: monitoring of motors whose control is not managed by the controller,
- independent mode: starting of non-reversing motors,
- reverser mode: starting of reversing motors,
- 2-step mode: 2-step starting of motors (star-delta, by autotransformer and by resistor),
- 2-speed mode: 2-speed starting of motors (Dahlander, pole changer).

A 6th Custom mode is available to allow the user to create a specific motor control mode that is not predefined in the controller.

Statistical and diagnostic functions
- fault statistics: counters per type of protection and history of the last 5 faults,
- motor statistics: saving of motor statistics values,
- diagnosis of faults affecting correct operation of the product.

Protection components
TeSys® T Motor Management System

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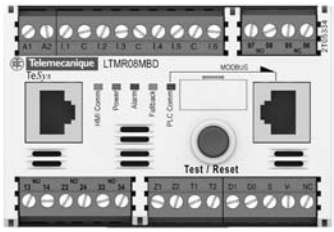

LTM R●●

Description

The LTM R controller

The controller is the central component in the motor management system.
It manages the basic functions such as:
- measurement of single phase and 3-phase current via integral current transformers from 0.4 to 100 A (up to 1000 A by external current transformers),
- measurement of ground current by external ground fault toroid.
- measurement of motor temperature by PTC probe,
- inputs and outputs for the various motor control modes, fault management and associated functions.

Characteristics

As standard, the controller manages the following predefined control mode functions:
- overload mode,
- independent mode,
- reverser mode,
- 2-speed mode,
- 2-step mode,
- Custom mode.

Supply

2 types of controller power supply are available:
- ⎓ 24 V,
- ∿ 100…240 V.

Current ranges

3 current ranges allow measurement of motor current from 0.4 to 100 A:
- 0.4…8 A,
- 1.35…27 A,
- 5…100 A.

For currents above 100 A use external current transformers. Choose the 0.4…8 A range (1 or 5 A current transformer secondary).

Inputs
- 6 discrete logic inputs.

Outputs
- 3 relay logic outputs (1 N.O.)
- 1 relay output for fault signalling (1 N.O. + 1 N.C.)

Measurements
- connections for a temperature probe,
- connections for an ground fault toroid.

LTM E expansion module

The expansion module adds the following functionalities to the TeSys T controller:
- voltage measurement on the 3 phases. This enables it to calculate numerous motor monitoring parameters (power, frequency, Cos φ …),
- 4 additional inputs.

Characteristics

Inputs
- 4 discrete logic inputs (independent).

Power supplies
- 2 types of power supply for the inputs: ⎓ 24 V and ∿ 100…240 V.

A ⎓ 24 V controller can be assembled with a ∿ 100…240 V expansion module and vice versa.

Voltage measurement between phases up to 690 V nominal.

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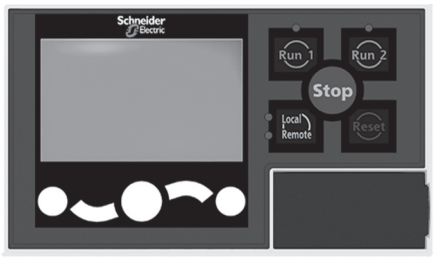


LTM CU

Description (continued)

Human/Machine Interfaces (HMI)

Depending on the application, 2 types of HMI can be used with the LTM R controller.
- ■ The LTM CU operator control unit:
  - □ Entirely dedicated to the TeSys T range,
  - □ Setting and control/monitoring of 1 to 1 LTM R controller.

- ■ A Magelis® XBT N410 terminal
  - □ For setting and monitoring of 1 to 8 LTM R controllers.

LTM CU operator control unit

Dedicated exclusively to TeSys T controllers, control unit LTM CU makes it possible to:
- ■ Configure the parameters of the LTM R controller
- ■ Display information on controller configuration and operation.
- ■ Monitor the alarms and faults generated by the controller.
- ■ Local control of the motor via the local control interface (keys can be customized).

Three different languages can be loaded into the LTM CU controller at the same time. By default, these 3 languages are: English, French and Spanish.

***Note**: English is the only compulsory language.*

A language download utility (LangTool), along with files for other languages, is available at www.schneider-electric.com.
This tool allows the user to customize the languages in the LTM CU control unit.
The LTM CU HMI control unit has an RJ45 port, protected by a flexible cover to provide a good level of protection (IP54).
This port on the front panel allows connection to a PC, via a connecting cable, in order to use PowerSuite™ software. The control unit then acts as a transmitter and all information can then be viewed in the PowerSuite™ software.

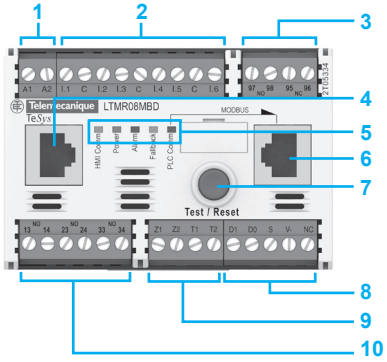
The Magelis® XBT N410 HMI terminal

Two applications have been predefined for the TeSys T management system .
Depending on the application loaded, the HMI terminal makes it possible to:
- ■ configure and monitor a motor starter.
- ■ monitor and modify certain parameters on up to 8 motor starters.

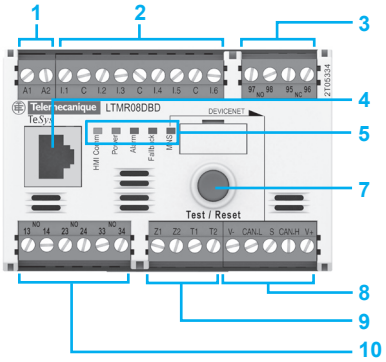
XBT L1000 programming software is needed for loading applications into the HMI terminal.
These applications are available at the following websites:
www.squared.com, and www.us.telemanique.com.

LTM R controllers

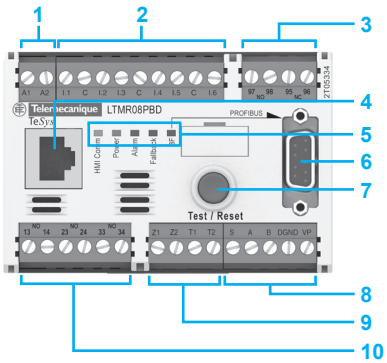
Modbus® protocol



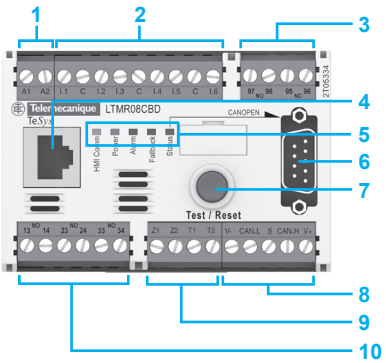
DeviceNet



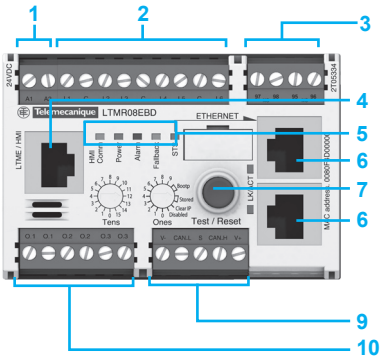
Profibus DP



CANopen



Ethernet TCP/IP

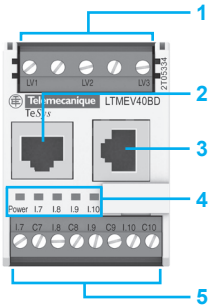


Controllers feature the following on their front panel:

1 Controller power supply.
2 Input connections.
3 Fault outputs (N.O.+N.C.).
4 Port for connection to the HMI terminal, a PC or an expansion module (RJ45).
5 Controller status LEDs.
6 Network port for connection to the network by connector (except DeviceNet).
7 Test/Reset button.
8 Connection to the network by terminal block.
9 Connection for a ground fault toroid and temperature probes.
10 Outputs for motor control mode function.

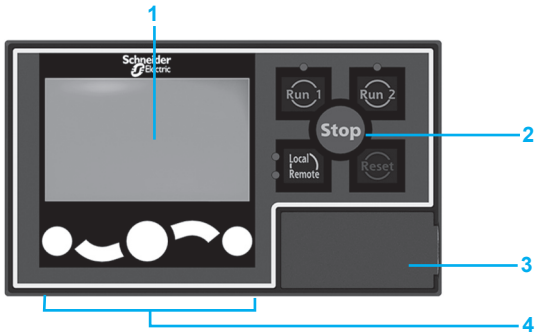
(1) Connection using power expansion (daisy-chaining) is possible for Ethernet.

LTM EV40●● expansion modules



Expansion modules have the following on their front face:
1 Inputs for voltage measurement.
2 Port for connection to the HMI terminal or to the PC.
3 Port for connection to the controller.
4 Expansion module status LEDs.
5 Connection of additional inputs.

LTM CU operator control unit



The control unit has the following on its front face:
1 LCD display screen
2 Local control interface including control keys and LEDs.
3 RJ45 port on front panel for connection to a PC (protected by a cover).
4 Contextual navigation keys.

