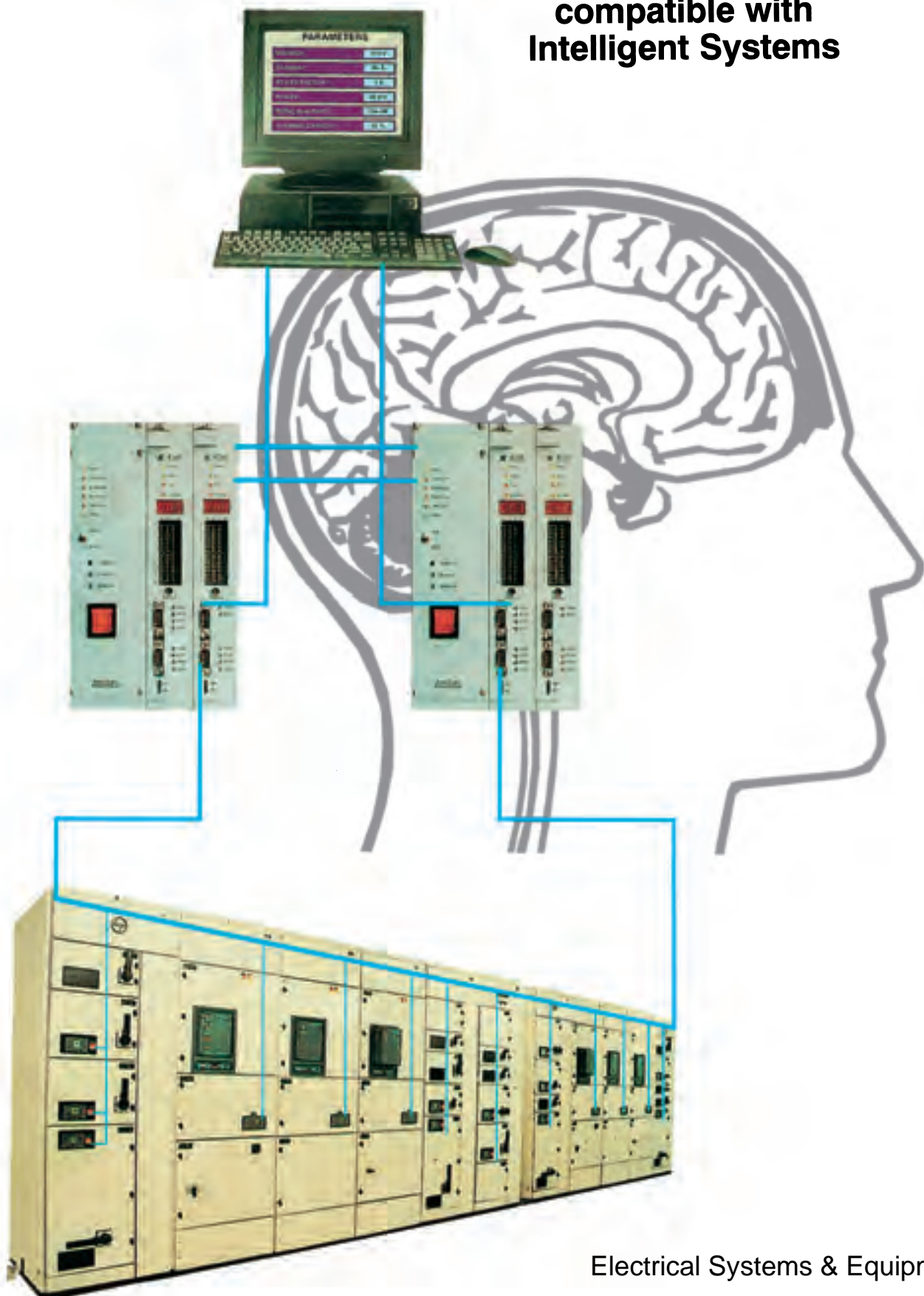


## Motor Control Centre type TQ compatible with Intelligent Systems



Electrical Systems & Equipment

## **L&T Switchgear – a tradition of Innovations**

Motor Control Centre type TQ  
Represents yet another development  
in L&T's wide range of switchgear.  
TQ has been designed to satisfy the  
most rigorous demands of modern  
industry. It meets the diverse  
technical requirements under  
stringent and varying site conditions.

