Energy Division

Modis 25/32 – the modular switchboard solution

Tyco Electronics

Our commitment. Your advantage.

Energy Division

From components to switchboard – just add labour!

Tyco Electronics offers the Modis 25/32 LV distribution switchboard systems of the form of components that are delivered on a pallet enabling assembly to a fully type tested unit.

- Fully and partially type tested options in accordance with EN 60439-1
- Wide range of busbar fault ratings options up to 80kA for 1s
- ASTA certified
- Form 4 type 2 or 6
- Horizontal busbars up to 3200A

Modis – the modular switchboard solution

The Modis family of switchboards and associated devices, originally developed by Dorman Smith Switchgear Limited, continues to advance and grow in popularity as part of the product portfolio of Tyco Electronics UK Ltd.

The innovative Modis concept provides complete solutions for almost all practical switchboard system applications. Its modular design and construction meet diverse needs from throughout the supply chain, fulfilling the requirements of electrical engineers, contractors, equipment installers and end users.

The modular building blocks of Modis combine to produce an effective and compact switchboard system with a space-saving, high stacking density. Modis can grow with your electrical and energy needs as its modular design is easy to extend and modify.

Modis switchboard integrates world-class components from the Tyco Electronics product portfolio. These include Dorman Smith circuit breakers and fuse combination units, Crompton Instruments meters and Bowthorpe EMP surge suppression units. Modis switchboard can also accommodate third-party equipment, for example capacitors for power factor correction.

Modis switchboard was designed to make tasks easier, quicker and to enable you to achieve system build in the most cost effective way without compromising quality. Backed by comprehensive build documentation, the self-assembly Modis range amply demonstrates its 'pallet to Power Room' slogan. Reverse-packed into a series of 'coffin boxes' and shipped as a flat-pack kit on a pallet, each switchboard speedily takes shape on the assembler's shop floor.

With a strong emphasis on quality and design, Modis switchboards have found acceptance in numerous prestigious local and global contracts. Amongst the many high profile projects are B&Q's superstores, the Lawn Tennis Centre at Wimbledon, Eurotunnel, the Hewlett Packard Datacentre and British Airports Authority installations. In export markets, systems have been supplied to the landmark Emirates Towers in Dubai and also to the nearby Burj al Arab, which is widely acclaimed as the world's only '7-star' hotel.

Within the UK, Modis 25/32 switchboard is brought to market through systems integrators and panel builders, each specially selected by qualification and linked by a formal Partnership Agreement to Tyco Electronics. End user applications for these switchboards and associated systems are found in rail transportation, building management, utilities and infrastructure, together with the manufacturing sector and many parts of the process industry.

Features

- Fully type-tested in accordance with EN60439-1:1999
- ASTA Certified
- Form 4b Type 2 or Type 6 as standard
- Horizontal busbars from 1250A up to 3200A
- Wide range of busbar fault withstand options up to 80kA for 1 second
- Option for extending at either end
- Front or rear access with cable entries top or bottom to suit application
- Compact modular design
- ACB, MCCB, Fuse Combination Units and MCB options
- IP3X, IP42 or IP54 options

Benefits

- Improved stacking densities
- Complete range of devices ensures Modis switchboard is suitable for any LV application
- Cost effective and time/cost efficient system build

Applications

LV power distribution and protection

Approvals

EN 60439-1
ISO 9001
EN 60529

Modis 25/32 - Product technical specification

Manufacturer:	Tyco Electronics UK Ltd.
Quality certification:	ISO9001
Product:	LV Switchboard (TTA)
Standards:	BS EN 60439-1: 1999 EN 60439-1: 1999 IEC 60439-1: 1999
Forms of separation:	Complies with EN 60439-1: 1999, Form 4. British National Annex accommodated
Designation:	Type Tested Assembly (TTA)
IP rating: External	IP3X, IP41 or IP54 to IEC 60529: 1989
IP rating: Internal	IP2X minimum to the above named standard
Construction: Frame structure	2mm gauge folded, painted and preplated steel
Construction: Cover plates	1.6mm screw fixed, painted and preplated steel
Construction: Integral segregation	Plated sheet steel, perforated sheet steel or transparent polycarbonate sheet
Cabling access:	Suitable for front or rear access cabling entry via the top gland plates or the optional bottom gland plate.
Busbars: Material	HDHC copper. Multiple laminations per phase
Busbars: Mounting	4-pole air insulated in glass fibre reinforced moulded supports
Busbars: Shielding	Non-conductive rigid insulated barriers or rigid sheet steel barriers
Busbars: Maximum current and fault withstand ratings	1250–1600A: 50kA for 3s 2500A: 80kA for 1s or 3s or 80kA for 1s 3200A: 80kA for 1s or 50kA for 3s