Protection components
TeSys® T Motor Management System

Functions Description	Setting range	Controller LTM R	Controller and expansion module (LTM R + LTM E)	Alarm threshold	Fault threshold
Thermal and current protection functions					
Thermal overload: thermal protection of motor by monitoring current consumption	Class: 5, 10, 15, 20, 25, 30. Inverse definite time				
Motor temperature: thermal monitoring of the motor using temperature probes (winding, paper...). Up to 3 sensors in series.	PTC binary PTC/NTC analog: 20 …6500 Ohm				
Phase imbalance: monitors the symmetry of currents. To be used for imbalance < 80% of the average current *(1)*.	10…70% I average 0.2…20 s				
Phase failure: monitors the symmetry of currents. To be used for imbalance < 80% of the average current *(1)*.	0.1…30 s				
Phase reversal: signals when the phase sequence is different from the defined sequence (motor running).	A-B-C A-C-B				
Long starting time: monitors the motor starting time	100…800 % of FLC *(2)* 1…200 s				
Locked rotor: locking detected by a sudden increase in current after the start phase	100…800 % of FLC *(2)* 1…30 s				
Min/max current load limit variations: monitors motor load through variations of current around preset thresholds.	**min.:** 30…100 % of FLC *(2)* 1…200 s **max.:** 20…800 % of FLC *(2)* 1…250 s				
Ground fault: signals internal insulation faults, by vectorial summing of external currents, via ground fault toroid.	**internal:** 20…500 % min FLC *(2)* 0.05…25 s **external:** 0.02…10 A 0.05…25 s				
Frequent starting (rapid cycling): Protects the motor against overheating due to frequent starting.	0…999.9 s				
Voltage and power protection functions					
Phase imbalance: monitors the symmetry of voltage between phases. To be used for imbalance < 40 % of the average voltage *(3)*.	3…15 % 0.2…20 s				
Phase failure: monitors the symmetry of voltage between phases. To be used for imbalance > 40 % of the average voltage *(3)*.	0.1…30 s				
Phase reversal: signals when the phase sequence is different from the defined sequence (motor stopped).	A-B-C A-C-B				
Voltage variations. **Min/max voltage limits:** monitors voltage variations around preset thresholds.	**min.:** 70…99 % 0.2…25 s **max.:** 101…115 % 0.2…25 s				
Load shedding: opens outputs O.1 and O.2 if voltage drops below a preset threshold.	68…115 % 1…9999 s				
Power variations. **Min/max power limits:** monitors power variations around preset thresholds.	20…800 % 0…100 s				
Variations of Cos φ. **Min/max limits of Cos φ :** monitors variations of Cos φ around preset thresholds.	0…10…25 s				

Function performed.

(1) Average current value measured on the 3 phases.
(2) FLC: Full Load Current (setting current).
(3) Average voltage value measured on the 3 phases.

Motor control functions

Functions	Description	With controller LTM R	With controller LTM R and expansion module LTM E
Control modes	Local, via terminal block	X	X
	Local, via HMI terminal *(1)*	X	X
	Remote, via network	X	X
Operating modes	Overload	X	X
	Independent	X	X
	Reverser	X	X
	2-step	X	X
	2-speed	X	X
	"Custom" mode	X	X
Fault management	Manual reset	X	X
	Automatic reset	X	X
	Remote reset	X	X

Metering functions and statistics

Functions	Description	Measurement range	With controller LTM R	With controller LTM R and expansion module LTM E
Measurements *(2)*	Current/Phase	0.08…1000 A	X	X
	Ground current	0.1633 x CT ratio	X	X
	Average current	0.08…1000 A	X	X
	Current imbalance between phases	0…200 %	X	X
	Thermal capacity level	0…200 %	X	X
	Motor temperature rise	0…6500 Ohm	X	X
	Frequency	0… 100 Hz		X
	Voltage between phases	∼ 0…830 V		X
	Voltage imbalance between phases	0…200 %		X
	Active power	0…6553.5 kW (0…8788.3 hp)		X
	Reactive power	0…6553.5 kWr (8788.3 hp)		X
	Cos φ (power factor)	0…100		X
	Active power consumption	0…400 kWh (536.4 hp)		X
	Reactive power consumption	0…400 kWrh (536.4 hp)		X
Fault statistics	Protection fault counters		X	X
	Protection alarm counters		X	X
	Diagnostic fault counters		X	X
	Motor control function counters		X	X
	Fault history		X	X
Fault diagnostics	Internal watchdog fault		X	X
	Controller internal temperature		X	X
	Temperature sensor connection		X	X
	Current connection		X	X
	Voltage connection			X
	Motor control commands (start, stop, run check back and stop check back)		X	X
	Control configuration checksum		X	X
	Loss of communication		X	X
Motor statistics	Number of motor control commands (O.1/O.2 starts)		X	X
	Operating time		X	X
	Number of starts/hour		X	X
	Maximum current (I) of last start		X	X
	Duration of last start		X	X
Thermal overload statistics	Time to trip		X	X
	Time to restart		X	X
System operating statistics	Run, ON, Start, alarm, fault.		X	X

(1) HMI: Human Machine Interface.
See measurement details page 8.

Service classes offered by Modbus® TCP/IP communications

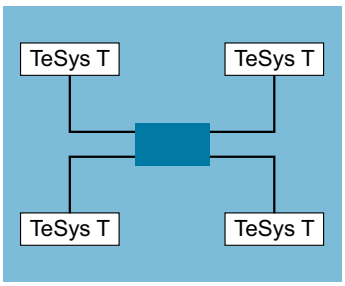
Class		A 20 ETH10/100 + FTP server
Basic Web server		Yes
Basic communications services Ethernet TCP/IP		Modbus® communication system; messaging (read/write of data words)
Ethernet TCP/IP communication advanced management services	I/O Scanning	Yes
	Global Data	No
	Client FDR *(1)*	Automatic monitoring and updating of product parameter configuration. Automatic assignment of IP address and network parameters.
	SNMP network administrator *(2)*	Yes

Ethernet: different network topologies

Star topology

In a star topology, all the peripherals are linked via an intermediate peripheral (such as a hub or switch).

In industrial Ethernet applications, the use of full duplex switches (instead of hubs) as central peripherals is strongly recommended.



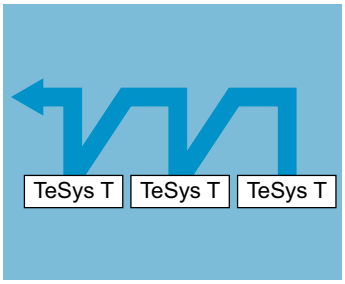
Star topology

Power expansion *(Daisy chain)* topology

Power expansion (or *Daisy chaining*), at bus level, is another connection topology commonly used in traditional, industrial automation system networks. The cable segments link several peripherals to each other, constituting the peripheral section of the network cable.

Ethernet Power expansion *(Daisy chain)*
Power expansion is not yet a very commonly used Ethernet connection topology, but will quickly become so when a large number of peripherals are made available in the market.
In an Ethernet power expansion topology, the peripherals have:
- **2 Ethernet ports**
- and an **integrated switch**.

Schneider Electric is progressively introducing, into the industrial market, Ethernet peripherals that can be used in daisy chain type architectures.

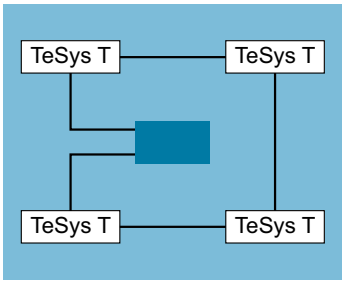


Daisy chain topology

Implementation of a power expansion topology
No hub or switch is required for using a power expansion topology. Each peripheral must have an integrated switch (two ports).
A port on the peripheral is connected to a port on the neighboring upstream and downstream peripherals. These consecutive connections constitute the power expansion (daisy chain).

Ethernet switches may be included in a power expansion (daisy chain) topology when several scan chains are used by the monitoring peripheral.
The Ethernet switch must be installed close to the monitoring peripheral, with the various scan chains coming from the switch.

(1) FDR : Faulty Device Replacement.
(2) SNMP: Simple Network Management Protocol.



Ring topology

Ethernet: different network topologies *(continued)*

Ring topology

In a ring topology, all the peripherals or components of the network infrastructure are connected within a loop.
This type of topology makes it possible to achieve different levels of redundancy of the network.

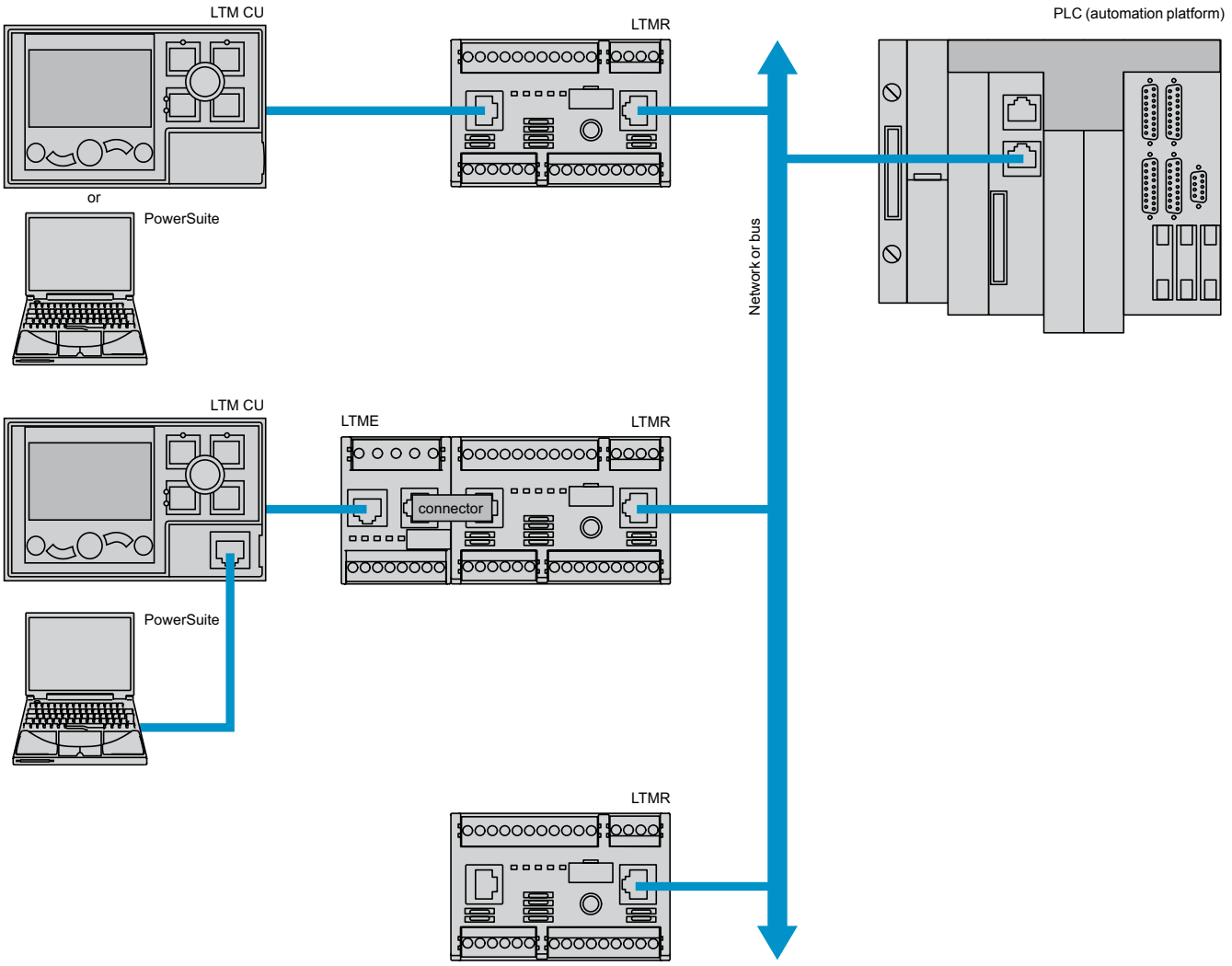
Ethernet ring
Ethernet rings are generally the main networks in applications where a high level of reliability is required. If a ring topology is required, the switches handling this function must be used.