MCC TQ is the culmination of over  
35 years of experience and expertise  
in designing, manufacturing and  
marketing low voltageswitchboards.  
L&T's TQ MCC is developed to  
function reliably in Indian tropical  
conditions – in sectors such as  
power, cement, fertilizer,  
steel, chemical ....

### **TQ : State-of-the-art technology**

The TQ Motor Control Centre is a  
multi-cubical type assembly  
designed in accordance with  
IS 8623 – 1993 and IEC – 60439 –  
2004 standards. Modern manu-  
facturing techniques and exten-  
sive tooling ensure consistent  
quality in every TQ MCC. The  
design conforms to IS 2147  
standard and offers IP54 degree  
of protection.

An insight into varying customer  
requirements combined with a  
sustained effort to offer newer  
and better solutions have enabled  
L&T to meet international  
benchmarks in low-voltage power  
distribution and control systems.  
Comprehensive quality assurance  
backed by state-of-the-art quality  
control infrastructure – i.e. systems  
certified for ISO 9001 (2000) by  
BVQI – form the core of all operations.



*Fully drawout Motor Control Centre type TQ*



## Motor Control Centre Type TQ

### Overall Dimensions (in mm)

PARAMETER	SINGLE FRONT	DOUBLE FRONT
Width	800	800
Height	2430	2430
Depth	644	944

The equipment is housed in a withdrawable module which slides on telescopic rails. Incoming and outgoing power contacts as well as control contacts are automatically isolated with the movement of module without manual disengagement. A large number of self-aligning sliding type control contacts can be accommodated on each module on RHS as well as LHS.

TQ double front panel offers a separate set of TP/TPN vertical droppers as well as vertical earthbars for each front.