Independent switchboard certification :	Modis 25		Modis 32
Temperature rise	ASTA Certificate number	15467	16490
Dielectric properties	ASTA Certificate number	15467	16490
Short circuit withstand strength	ASTA Certificate number	15467	16490
Effectiveness of protective circuit	ASTA Certificate number	15467 & 15471	16490
Clearance and creepage distances	ASTA Certificate number	15467	16490
Mechanical operation	ASTA Certificate number	15467	16490
Degree of protection	ASTA Certificate number	15467	16490
Earthing:	2 earth bar sizes: 300mm^2 for 50kA for 1s fault withstand and 500mm^2 for 50kA for 3s and 80kA for 1s fault withstand. Earth continuity of cladding is maintained by specifically designed fixing screws		
Rated operational voltage:	400V		
Power frequency withstand voltage:	2500V		
Rated operational current:	Project specific		
Paint finish:	Light grey RAL 7035 semi-gloss		
Paint depth:	40/60 microns		
Paint process:	4-stage process that includes chemical spray degreasing, iron phosphate coating, automatic electro-static epoxy polyester film application and curing in a high temperature oven		

Modis 25/32 Components

Cubicles

The Modis system houses all devices and busbars within modular frames. Frames come in widths of 500, 600 and 800mm and depths of 500, 800, 1000 and 1300mm. This combination can achieve 12 different footprints. The standard frame heights are 1984, 2170 and 2356mm of which the shortest frame can fit under an industrial standard height door.

Frames are designed with the ability to remove horizontal angles, allowing the installer to move frames easily over trenches where existing cables protrude, saving time on site.

The Modis system is designed for installation in enclosed locations. The standard cubicles are IP3X with options of IP42 or IP54. Frames are painted in light grey RAL 7035 epoxy polyester film.

Busbars

Busbar systems are four-pole with a fully rated neutral, available in 1250A, 1600A, 2500A and 3200A. All systems are tested for temperature rise and short circuit withstand:

- 1250A tested at 50kA for 1s and 3s
- 1600A tested at 50kA for 1s and 3s
- 2500A and 3200A tested at 80kA for 1 second and 50kA for 3 second

The busbars are manufactured from HDHC copper (tin plated option available) and are mounted on a patented, insulated and reinforced support. All connections to the busbar are clamped with no drilling required. This makes the system easy both to connect and extend, saving time during build and on site. Busbars can be mounted at the top, middle or bottom of each cubicle depending upon the location of cable entry. More than one busbar set can be accommodated in each cubicle.

Protective Earth Conductors

Modis switchboard is fitted with a horizontal earth conductor mounted either at the top or bottom of the frame depending upon cable entry. The conductor runs the full length of the suite and is sized according to the fault withstand of the busbar system. Pre-punched holes in the conductor enable quick and reliable cable connections, reducing installation time and providing a high level of confidence in the security of the joints.

Internal Segregation

The Modis system has been designed to meet the requirements of EN 60439-1 with regard to Form b Type 2 & Type 6 separation. For front or rear access, IP2X internal protection for cabling can be provided.

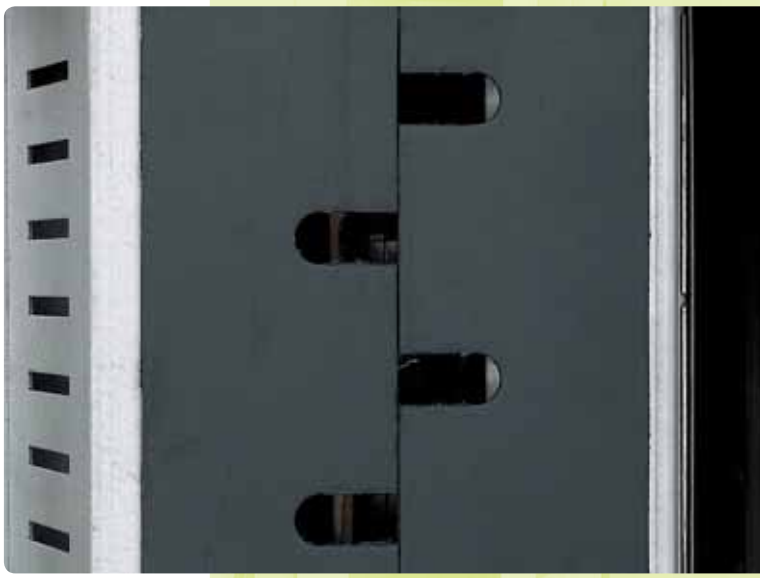
Termination

Modis switchboard offers good all-round access and has the option of rear or front access for cabling. Removable gland plates make cutting for glands both simple and safe. Removable barriers simplify access for cable termination.

Design Considerations

Fuse switches and MCCBs can be readily accommodated within the smallest frame dimensions of 500mm deep x 500mm wide, based on front access. Where an ACB is used as the main incoming device, the following configurations are available:

Access	Depth (mm)	Width (mm)	ACB Rating (A)
Front	500	600	up to 2000
Front & Rear	800	800	2500-3200
Rear	1000	800	2500-3200
Rear	1300	800	3200



Modis 25/32 Internal Devices

General
MCCBs are available up to 800A in TP&N or four-pole, fixed or plug-in types. Fuse Combination Units are available up to 800A SP&N, TP&N or four-pole. All types are fitted with door-interlocking handles for operator safety. Modis switchboard accommodates the Dorman Smith range of withdrawable ACBs with current ratings up to 3200A TP&N or four-poles. The solid copper busbar connection has been tested to the devices' breaking capacity (80kA in the case of fuse combination units) ensuring fault withstand to the point of cable termination.