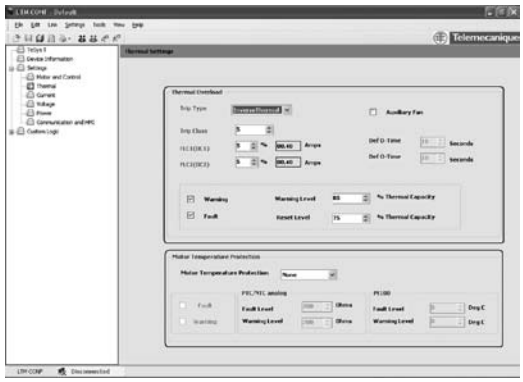
Redundancy
Redundancy of the network infrastructure is the key to development of applications with high operational reliability.
Implementing a single or double ring architecture makes it possible to provide protection against breaks in network segments.

Single ring
The first level of redundancy can be achieved by installing a single ring.
ConneXium™ switches can be used to establish main network ring configurations.
The ring is created using HIPER-Ring ports.
If a section of the line fails, the ring structure (including a maximum of 50 switches) converts into a line type configuration in less than 0.5 seconds.

Protection components
TeSys® T Motor Management System

Possible configurations and applications





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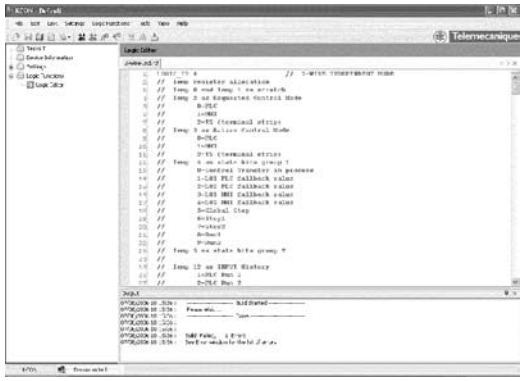
Example of TeSys T configurator setup screen



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Example of logic editor screen.

Configuration with PowerSuite™ software

The TeSys T configurator is incorporated in the PowerSuite software application, as from version 2.5. or greater. *(1)*
It allows configuration, commissioning and maintenance of motor starters protected by the TeSys T management system .

A library containing predefined motor control mode functions is available in order to:
- allow standardization,
- avoid errors,
- reduce motor starter setup times.

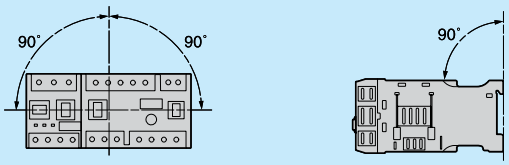
5 predefined motor control modes are incorporated in the controller:
- overload mode: monitoring of motors whose control is not managed by the controller,
- independent mode: starting of non-reversing motors,
- reverser mode: starting of reversing motors,
- 2-step mode: 2-step starting of motors (star-delta, by autotransformer and by resistor),
- 2-speed mode: 2-speed starting of motors (Dahlander, pole changer).

By using logic functions, a "Custom" mode makes it possible to:
- easily adapt these predefined motor control mode functions to the specific needs of your applications,
- create a link with the motor starter environment or
- create new functions.

The defined functions can be saved and used to build your function library for future applications.
To create special functions, a logic editor is incorporated in the configurator and allows a choice of 2 programming languages:
- function block,
- structured text.

(1) An update file is available, free of charge, on the following websites, www.squared.com, and www.us.telemecanique.com. It will enable you to take advantage of the latest functions in the TeSys T motor management system.

Environment

Product type			LTM R controllers				LTM EV40●● expansion modules	
Conforming to standards			IEC/EN 60947-4-1, UL 508, CSA 22-2 n°14, IACS E10					
Product certifications			UL, CSA,BV, LROS, DNV, GL, RINA, ABS, RMRos, NOM, CCC, C-TIC'K, ATEX, GOST, KERI *(1)*					
Rated insulation voltage of the outputs (Ui)	Conforming to IEC/EN 60947-1, overvoltage category III, degree of pollution 3	**V**	690					
	Conforming to UL 508, CSA C222 n° 14	**V**	690					
Rated impulse withstand voltage (Uimp)	Conforming to IEC/EN 60947-4-1							
	∿ 100…240 V supply, inputs and outputs	**kV**	4				4	
	⎓ 24 V supply, inputs and outputs	**kV**	0.8				0.8	
	Communication circuits	**kV**	0.8				–	
	Current or voltage measurement circuit	**kV**	6				6	
Short-circuit withstand	Conforming to IEC/EN 60947-4-1	**kA**	100					
Protective treatment	Conforming to IEC/EN 60068		"TH"					
	Conforming to IEC/EN 60068-2-30		12 x 24 hour cycles					
	Conforming to IEC/EN 60070-2-11	**h**	48					
Ambient air temperature around the device	Storage	**°C**	- 40…+80					
	Operation	**°C**	- 20…+60					
Operating position without dating	In relation to normal vertical mounting plane		± 30° in relation to mounting plate, ± 90° 					
Flame resistance	Conforming to UL 94	**°C**	960 (for parts supporting live components)					
	Conforming to IEC/EN 60695-2-12	**°C**	650 (for other parts)					
Shock resistance (1/2 sine wave, 11 ms)	Conforming to IEC/EN 60068-2-27 *(2)*		15 gn					
Vibration resistance	Conforming to IEC/EN 60068-2-6 *(2)* 5…300 Hz		4 gn (plate mounted) 1 gn (mounted on ⊥⌐ rail)					
Resistance to electrostatic discharge	Conforming to IEC/EN 61000-4-2	**kV**	In open air: 8 - Level 3 On contact: 6 - Level 3					
Immunity to radiated electromagnetic interference	Conforming to IEC 61000-4-3	**V/m**	10 - Level 3					
Immunity to fast transient bursts	Conforming to IEC 61000-4-4	**kV**	On supply and relay outputs: 4 - Level 4 Other circuits: 2 - Level 3					
Immunity to radioelectric fields	Conforming to IEC/EN 61000-4-6	**V**	10 - Level 3					
Immunity to dissipated shock waves	Conforming to IEC/EN 61000-4-5		**Common mode**	**Serial mode**			**Common mode**	**Serial mode**
	Relay outputs and supply	**kV**	4	2			–	–
	⎓ 24 V inputs	**kV**	1	1			1	1
	∿ 100…240 V inputs	**kV**	2	1			2	1
	Voltage inputs	**kV**	–	–			4	2
	Communication	**kV**	2	–			2	–
	Temperature sensor (IT1/IT2)	**kV**	1	0.5			–	–
Altitude derating			**2000 m**	**3000 m**	**3500 m**	**4000 m**	**4500 m**	
	Rated operational voltage (Ui)		1	0.93	0.87	0.8	0.7	
	Max. operating temperature		1	0.93	0.92	0.9	0.88	