**TQ : an optimum combination of safety, reliability and convenience**

### Technical Specifications

Rated Service Voltage : Upto 690V

Rated Frequency : 50/60Hz

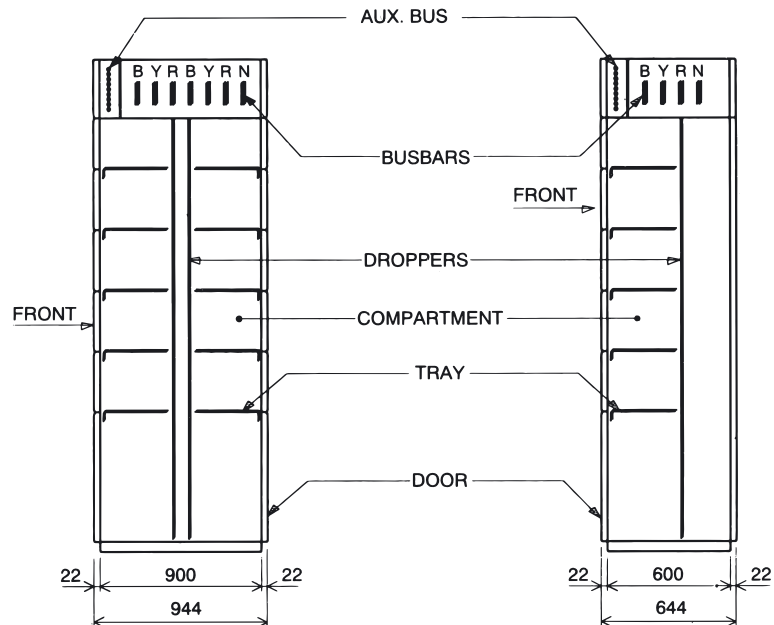
Rated Current (maximum) : 4000A

Busbar Fault Level Withstand : 100kA

Busbar System : TPN-E or TP-E

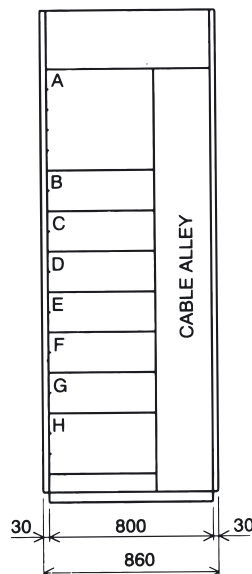
Degree of Protection : IP54

Type of internal separation : Form 3/4

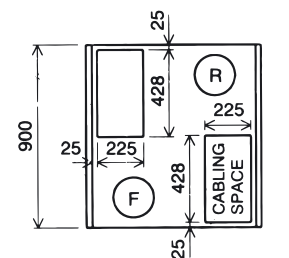


DOUBLE FRONT  
(SIDE VIEW)

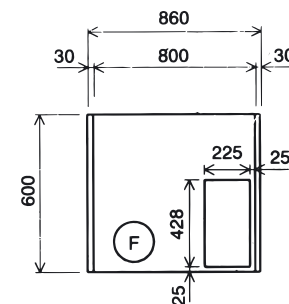
SINGLE FRONT  
(SIDE VIEW)



FRONT VIEW



DOUBLE FRONT



SINGLE FRONT

FOUNDATION PLAN  
(DIMENSIONS EXCLUDING DOOR DEPTH)



## Compatible with Intelligent Motor Control System (IMCS)

Integrated protection and control systems with communication network demand specially engineered solutions to counter the effects of electromagnetic interference (EMI) apart from ease of operation and easy access to the intelligent relays for retrieval of data.

L&T's Motor control Centre type TQ is designed to meet the requirements of IMCS. The module layout is engineered to accommodate L&T's versatile numerical relays.

The communication bus system is specifically designed to take care of the multi-drop or daisy chain requirement with the option of redundant connectivity.

### SALIENT FEATURES

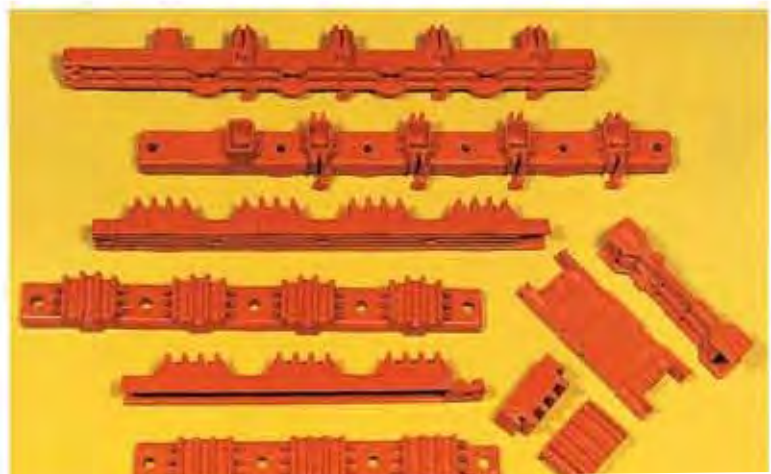
#### Busbars and busbar supports

Horizontal busbars run through the length of the MCC at the top in a distinct zone. Aluminium busbars of EC grade E91E as per IS 5082 are available as standard. Copper busbars can be provided on request. Busbars are available in 2 sizes :  $\frac{1}{4}$ " x 4" and  $\frac{1}{4}$ " x 6" – up to a maximum of 6 flats per phase. For ratings above 1600A, interleaved busbar configuration is offered in double front design.

In the TQ MCC, the busbar supports are moulded from fibreglass reinforced thermosetting plastic. This material has higher mechanical strength compared to conventional support material. Ribbed



*Starter feeder with intelligent relay*



*Variety of specially designed moulded supports*

construction of moulded supports prevents tracking caused by dust accumulation. Busbars can be inspected by removing the top cover plate or the front covers and shields.