For more detailed information on all circuit protection devices please refer to the relevant Tyco Electronics publications.

MCBs:
The Loadlimiter 63 family of devices comprises a comprehensive series of MCBs with B, C & D characteristics and current range of 6A to 63A. These come in one to four-pole format, together with a range of complementary RCBOs and RCCBs. The Loadlimiter 63 range is the premier choice for final circuit protection within any switchboard or distribution scheme.
An extensive range of enclosure systems is also available, suitable for instances where final circuit distribution boards are sited remote from the main switchboard.

MCCBs:
Loadline MCCBs have current ratings of 20A to 800A and support a comprehensive range of accessories. All devices comply with EN 60947-2 standards. Loadline MCCBs meet market demands for higher breaking capacities, having optional thermal/magnetic or electronic trip unit protection. Electronic variants attain Category B selectivity utilisation and can read up to the 19th harmonic. The thermal/magnetic devices are unaffected by harmonic distortion. This range is completed by a series of generator MCCBs and temperature-calibrated thermal/magnetic devices for tropical climates.

ACBs:
Loadline Z-Frame air circuit breakers utilise leading-edge technologies and features a number of innovations that make this family of ACBs a leader in its class. All devices comply with EN 60947-2 standards. With just three ratings, this range spans an input current spectrum of 800A to 3200A. Units are available as three or four-pole variants and offer a choice of fixed or withdrawable chassis patterns. The ACBs are complemented with a wide range of accessories, from simple key locks to intelligent trip units that offer data measuring and communication facilities.

Fuse Combination Units:
Loadswitch FCUs have been designed to meet customer needs for straightforward installation and the acceptance of large cable sizes, whilst exceeding EN 60947-3 standards. The full-uninterrupted duty ensures that these units can indefinitely maintain the full rated load indefinitely. With utilisation category of AC23A and short-circuit capacity of 80kA, Loadswitch devices can be installed with confidence on any inductive or resistive load.

The housed variant has a robust steel enclosure, a door that opens 180 degrees for easy access and is finished in a light grey epoxy powder coating RAL 7035. Padlocking is standard with room for up to three padlocks. Room for cable spreading (easily reversed by installer) is at the bottom of the housed unit.

Further details of these products can be found in the appropriate product catalogues.

Measurement and Control

Digital Metering Systems
The Integra product line represents a comprehensive range of fully programmable, high accuracy multi-function digital metering systems for all power monitoring applications. Integra systems measure, display and communicate true RMS system values, power quality data and total harmonic distortion. To meet user requirements, Integra products come with a variety of output options and case styles with LED or LCD displays.

Kilowatt Hour Energy Meters
A range of panel mounted and DIN rail mounted meters for monitoring energy consumption is available. Self-contained meters offer combined kWh or kVArh energy measurement with pulsed or analogue output options and selectable CT and VT ratios, replacing rotating disc meters and separate instantaneous wattmeters.

Protector Trip Relays
This array of devices includes electronic control products for the continuous monitoring of many electrical parameters and the protection of associated circuits. Designed to fit a wide variety of applications, the range offers both technologically advanced and traditional products.

Included within this portfolio are sophisticated multi-functional microprocessor-based systems and single parameter units that measure earth leakage, ground fault current, vector shift and rate of change of frequency (ROCOF). The same devices also provide the means for protection.

Meter Relays & Digital Indicators
Tyco Electronics provides a range of meter relays and digital indicators for measuring, monitoring and control of any electrical or process parameter. Meter relays are ideal for process control and load-shedding applications, combining an indicator with set points which operate alarm and control circuits when the signal deviates from set limits. This range includes digital and analogue meter relays, digital bar graph indicators and controllers. These instruments have been specifically designed for use in control panels and switchboards, monitoring systems, power generation and control applications.

Analogue Instruments
High quality analogue instruments, designed to measure an extensive range of electrical and electronic parameters, are often the preferred choice for panel instrumentation. These instruments are precision engineered and robust, ensuring accurate measurement and display in the most demanding of environments. This extensive range offers various styles, sizes and specifications to meet the exacting needs of industrial installations.

Further details of these products can be found in the appropriate product catalogues.

Transient Voltage Surge Suppression

Modular Distribution Surge Protectors

The Modis system supports several forms of TVSS, including modular distribution surge protectors for single and three-phase power systems with exceptionally high surge handling capabilities of 90, 150 and 300kA. The MDSP product is intended for high lightning exposure areas and critical systems where long life and low maintenance are required.