Controller and expansion module characteristics

Product type				Controllers		Expansion modules	
				LTM R●●●BD	LTM R●●●FM	LTM EV40BD	LTM EV40FM
Control supply							
Operational voltage (U)	Conforming to IEC/EN 60947-1		**V**	⎓ 24	∿ 100…240	–	
Resistance to voltage dips	Conforming to IEC/EN 61000-4-11		**V**	0 for 3 ms 70% of U for 500 ms		–	
Associated protection			**A**	gG fuse, 0.5		–	
Operational voltage			**V**	⎓ 20.4…26.24	∿ 93.5…264	–	
Current consumption	50/60 Hz		**mA**	⎓ 56…127	∿ 8…62.8	–	
Cabling							
Connectors	Pitch		**mm**	5.08		5.08	
Flexible cable without cable end	1 conductor		**mm²**	0.2…2.5 (24…14 AWG)		0.2…2.5 (24…14 AWG)	
	2 identical conductors		**mm²**	0.2…1.5 (24…16 AWG)		0.2…1.5 (24…16 AWG)	
Flexible cable with cable end							
Without insulated ferrule	1 conductor		**mm²**	0.25…2.5 (24…14 AWG)		0.25…2.5 (24…14 AWG)	
	2 identical conductors		**mm²**	0.5…1.5 (20…16 AWG)		0.5…1.5 (20…16 AWG)	
With insulated ferrule	1 conductor		**mm²**	0.25…2.5 (24…14 AWG)		0.25…2.5 (24…14 AWG)	
	2 identical conductors		**mm²**	0.2…1 (24…18 AWG)		0.2…1 (24…18 AWG)	
Solid cable without cable end	1 conductor		**mm²**	0.2…2.5 (24…14 AWG)		0.2…2.5 (24…14 AWG)	
	2 identical conductors		**mm²**	0.2…1 (24…18 AWG)		0.2…1 (24…18 AWG)	
Conductor size				AWG 24 to AWG 14		AWG 24 to AWG 14	
Tightening torque			**N.m**	0.5…0.6 (4.4 …5.3 lb-in)		0.5…0.6 (4.4 …5.3 lb-in)	
Flat screwdriver			**mm**	3		3	
Input characteristics							
Nominal values	Conforming to IEC/EN 61131-1			Type 1 positive logic (⎓: resistive, ∿: capacitive)			
	Voltage		**V**	⎓ 24	∿ 100…240	⎓ 24	∿ 100…240
	Current		**mA**	⎓ 7	∿ 3.1 for 100 V ∿ 7.5 for 240 V	⎓ 7	∿ 3.1 for 100 V ∿ 7.5 for 240 V
Logic inputs	Logic state 1	Voltage	**V**	15 max	79 < U < 264	15 max	79 < U < 264
		Current	**mA**	2 min…15 max	2 min at 110 V… 3 min at 220 V	2 min…15 max	2 min at 110 V… 3 min at 220 V
	Logic state 0	Voltage	**V**	5 max	0 < U < 40	5 max	0 < U < 40
		Current	**mA**	15 max	15 max	15 max	15 max
Response time	Change to state 1		**ms**	15	25	15	25
	Change to state 0		**ms**	5	25	5	25
Output characteristics							
Type				Volt free, single break			
Load	∿			250 V / 5 A B300			
	⎓			30 V / 5 A			
Permissible power in cat. AC-15	For 500 000 operating cycles		**VA**	480 / Ie max: 2 A			
Permissible power in cat. DC-13	For 500 000 operating cycles		**W**	30 / Ie max: 1.25 A			
Associated protection			**A**	gG fuse, 4			
Max. frequency			**Hz**	2			
Max. operating level			**op. cycles/h**	1800			
Response time	Change to state 1		**ms**	10 max			
	Change to state 0		**ms**	10 max			
Measurement details							
Current				1 % for the 0.4…8 A and 1.35…27 A ranges 2 % for the 5…100 A range			
Voltage				1% from 100 to 830 V			
Ground fault current	Internal measurement without ground fault toroid			5…15 % for current > 0.1 A in the 0.4…8 A range current > 0.2 A in the 1.35…27 A range current > 0.3 A in the 5…100 A range			
	External measurement with ground fault toroid			< 5 % or 0.01 A			
Temperature measurement				2 %			
Power factor				3 % for a Cos φ > 0.6			
Active and reactive power				5 % (typical value)			
Internal clock				± 30 min / year			

Bus and network characteristics

Type of bus/network	Modbus® protocol	CANopen	DeviceNet	Profibus DP	Ethernet
Physical interface	2-wire RS 485	ISO 11898	ISO 11898	polarized 2-wire RS 485	IEEE 802.3
Addressing	1 to 247	1 to 127	0 to 63	1 to 125	0 to 159
Transmission speeds	1.2 to 19.2 K bits/s	10, 20, 50, 125, 250, 500, 800 and 1000 K bits/s + Auto baud	125 to 500 K bits/s	9.6 K to 12 M bits/s	10/100 Mbit/s, with automatic recognition
Connections	RJ45/terminal block	RJ45/terminal block	Terminal block	9-way SUB-D/ terminal block	RJ45
Cables	2 shielded twisted pairs	4 twisted, shielded wires	4 twisted, shielded wires	2 shielded twisted pairs, type A	2 shielded twisted pairs

LTM CU operator control unit

Environment

Conforming to standards			IEC/EN 61131-2, UL 508, CSA 22-2 n°14
Product certifications			UL, CSA, CE, C-TIC'K, NOM, GOST
Ambient air temperature around the device	Storage	**°C**	-40…+80
	Operation	**°C**	-20…+60
Relative humidity			15…95 % without condensation
Protective treatment	Conforming to IEC/EN 60068-2-30		12 x 24 hour cycles
Degree of protection	Conforming to IEC 60947-1		IP 54
Shock resistance	Conforming to IEC/EN 60068-2-27		15 gn / 11ms
Vibration resistance	Conforming to IEC/EN 60068-2-6 5…30 Hz		4 gn
Flame resistance	Conforming to IEC 60947-1	**°C**	650
	Conforming to UL 94		V2

Electrical characteristics

Supply to the product			Powered via the controller
Maximum current		**mA**	140
Maximum power dissipated		**W**	1
Resistance to electromagnetic discharge	Conforming to IEC/EN 61000-4-2	**kV**	In open air: 8. Level 3 On contact: 4. Level 3
Immunity to radiated electromagnetic interference	Conforming to IEC/EN 61000-4-3	**V/m**	10 - Level 3
Immunity to fast transient bursts	Conforming to IEC/EN 61000-4-4	**kV**	2, shielded access. Level 3
Immunity to radioelectric fields	Conforming to IEC/EN 61000-4-6	**V**	10. Level 3
Immunity to shock waves	Conforming to IEC/EN 61000-4-5	**kV**	2, shielded access. Level 3

Physical characteristics

Mounting			Flush mounted
Display			Backlit LCD
Signaling			By 4 LEDs
Cabling			RJ45

LT6 CT●●●● external current transformer characteristics

Conforming to standards		IEC 60185, BS 7626			
Precision		Class 5P			
Precision limit factor		15			
Rated insulation voltage (Ui)		690			
Maximum operating temperature	**°C**	50			
Transformer ratio	**A**	100/1	200/1	400/1	800/1
Diameter of conductor passage hole	**mm**	35 (1.38 inch)	35 (1.38 inch)	35 (1.38 inch)	35 (1.38 inch)
Maximum bus bar	**mm (inch)**	30 x 10 (1.0 x 0.5)	30 x 10 (1.0 x 0.5)	30 x 10 (1.0 x 0.5)	incorporated *(1)*

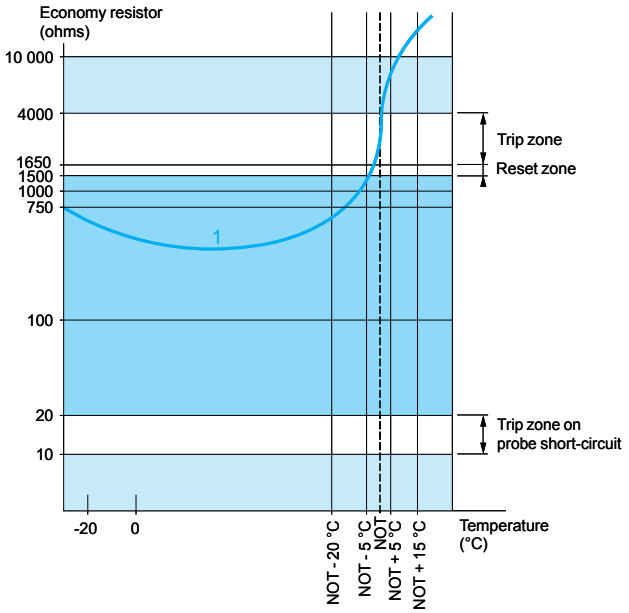
Ground fault toroid characteristics

Toroid type		**50437**	**50438**	**50439**	**50440**	**50441**	**50442**	**50485**	**50486**
Rated insulation voltage Ui	**V**	1000							
Operating temperature	**°C**	- 35…+ 70							
Protection index		IP30 (connections IP20)							
Transformer ratio		1/1000							
Rated operational current Ie	**A**	65	85	160	250	400	630	85	250
Max. conductor cross sectional area (c.s.a.) per phase	**mm² (AWG)**	25 (4)	50 (1/0)	95 (4/0)	240 (500 kcmil)	2 x 185 (400 kcmil)	2 x 240 (500 kcmil)	50 (1/0)	240 (500 kcmil)

DA1 TT●● probe characteristics

Conforming to standards			IEC 60034-11 mark A
Economy resistor	At 25 °C	Ω	3 x 250 in series
Rated operational voltage (Ue)	Per probe	**V**	⎓ 2.5 max
Rated insulation voltage (Ui)		**kV**	2.5
Insulation			Reinforced
Length of connecting cables	Between probes	**mm**	250
	Between probe and motor terminal plate	**m**	1

Operating zones: example with 3 probes type DA1 TT●●● (250 Ω at 25 °C) in series, conforming to standard EC 60034-11, mark A.



1 3 probes type DA1●●● (250 Ω at 25 °C) in series.

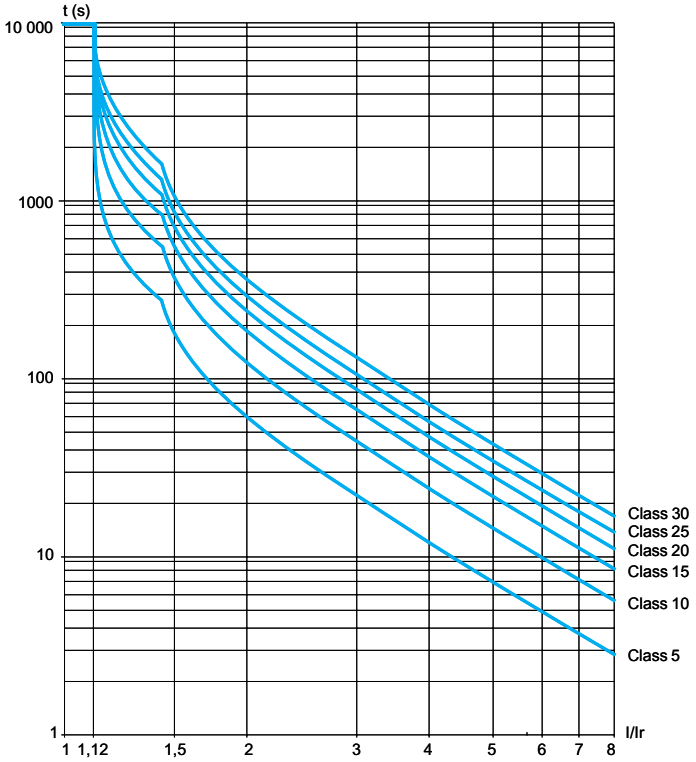
NOT: Nominal Operating Temperature.