To suit stringent site conditions, the busbar system has been designed with generous inter-phase clearances which far exceed the minimum specified by standards. This enhances the reliability of the busbar system in tropical conditions.

The TQ MCC is designed for TPN system. Vertical droppers can be TPN, TPN-E or TP-E. Busbar zone is designed to accommodate neutral busbar.

### Total Protection of Busbars

Busbars and droppers are provided with heat-shrunk PVC sleeving. The heat curing process leaves no voids or pinholes. Except at the tap-offs and stab-in contact plates, the busbars are completely covered with insulating material. Sleeving also protects busbars against accidental contact with hardware, tools and vermin. 'Click-fit' joint shrouds (optional accessories) can be used to cover tap-offs and fish-plate joints. Result : short circuits between phase, and neutral or earth in the bus zone are virtually eliminated.

### Interphase Barriers

In TQ MCC, interphase barriers can be offered in busbar and dropper zones. In addition to secondary insulation on busbars, interphase barriers provide extra protection by eliminating the probability of arc-formation between phases and phase and neutral, and phase and earth at the tap-off points.



*Completely sleeved busbars & droppers*



*Interphase barriers for droppers*



*Interphase barriers for horizontal busbars*

### Advantages of Interleaved Busbar System

In the conventional busbar system, conductors of each phase are grouped together. At higher current ratings, in each phase, more than one flat of busbars are used. These flats are placed quite close to each other. As a compounded result of 'skin effect' and 'proximity effect', current distribution in each flat of the same phase is uneven. It also results in unequal temperature rise in different phases. At very high currents, say above 2500A, any enlargement of the cross section of conductors does not result in a proportionate increase in the current-carrying capacity of busbars.

The Interleaved Busbar System, therefore, offers a cost-effective solution, specially at high currents. In this busbar system, conductors of each phase are placed as R-Y-B-R-Y-B instead of RR-YY-BB. Such an arrangement offers much lower impedance. Also, impedance of each phase is fairly even. This results in uniform temperature rise in all three phases.

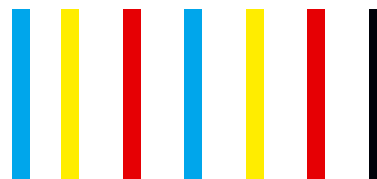
Interleaving of busbars also reduces dynamic forces caused during short circuits, enabling the system to withstand much higher fault levels.

The Interleaved Busbar system thus enhances the busbar current-carrying capacity, and therefore enables optimum utilisation of busbar conductors. Reduced power loss leads to energy savings. The reduction in temperature rise,

BUSBAR ARRANGEMENT



CONVENTIONAL SYSTEM



INTERLEAVED SYSTEM



*Interleaved arrangement of busbars*





especially important in high ambients, increases the reliability and life of equipment, and also reduces ventilation and cooling requirements.

#### **Arrangement for incomer feeders**

For desired rating of incomer, either a switchfuse unit (up to 800A) or an ACB may be used. ACBs are mounted in TQ panel of 944mm depth. ACBs rated up to 2500A can be accommodated. For higher rating of incomer, a power-cum-motor control centre can be considered.

#### **Unique five-position draw-out modules**

Conventional draw-out MCCs offer only three positions for the withdrawable module. The TQ draw-out design provides five.

In addition to Service, Test and Isolated positions, a distinct Maintenance position is available in the draw-out TQ MCC. In this position, the unit remains mechanically attached to the MCC. This facility gives the operator complete access to all components on the withdrawable module. Simple maintenance checks are made easy. It is also possible to swing out the starter unit in the maintenance position for total access to the wiring and control components. The design ensures total safety while withdrawing.