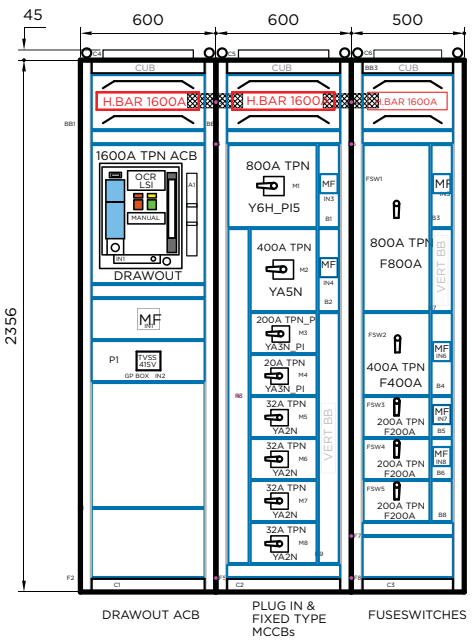
Distribution Surge Protector

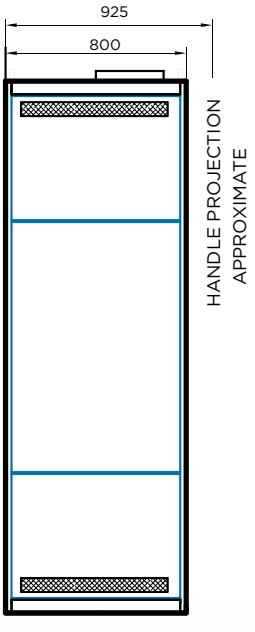
A series of general purpose, hardwired, single and three-phase distribution surge protectors with 30kA of surge capacity and two stage (redundant) protection provide pre-failure indication. The DSP600 Series L & N types have site fault condition indicators and relay contacts that enable remote indication of protection status.

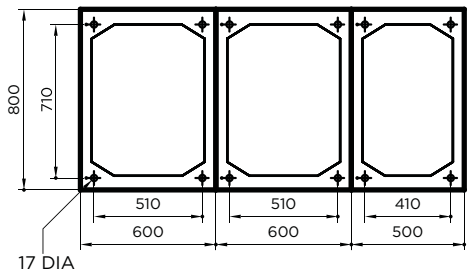
Sub Panel Protectors

The compact, 10kA rated, 6651C Protector has been designed for sub-distribution panels that supply mission-critical hardware such as mini-computers, PABX systems, network file servers and mainframes. This hardwired, panel mounting surge suppression device has redundant protection and offers full status monitoring in single and three-phase versions.

Further details of these products can be found in the appropriate product catalogues.







Modis 25/32 Forms of Separation

Fundamentals of Separation

In accordance with EN60439-1, the various assembly elements such as busbars, functional units and terminals can be claimed as adequately separated providing one or more of the following criteria are met:

1. For protection against contact with live parts belonging to adjacent functional units, the degree of protection must be at least IP2X or IPXXB. As a minimum, finger contact with live parts in adjacent functional units must be prevented. With Modis assemblies this definition is extended to include protection against finger contact between functional units, adjacent busbars and busbar connections, and terminals required for the particular form of separation.

Meeting this requirement can be verified with the standard test finger.

2. For protection against passage of solid foreign bodies from one unit of an assembly to an adjacent unit, the degree of protection must be at least IP2X. Meeting the minimum standard test finger requirements is demonstrated by the impossibility of touching live parts in adjacent units and passing a 12mm diameter ball between units. In practice, a higher degree of protection may be required for horizontal partitions to prevent small objects from falling between compartments. This should be identified in the contract specification.

Typical Applications

Form 1 - No separation

This form is acceptable where the switchboard is in a secure location and where its failure will cause little or no additional disruption to other areas fed by the switchboard.

Form 2 - Separation of busbars from individual functional units

Applications may be identical to Form 1. The main distinction is that a fault in the switchboard need not affect all functional units fed from the same busbar system.

Form 3 – Separation of busbars from functional units and individual functional units are separate from each other but share a common termination. Applied where it is important to provide protection from internal live parts and where the failure of functional units fed from the same busbar would cause unacceptable disruption.

Form 4 – Separation of busbars from functional units. Individual functional units are separate one from another, including at their termination points.

Applications may be identical to Form 3. However, all terminations are separated, it is possible to isolate a single functional unit.

UK National Annex

The internal separation of assemblies by barriers or partitions is specified in Section 7.7 of EN60439-1: 1999 and is subject to agreement between the manufacturer and the user.

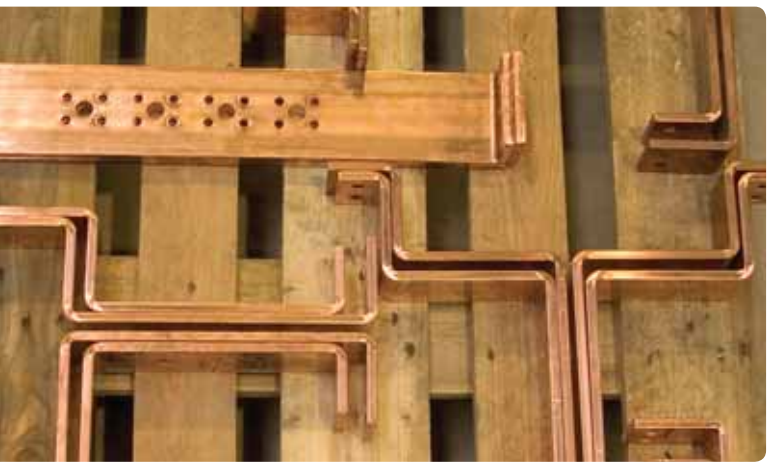
The table overleaf gives additional information regarding different types of construction, based on typical practice in the United Kingdom. Other types of construction are not precluded, and it is not essential to adopt any of the listed types in order to comply with the standard requirements.