Protection unit tripped.

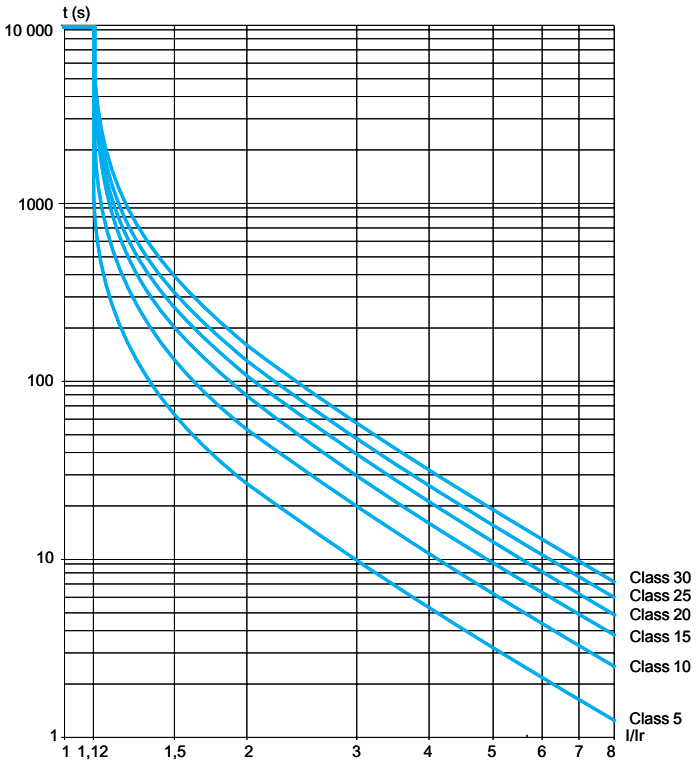
Protection unit reset.

(1) Electrical connection to be made using M10 bolt.

Cold state curves



Hot state curves



Protection components
TeSys T Motor Management System

105836

LTM R08MBD

105838

LTM R08CBD

105840

LTM R08DBD

105842

LTM R08PBD

105844

LTM R08EBD

Controllers

Setting range	Control voltage	Current range	Reference	Weight
A	V	A		kg
For Modbus® PLC's				
8	⎓ 24	0.4…8	**LTMR08MBD**	0.530
	∿ 100…240 V	0.4…8	**LTMR08MFM**	0.530
27	⎓ 24	1.35…27	**LTMR27MBD**	0.530
	∿ 100…240 V	1.35…27	**LTMR27MFM**	0.530
100	⎓ 24	5…100	**LTMR100MBD**	0.530
	∿ 100…240 V	5…100	**LTMR100MFM**	0.530
For CANopen				
8	⎓ 24	0.4…8	**LTMR08CBD**	0.530
	∿ 100…240 V	0.4…8	**LTMR08CFM**	0.530
27	⎓ 24	1.35…27	**LTMR27CBD**	0.530
	∿ 100…240 V	1.35…27	**LTMR27CFM**	0.530
100	⎓ 24	5…100	**LTMR100CBD**	0.530
	∿ 100…240 V	5…100	**LTMR100CFM**	0.530
For DeviceNet				
8	⎓ 24	0.4…8	**LTMR08DBD**	0.530
	∿ 100…240 V	0.4…8	**LTMR08DFM**	0.530
27	⎓ 24	1.35…27	**LTMR27DBD**	0.530
	∿ 100…240 V	1.35…27	**LTMR27DFM**	0.530
100	⎓ 24	5…100	**LTMR100DBD**	0.530
	∿ 100…240 V	5…100	**LTMR100DFM**	0.530
For Profibus DP				
8	⎓ 24	0.4…8	**LTMR08PBD**	0.530
	∿ 100…240 V	0.4…8	**LTMR08PFM**	0.530
27	⎓ 24	1.35…27	**LTMR27PBD**	0.530
	∿ 100…240 V	1.35…27	**LTMR27PFM**	0.530
100	⎓ 24	5…100	**LTMR100PBD**	0.530
	∿ 100…240 V	5…100	**LTMR100PFM**	0.530
For Ethernet TCP/IP				
8	⎓ 24	0.4…8	**LTMR08EBD**	0.530
	∿ 100…240 V	0.4…8	**LTMR08EFM**	0.530
27	⎓ 24	1.35…27	**LTMR27EBD**	0.530
	∿ 100…240 V	1.35…27	**LTMR27EFM**	0.530
100	⎓ 24	5…100	**LTMR100EBD**	0.530
	∿ 100…240 V	5…100	**LTMR100EFM**	0.530

105846

LTM EV40BD

568605

LTM CU

Expansion modules. with voltage measurement on the 3 phases

Input control voltage	Number of inputs	Supply to the electronics	Reference	Weight
V				kg
⎓ 24	4	Via the controller	**LTMEV40BD**	0.210
∿ 100…240	4	Via the controller	**LTMEV40FM**	0.210

HMI terminals

Description	Supply Voltage	Reference	Weight kg
Operator control unit	Supply via the controller	**LTMCU**	0.400
Magelis® compact display.	⎓ 24 V external	**XBTN410**	0.380

Description	Number and type of connectors	Length m	Reference	Weight kg
Connecting cables for the LTM CU control unit	2 x RJ45	1	**VW3A1104R10**	0.065
		3	**VW3A1104R30**	0.140
		5	**VW3A1104R50**	0.210
Connecting cables for the XBT N410	SUB-D 25-way female RJ45	2.5	**XBTZ938**	0.200

Cables

Description	Number and type of connectors	Length m	Reference	Weight kg
Connecting cables For connecting the controller to the expansion module	2 x RJ45	0.04	**LTMCC004** *(1)*	0.120
		0.3	**LU9R03**	0.045
		1	**LU9R10**	0.065

Replacement connectors

Description	Number and type of connectors	Reference	Weight kg
Complete set of connectors for controllers and expansion modules	10 screw terminals (all network versions included)	**LTM9TCS**	0.200

(1) Sold in lots of 6.

Configuration tools

Description	Composition	Reference	Weight kg
Connection kit for PC serial port for Modbus® PLC multidrop connection	■ 1 x 3 m length cable with two RJ45 connectors, ■ 1 RS 232/RS 485 converter with one 9-way female SUB-D connector and one RJ45 connector.	**VW3A8106**	–
Interface for USB port (for use with cable VW3 A8 106) Length: 1.8 m	■ 1 USB cable, SUB-D 9-way ■ Drivers supplied on CD-Rom	**SR2CBL06**	0.350

Current transformers *(1)*


813354

LT6 CT4001

Operational current		Reference	Weight
Primary	Secondary		
A	A		kg
100	**1** *(2)*	**LT6CT1001**	0.550
200	**1** *(2)*	**LT6CT2001**	0.550
400	**1** *(2)*	**LT6CT4001**	0.550
800	**1** *(2)*	**LT6CT8001**	0.680

Ground fault toroids (marketed under the Merlin Gerin® brand)

Rated operational current Ie	Internal Ø of toroid	Reference	Weight
A	mm		kg
Closed toroids, type A			
65	30	**50437**	0.120
85	50	**50438**	0.200
160	80	**50439**	0.420
250	120	**50440**	0.530
400	200	**50441**	1.320
630	300	**50442**	2.230
Split toroids, type OA			
85	46	**50485**	1.300
250	110	**50486**	3.200

PTC thermistor probes *(3)*


510575

DA1 TT●●●

Description	Nominal Operating Temperature (NOT)	Color	Unit reference *(4)*	Weight
	°C			kg
Triple probes	90	Green/green	**DA1TT090**	0.010
	110	Brown/brown	**DA1TT110**	0.010
	120	Gray/gray	**DA1TT120**	0.010
	130	Blue/blue	**DA1TT130**	0.010
	140	White/blue	**DA1TT140**	0.010
	150	Black/black	**DA1TT150**	0.010
	160	Blue/red	**DA1TT160**	0.010
	170	White/green	**DA1TT170**	0.010

(1) The transformers offered for use with TeSys U LUTM starters are suitable. Please see our latest Digest for more information on available parts.
(2) For use with LTM R08●● controllers.
(3) PTC: Positive Temperature Coefficient.
(4) Sold in lots of 10.