*Module in Service position*



*200mm module in maintenance position*



*Maintenance being carried out on a 200 mm module*

## Motor Control Centre Type TQ

The design offers a wide choice in compartment sizes of feeders. It also offers greater flexibility for mounting power and control equipment. Standard sizes vary from 100mm to 1300mm height in steps of 100mm.

The 100mm module has cassette-type construction and offers a distinct test position with a latch on the module.

### Unique Telescopic Rail System

Telescopic rails offer precise guidance during insertion of a drawout module. Result : perfect alignment. For easy withdrawal and insertion, a special racking screw and handle arrangement is provided.

### Safety shutters

Spring-loaded safety shutters block access to stab-in power contact when the module is withdrawn from service position.

### Provision for scraping earth

In drawout version, the withdrawable module is earthed by means of a silver-plated spring loaded pin (optional accessory). The earthing contact 'makes' before or 'breaks' after the power and control contacts engage or disengage, thus ensuring total operator safety.



*Safety shutter for incoming power contacts*



*Earthing of chassis is achieved through scraping earth*



*Completely shrouded power terminals offer operator safety*



### Facility for Padlocking/Interlocking

Withdrawable module can be padlocked in service and test positions. Padlocking and door interlocking arrangements for power switches are also available. A defeat facility is provided for the door interlock to facilitate testing/inspection.

### Control Plate

Indicating lamps, push buttons, meters and selector switches are mounted on a control plate. This plate can be hinged out for inspection/maintenance of the connections. Only the control plate needs to be changed in case of change in specified control equipment.

### Motor Starter Units

DOL starter units of ratings up to 11kW can be accommodated in a 100mm TQ cubicle. Standard design caters to DOL starters up to 200kW. Star/delta starters up to 300kW rating can also be provided.

### Auxiliary Busbars

Thirteen auxiliary busbars can be mounted in a distinct chamber housing auxiliary busbars.



*Padlocking for power switch*



*Door interlock defeat facility*



*Control plate with accessories mounted on it*



*Control plate hinged for maintenance purpose*

## USER FRIENDLY DESIGN

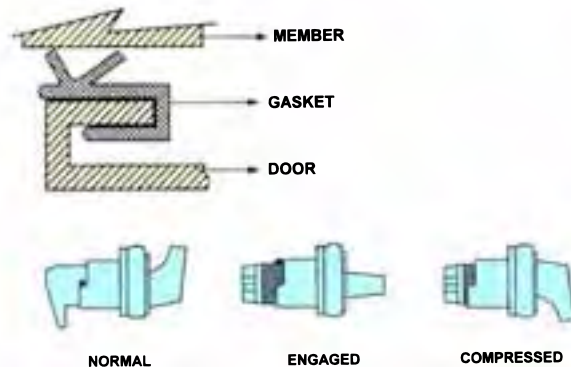
The TQ MCC also incorporates the following additional features that enhance user-friendliness and ease of operation :

- Large cabling area. Cable chamber width exceeds 250 mm. Aluminium cables can therefore be easily accommodated and terminated.
- Single unit panels with larger cabling area for higher ratings and large cable sizes.
- Programmable Secondary Isolating Contacts (SICs) : Depending on logic requirements, programmed contacts are used to permit selective signals during testing. Distinct Test Position and programmable SICs together ensure a high degree of operational safety during testing.
- A double action door camlock engages the door in the first quadrant of its turn and compresses the gasket in the second quadrant to ensure dust proofing.
- All the drawout power contacts and secondary isolating contacts are silver plated copper and offer high resistance to abrasion.
- Nut retainer plates at the joints make checking tightness of busbar joints easy.

Separate contact plates are used on the droppers – the incoming side of the feeders. This avoids need for replacement of entire dropper in case of welding of contacts on fault.



Silver plated power and control contacts



TWIN ACTION DOOR CAMLOCK

• Information given in this manual is illustrative. For information on specific equipment, please refer to the relevant contract document.

• Product improvement is a continuous process at L&T. For latest information on this equipment, contact any of our offices listed here.



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