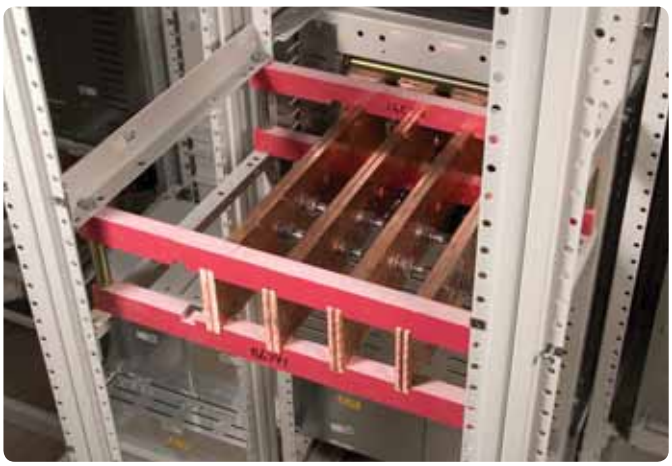
However, in order to achieve agreement between manufacturers and users, it is recommended to adopt one of the listed construction types.

See table overleaf.

Sub-categories of Separation Forms

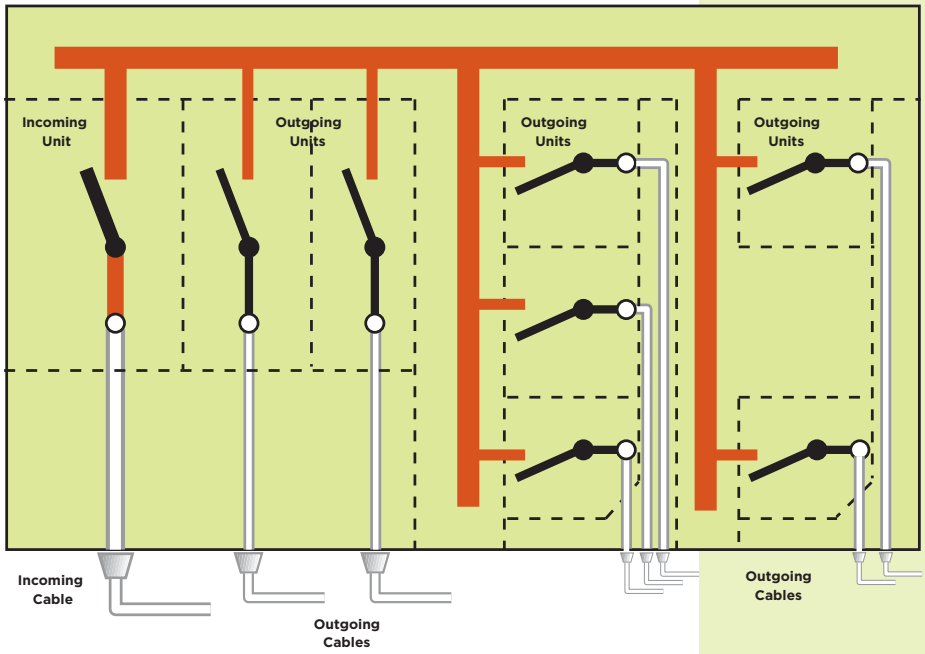
Main criteria	Sub criteria	Form	Type	Construction
No separation		1		
Separation of busbars from the functional units	Terminals for external conductors not separated from busbars	2a		
	Terminals for external conductors separated from busbars	2b	1	Busbar separation by insulated coverings
			2	Busbar separation by rigid barriers
Separation of busbars from the functional units and separaton of all functional units from one another. Separation of the terminals for external conductors from functional units but not from each other	Terminals for external conductors not separated from busbars	3a		
	Terminals for external conductors separated from busbars	3b	1	Busbar separation by insulated coverings
			2	Busbar separation by rigid barriers
Separation of busbars from the functional units and separation of all functional units from one another including terminals for external conductors which are an integral part of the functional unit	Terminals for external conductors in the same compartment as the associated functional unit	4a	1	Busbar separation by insulated coverings Cables may be glanded elsewhere
			2	Busbar separation by rigid barriers Cables may be glanded elsewhere
			3	All separation by rigid barriers The termination for each functional unit has its own integral glanding facility
	Terminals for external conductors not in the same compartment as the associated functional unit but in individual, separate, enclosed protected spaces or compartments	4b	4	Busbar separation by insulated coverings Cables may be glanded elsewhere
			5	Busbar separation by rigid barriers Terminals may be separated by insulated coverings and glanded in common cabling chambers
			6	All separation by rigid barriers Cables are glanded in common cabling chambers
			7	All separation by rigid barriers The termination for each functional unit has its own integral glanding facility