Marking accessories (ordered separately)

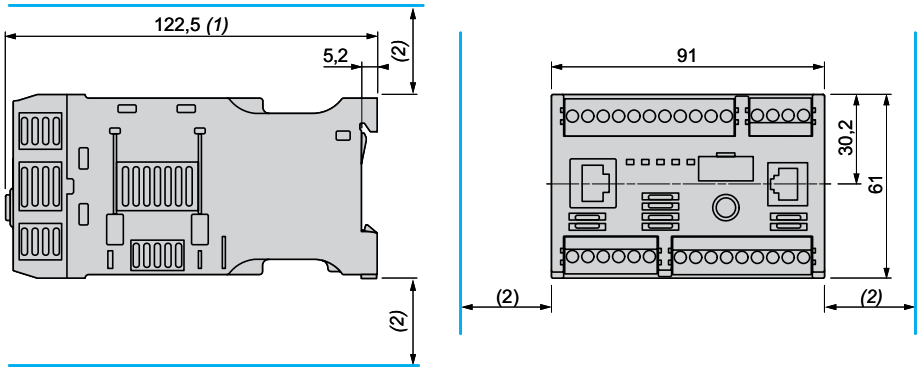
Description	Composition	Sold in lots of	Unit reference	Weight kg
Clip-in markers (maximum of 5 per unit)	Strips of 10 identical numbers (0 to 9)	25	**AB1R●** *(1)*	0.002
	Strips of 10 identical capital letters (A to Z)	25	**AB1G●** *(1)*	0.002

Connection accessories

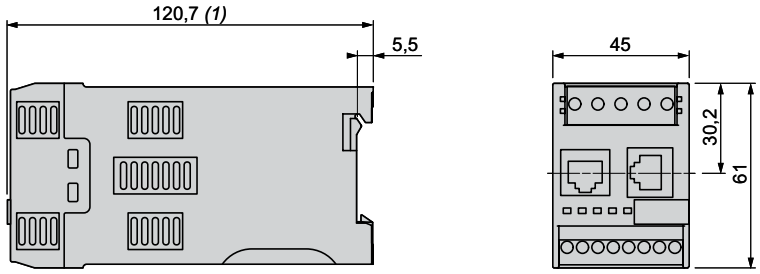
Description		Length m	Reference	Weight kg
For Modbus® PLC connection				
Cables fitted with 2 x RJ45 connectors		0.3	**VW3A8306R03**	0.045
		1	**VW3A8306R10**	0.065
		3	**VW3A8306R30**	0.125
T-junctions		0.3	**VW3A8306TF03**	0.032
		1	**VW3A8306TF10**	0.032
RS 485 line terminator		–	**VW3A8306R**	0.012
For CANopen connection *(2)*				
Cables		50	**TSXCANCA50**	4.930
		100	**TSXCANCA100**	8.800
		300	**TSXCANCA300**	24.560
IP20 connectors SUB-D 9-way female Line end adapter switch	Elbowed (90°)	–	**TSXCANKCDF90T**	0.046
	Straight	–	**TSXCANKCDF180T**	0.049
	Elbowed (90°) with SUB-D 9-way connector for connection to PC or diagnostic tool	–	**TSXCANKCDF90TP**	0.051
For DeviceNet connection				
Cables		50	**TSXCANCA50**	4.930
		100	**TSXCANCA100**	8.800
		300	**TSXCANCA300**	24.560
For Profibus DP connection				
Cables		100	**TSXPBSCA100**	–
		400	**TSXPBSCA400**	–
Connectors	With line terminator	–	**490NAD01103**	–
	Without line terminator	–	**490NAD01104**	–
	With line terminator and terminal port	–	**490NAD01105**	–
For Ethernet TCP/IP connection				
Shielded twisted pair cables to standard EIA/TIA568				
Cables fitted with 2 x RJ45 connectors for connection to terminal equipment	Straight	2	**490NTW00002**	–
		5	**490NTW00005**	–
		12	**490NTW00012**	–
		40	**490NTW00040**	–
		80	**490NTW00080**	–
Shielded twisted pair cables, UL and CSA 22.1 approved				
Cables fitted with 2 x RJ45 connectors for connection to terminal equipment	Straight	2	**490NTW00002U**	–
		5	**490NTW00005U**	–
		12	**490NTW00012U**	–
		40	**490NTW00040U**	–
		80	**490NTW00080U**	–

(1) When ordering, replace the ● in the reference with the number or letter required.
(2) To order other connectors and cables (UL cables for harsh environments) please consult our catalog "Machines and installations with CANopen. Performance and flexibility".

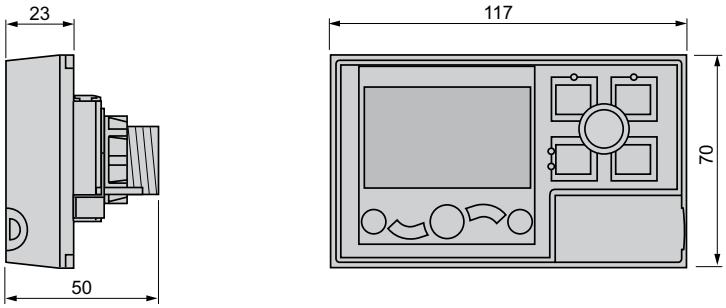
LTM R●● controllers



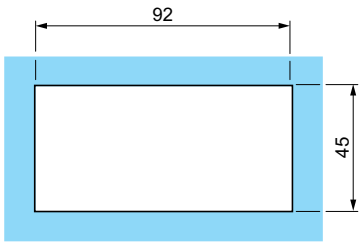
LTM EV40●● expansion modules



LTM CU operator control unit



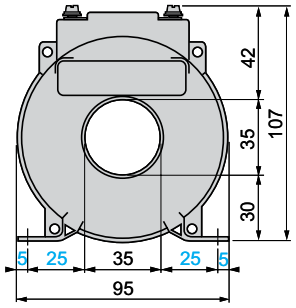
Panel mounting, cut-out

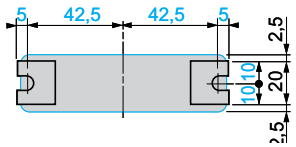


(1) 140 mm with RJ45 connector for connection to expansion module and to network,
166 mm with Profibus DP/CANopen connector.
(2) Leave a gap around the device of: 9 mm at 45 °C, 9 to 40 mm from 45 to 50 °C, 40 mm at 60 °C.

Current transformers

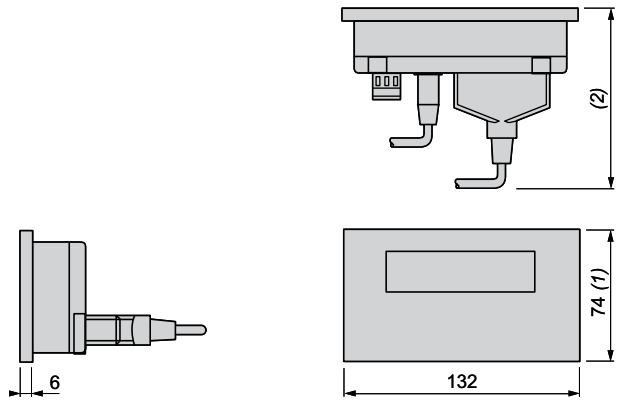
LT6 CT





HMI terminal

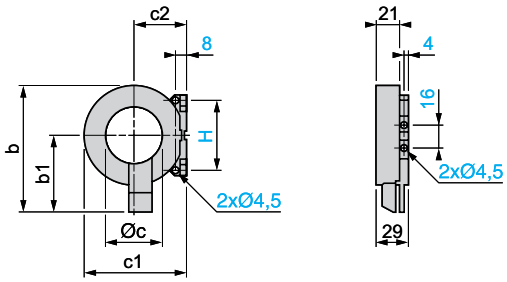
XBT N410



(1) 104 mm with mounting clips (supplied with the product).
*(2) 58 mm with SUB-D 25-way elbowed cable **XBT Z9680** for Twido®, TSX Micro™ and Premium™ PLC's or **XBT Z998** for Advantys™ STB distributed I/O system.*
*104 mm with SUB-D 25-way cable **XBT Z68/Z9681** for Twido®, TSX Micro™ and Premium™ PLC's*

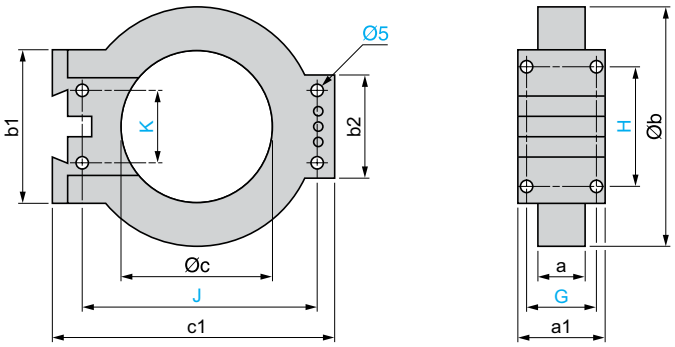
Ground fault toroids

50437 and 50438



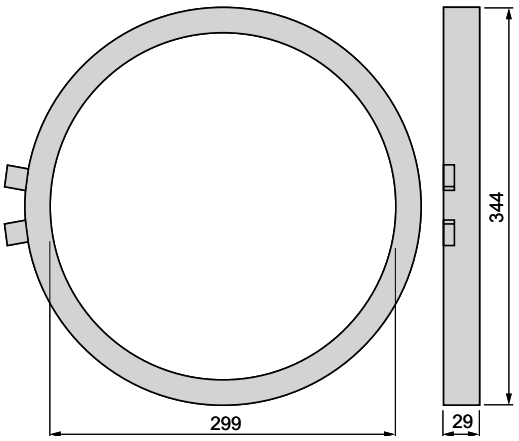
Type	b	b1	Øc	c1	c2	H
50437	83	53	30	60	31	50
50438	109	66	50	87	45	60

50439, 50440 and 50441

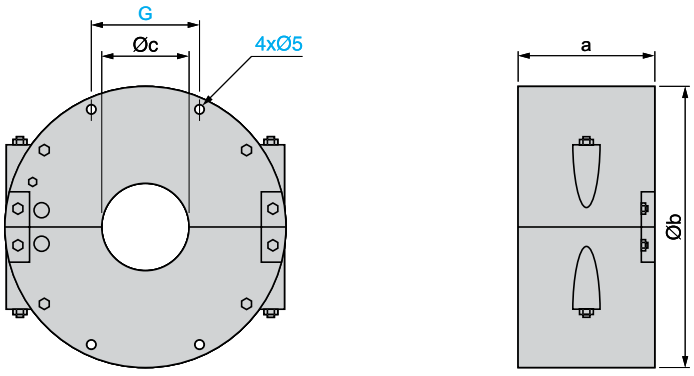


Type	a	a1	Øb	b1	b2	Øc	c1	G	H	J	K
50439	26.5	44	122	80	55	80	150	35	65	126	40
50440	26.5	44	164	80	55	120	190	35	65	166	40
50441	29	46	256	120	90	196	274	37	104	254	60

50442



50485 and 50486

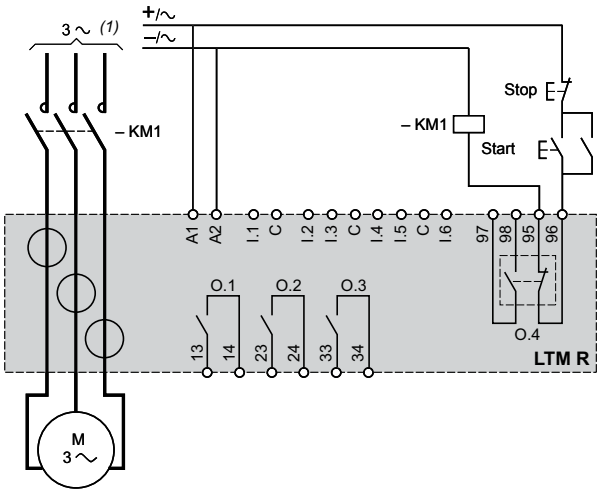


Type	a	Øb	Øc	G
50485	72	148	46	57
50486	78	224	110	76

Wiring diagrams

Overload mode

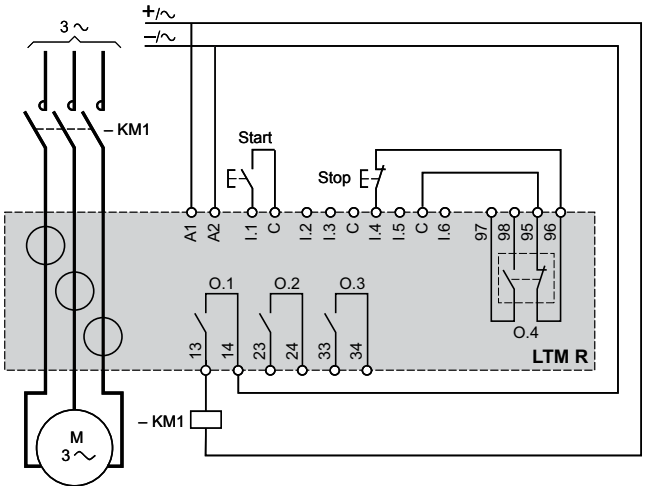
3-wire local-control



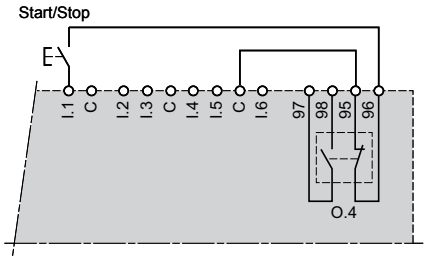
(1) Connection of a single-phase motor is possible. In this case, do not use the central current transformer.

Independent mode

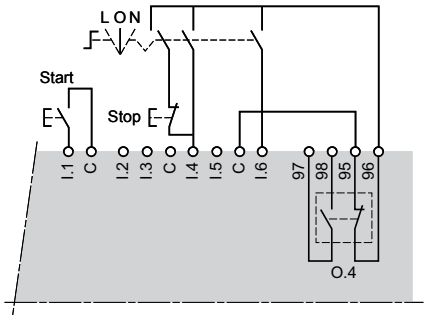
3-wire local-control



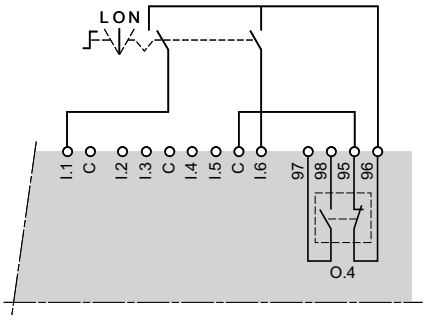
2-wire local-control



3-wire with switchable local/network control



2-wire with switchable local/network control

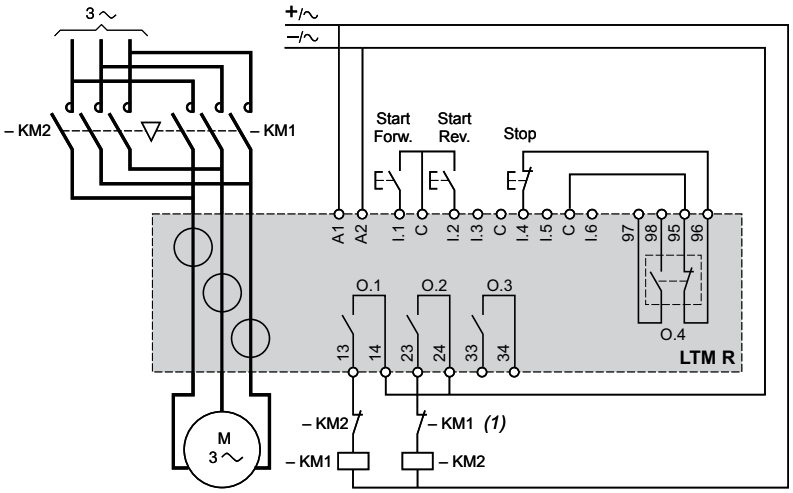


L : Local control
O : Stop
N : Network control

Wiring diagrams (continued)

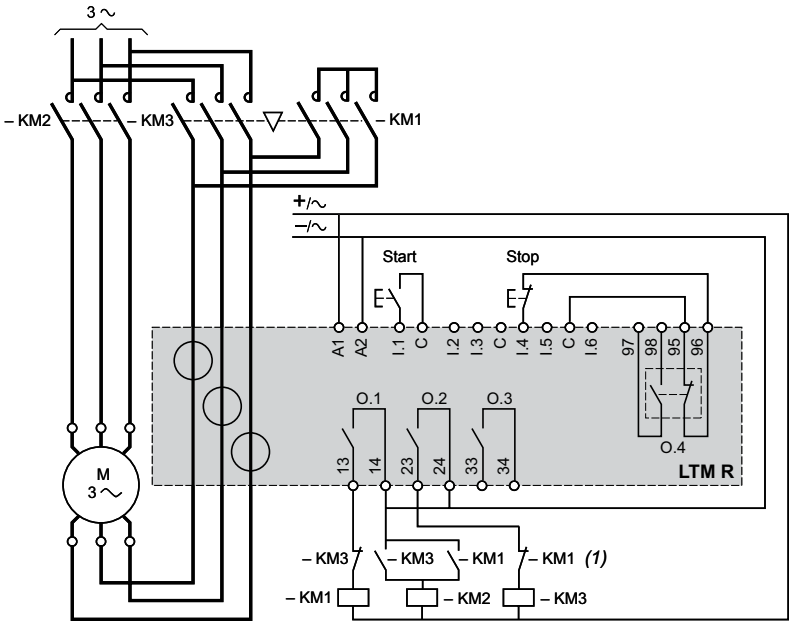
Reverser mode

3-wire local-control



2-step mode, star-delta application

3-wire local-control

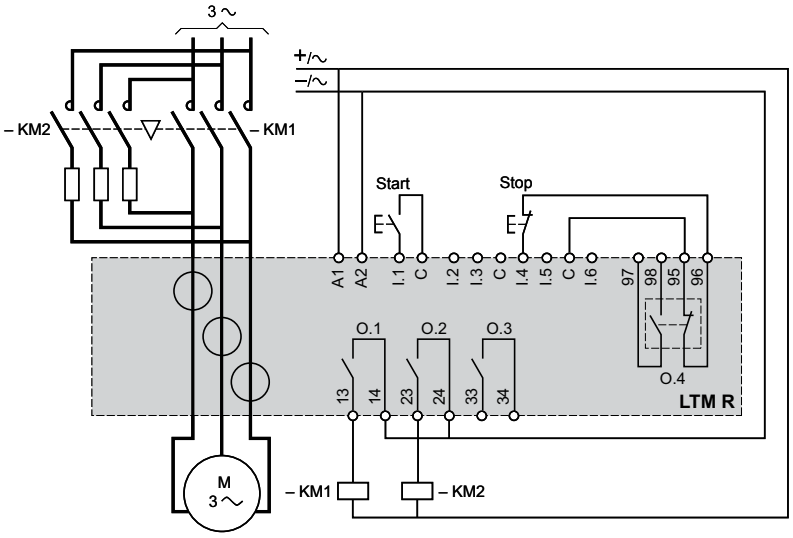


(1) Contacts for interlocking KM1 and KM2 are not required because the controller electronically interlocks outputs O.1 and O.2.