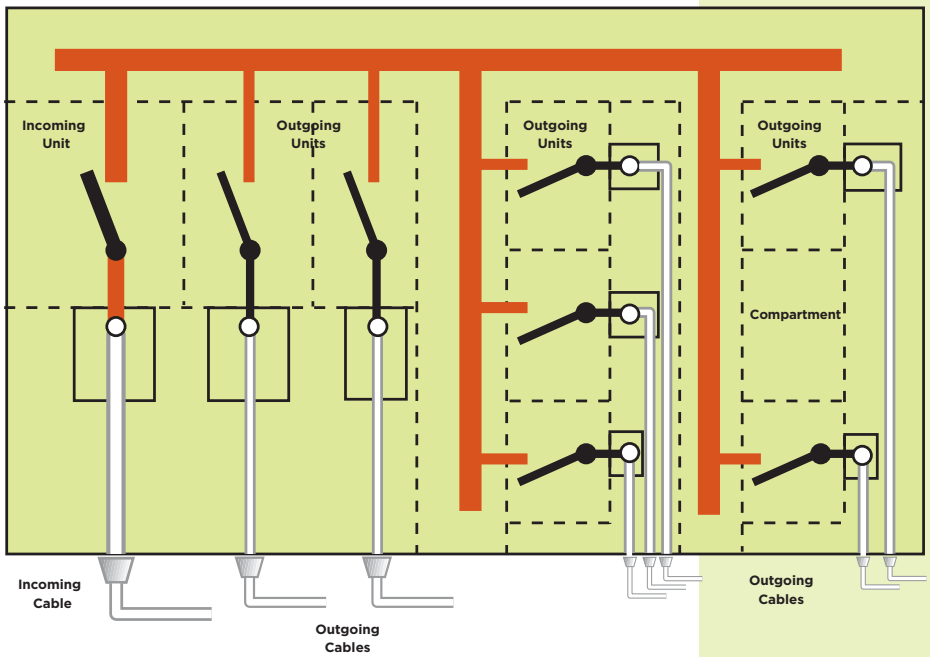


Forms of separation
Form 4a Type 2 and Form 4b Type 6

Form 4a Type 2



Form 4b Type 6



Modis 25/32 Type Testing

LV Switchboard Standards

LV Switchboards should be manufactured to meet EN60439-1 standard. This non-prescriptive standard allows for manufacturers to be innovative whilst fully meeting the standard and, most importantly, providing the user with the required equipment.
The standard details two assembly categories:
Type Tested (TTA) and Partially Type Tested (PTTA)

These terms are described as follows in EN60439-1:

Assembly:

"A combination of one or more low-voltage switching devices together with associated control, measuring, signalling, protective, regulating equipment etc., completely assembled under the responsibility of the manufacturer with all the internal electrical and mechanical interconnections and structural parts."
Assemblies are likely to be produced for specific customers who may specify equipment to their own specifications and requirements. Hence the phrase "by agreement between manufacturer and user" is used throughout the standard.

Type Tested Assembly:

"A low-voltage switchgear and control gear assembly conforming to an established type or system without deviations likely to significantly influence the performance, from the typical ASSEMBLY verified to be in accordance with this standard"

Partially Type Tested Assemblies:

"A low-voltage switchgear and control gear assembly, containing both type-tested and non-type-tested arrangements provided the latter are derived (e.g. by calculation) from type-tested arrangements which have complied with the relevant tests"

Why Type Test?

EN60439-1 states:

"Type tests are intended to verify compliance with requirements laid down in this standard for a given type of ASSEMBLY."
"Type tests are carried out on a sample of such an ASSEMBLY or on such parts of ASSEMBLIES manufactured to the same or similar design."
"The tests shall be carried out on the initiative of the manufacturer."
The standard also requires switching devices and other components to comply with their own relevant standards.

Type tests for assemblies include:

- Verification of temperature rise
- Verification of dielectric properties
- Verification of short circuit withstand strength
- Verification of the effectiveness of the protective circuit
- Verification of clearances and creepage distances
- Verification of mechanical operation
- Verification of the degree of protection

These tests are intended to:

- Prove design capability
- Be conducted on representative samples for the design of assembly, but are not intended to be undertaken on an assembly which is subsequently put into service
- Be undertaken at the instigation of the manufacturer. It is recognised that it is impractical to test every conceivable configuration of circuit within an assembly
- Be tested either in the manufacturer's own laboratory or at an independent facility
- Have results recorded in reports or certificates that are available for examination

Modis and Type Testing

In accordance with the guidelines of the governing specifications for Dorman Smith Modis switchboard, all type test certificates are valid for all Modis Systems, irrespective of assembler, provided that these Modis Systems are constructed in accordance with the assembly instructions published within a controlled manual or other controlled document issued by Tyco Electronics.