Wiring diagrams (continued)

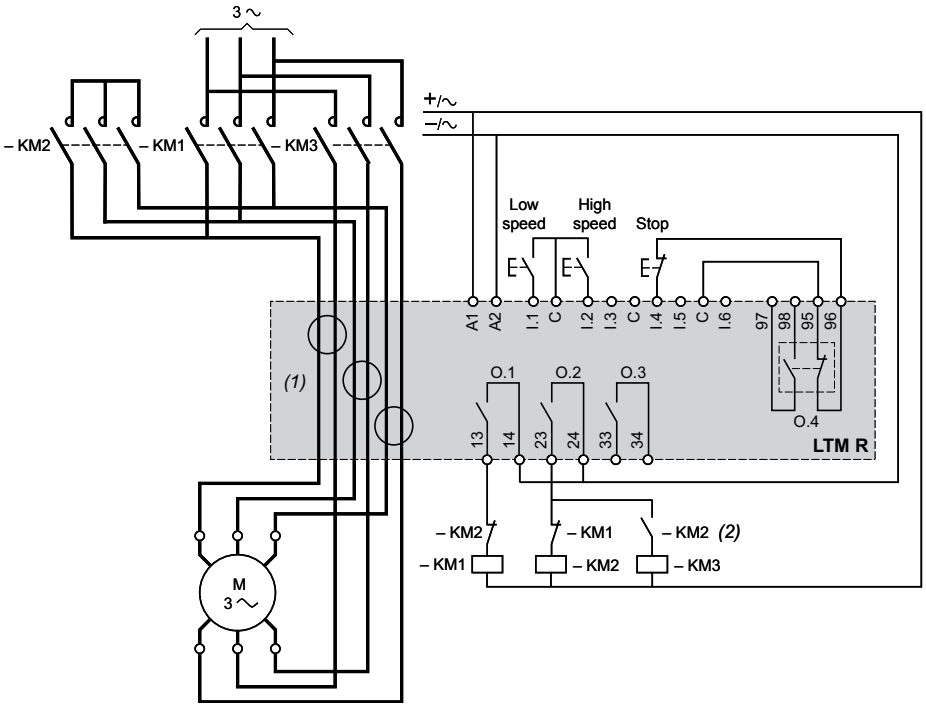
2-step mode, primary resistor application

3-wire local-control



2-speed mode, Dahlander application

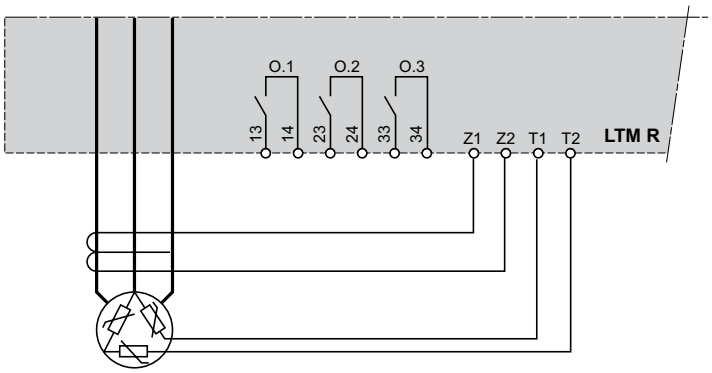
3-wire local-control



(1) For a Dahlander application, all the power cables must pass through current transformers. The controller can also be placed upstream of the contactor. In this case, and if the Dahlander motor is used in variable torque mode, all the cables downstream of the contactors must be of identical size.
(2) Contacts for interlocking KM1 and KM2 are not required because the controller electronically interlocks outputs O.1 and O.2.

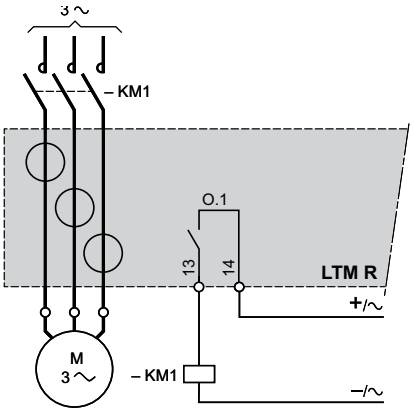
Wiring diagrams (continued)

Ground fault toroid and motor temperature probe connection

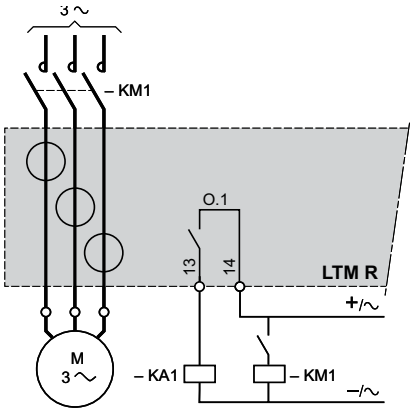


Connection of outputs for motor control mode function

Without intermediate relay



With intermediate relay



Combinations providing type 2 coordination

With circuit breaker

Standard power ratings of 3-phase motors 50/60 Hz in category AC-3 400/415 V			Circuit-breaker	Contactor	TeSys T controller	External current transformer
P kW	Ie A	Icc kA	Reference	Reference	Reference	Reference
0,06	0,22	130	**GV2L03**	**LC1D09**	**LTMR08●●**	–
0,09	0,36	130	**GV2L03**	**LC1D09**	**LTMR08●●**	–
0,12	0,42	130	**GV2L04**	**LC1D09**	**LTMR08●●**	–
0,18	0,62	130	**GV2L04**	**LC1D09**	**LTMR08●●**	–
0,25	0,88	130	**GV2L05**	**LC1D09**	**LTMR08●●**	–
0,37	0,98	130	**GV2L05**	**LC1D09**	**LTMR08●●**	–
0,55	1,6	130	**GV2L06**	**LC1D09**	**LTMR08●●**	–
0,75	2	130	**GV2L07**	**LC1D09**	**LTMR08●●**	–
1,1	2,5	130	**GV2L07**	**LC1D18**	**LTMR08●●**	–
1,5	3,5	130	**GV2L08**	**LC1D18**	**LTMR08●●**	–
2,2	5	130	**GV2L10**	**LC1D18**	**LTMR08●●**	–
3	6,5	130	**GV2L14**	**LC1D18**	**LTMR08●●**	–
4	8,4	130	**GV2L14**	**LC1D18**	**LTMR27●●**	–
5,5	11	130	**GV2L16**	**LC1D25**	**LTMR27●●**	–
7,5	14,8	50	**GV2L20**	**LC1D25**	**LTMR27●●**	–
9	18,1	50	**GV2L22**	**LC1D25**	**LTMR27●●**	–
11	21	50	**GV2L22**	**LC1D25**	**LTMR27●●**	–
15	28,5	70	**NS80HMA**	**LC1D50**	**LTMR100●●**	–
18,5	35	70	**NS80HMA**	**LC1D40**	**LTMR100●●**	–
22	42	70	**NS80HMA**	**LC1D50**	**LTMR100●●**	–
30	57	70	**NS80HMA**	**LC1D65**	**LTMR100●●**	–
37	69	70	**NS80HMA**	**LC1D80**	**LTMR100●●**	–
45	81	25	**NS100HMA**	**LC1D115**	**LTMR100●●**	–
45	81	70	**NS100HMA**	**LC1D115**	**LTMR100●●**	–
55	100	36	**NS160NMA**	**LC1D115**	**LTMR100●●**	–
55	100	70	**NS160HMA**	**LC1D115**	**LTMR100●●**	**LT6CT2001**
75	135	36	**NS160NMA**	**LC1D150**	**LTMR08●●**	**LT6CT2001**
75	135	70	**NS160HMA**	**LC1D150**	**LTMR08●●**	**LT6CT2001**
90	165	36	**NS250NMA**	**LC1F185**	**LTMR08●●**	**LT6CT2001**
90	165	70	**NS250HMA**	**LC1F185**	**LTMR08●●**	**LT6CT2001**
110	200	36	**NS250NMA**	**LC1F225**	**LTMR08●●**	**LT6CT2001**
110	200	70	**NS250HMA**	**LC1F225**	**LTMR08●●**	**LT6CT2001**
132	240	70	**NS400HMA**	**LC1F265**	**LTMR08●●**	**LT6CT4001**
132	240	130	**NS400LMA**	**LC1F265**	**LTMR08●●**	**LT6CT4001**
160	285	70	**NS400HMA**	**LC1F330**	**LTMR08●●**	**LT6CT4001**
160	285	130	**NS400LMA**	**LC1F330**	**LTMR08●●**	**LT6CT4001**
200	352	70	**NS630HMA**	**LC1F400**	**LTMR08●●**	**LT6CT4001**
200	352	130	**NS630LMA**	**LC1F400**	**LTMR08●●**	**LT6CT4001**
220	388	70	**NS630HMA**	**LC1F500**	**LTMR08●●**	**LT6CT4001**
220	388	130	**NS630LMA**	**LC1F500**	**LTMR08●●**	**LT6CT4001**
250	437	70	**NS630HMA**	**LC1F500**	**LTMR08●●**	**LT6CT6001**
250	437	130	**NS630LMA**	**LC1F500**	**LTMR08●●**	**LT6CT6001**

Substitution table

	Old range LT6 P multifunction protection relays			New range TeSys T controllers		
Motor current	Reference	Reference	External current transformer Reference	Reference	Reference	External current transformer Reference
	∼ 100…240 V	⎓ 24 V		∼ 100…240 V	⎓ 24 V	
I < 5 A	LT6P0M005FM	LT6P0M005S144	–	**LTMR08●FM**	**LTMR08●BD**	**–**
5 A < I < 25 A	LT6P0M025FM	LT6P0M025S144	–	**LTMR27●FM**	**LTMR27●BD**	**–**
25 A < I < 100 A	LT6P0M005FM	LT6P0M005S144	LT6CT1001	**LTMR100●FM**	**LTMR100●BD**	**–**
100 A < I < 200 A	LT6P0M005FM	LT6P0M005S144	LT6CT2001	**LTMR08●FM**	**LTMR08●BD**	**LT6CT2001**
200 A < I < 400 A	LT6P0M005FM	LT6P0M005S144	LT6CT4001	**LTMR08●FM**	**LTMR08●BD**	**LT6CT4001**
400 A < I < 800 A	LT6P0M005FM	LT6P0M005S144	LT6CT8001	**LTMR08●FM**	**LTMR08●BD**	**LT6CT8001**

Note: *For other voltages and combinations with fuses, please consult your Regional Sales Office.*

Schneider Electric

www.schneider-electric.com

Head Office: North America
1415 South Roselle Road
Palatine, IL 60064
USA

TEL: 847-397-2600
www.squared.com
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