Modis 25/32 Ingress Protection

Markings to indicate the degree of ingress protection consist of the letters IP (Ingress Protection) followed by two characteristic numerals. The first numeral designates the degree of protection with regard to solid objects. The second numeral designates the degree of protection against the ingress of liquids.

These markings provide standardised indication of:

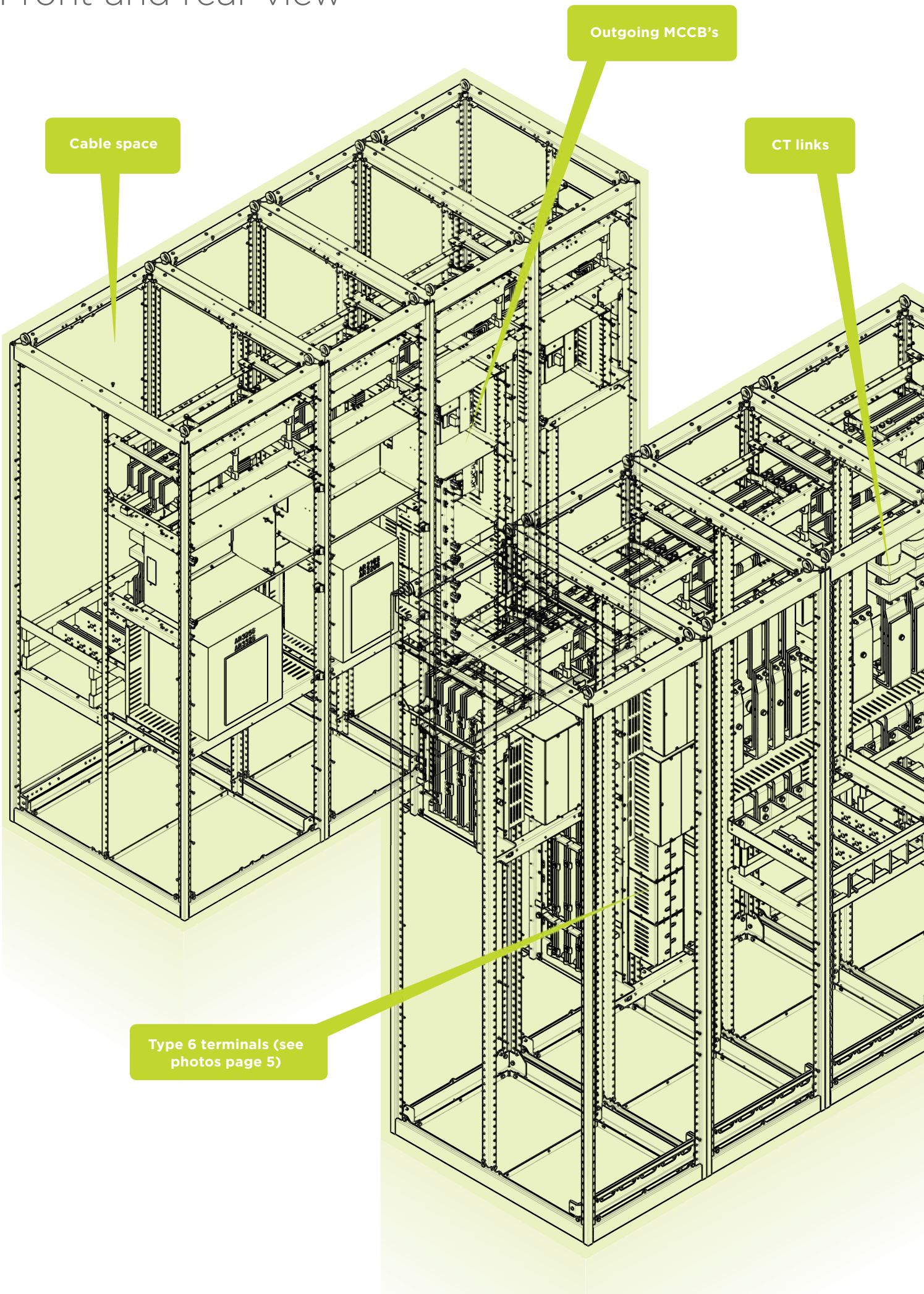
a) Protection of persons against access to hazardous parts inside enclosures and protection of equipment inside the enclosure against the ingress of solid foreign objects.
b) Protection of equipment inside enclosure against harmful ingress of liquids.
For switchboard assemblies intended for indoor use, EN60439-1: 1999 states that there is no requirement for protection against ingress of liquids (clause 7.2.1.1) and that the IP references preferred for designated indoor use assemblies are:

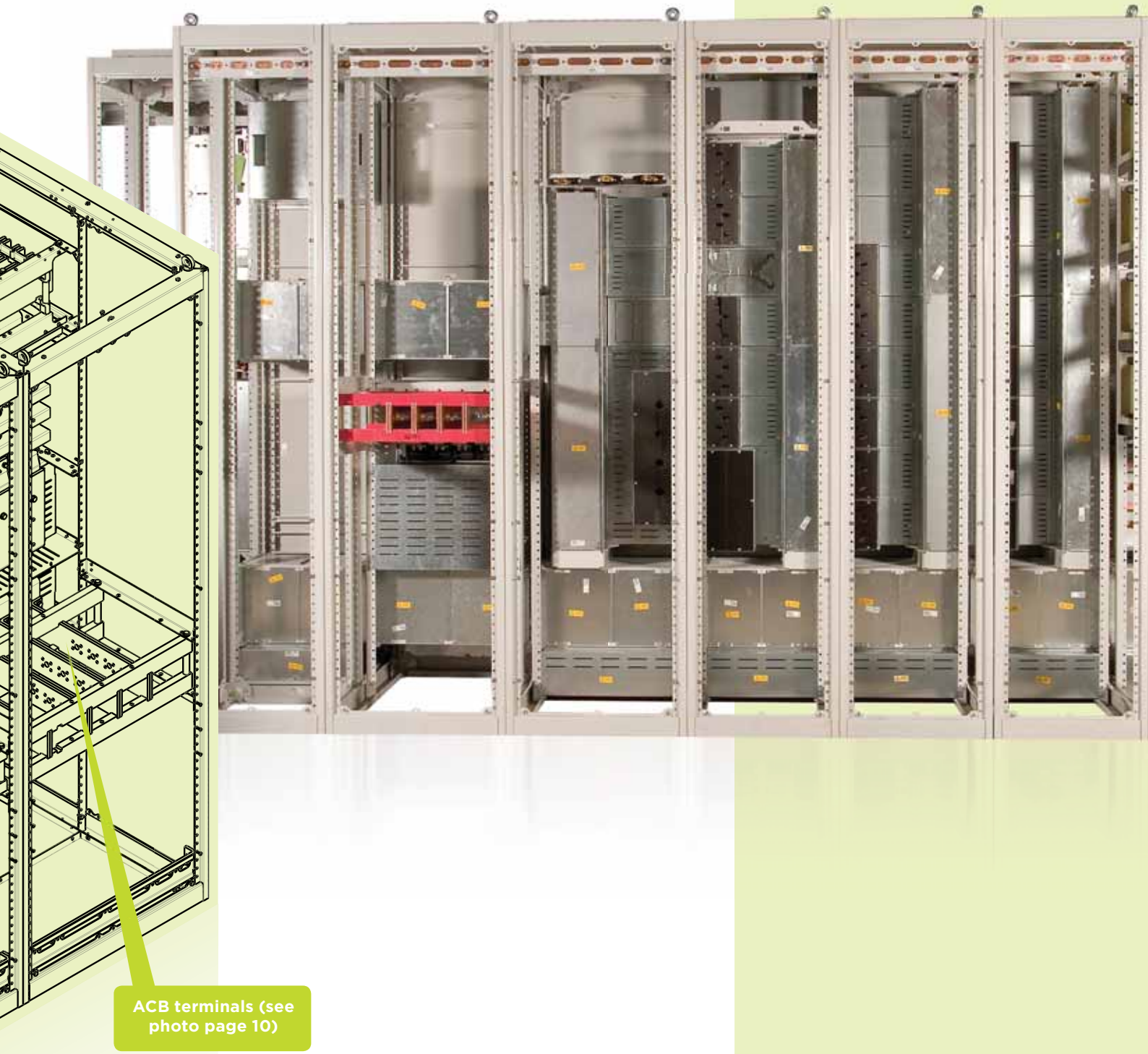
IP00, IP2X, IP3X, IP4X, IP5X.

IP	Protection (solids)	Equivalent
0	No protection	
1	Full entry of 50mm sphere, but no contact with hazardous parts	Back of hand
2	Full entry of 12.5mm sphere not allowed, but no contact with hazardous parts with jointed test finger	Finger
3	2.5mm diameter access probe shall not enter	Tool
4	1mm diameter access probe shall not enter	Wire
5	Limited ingress of dust (no harmful deposit)	Wire
6	Total protection against dust ingress	Wire
X	Not tested	-

IP	Protection (liquids)	Equivalent
0	No protection	
1	Against vertically failing water drops	Vertical drips
2	As in 1, but with enclosure tilted 15 degrees from vertical	Slanted dripping to 15 degrees from vertical
3	Against spray to 60 degrees from vertical – limited ingress permitted	Limited spray
4	Against splashing from any direction – limited ingress permitted	Splashing from any direction
5	Against low pressure jets from any direction – limited ingress permitted	Hosing jets from any direction
6	Against strong jets from any direction	Power hosing from any direction
7	Against immersion up to one metre	Temporary immersion
8	Against prolonged immersion under pressure	Continuous immersion
X	Not tested	-

Front and rear view




ACB terminals (see photo page 10)

Energy Division – economical solutions for the electrical power industry: cable accessories, connectors & fittings, electrical equipment, instruments, lighting controls, insulators & insulation enhancement and surge arresters.

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