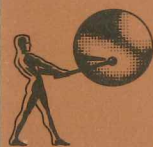


# MCM



# strand

## THYRISTOR PLUG-IN DIMMERS & RACKS

### **A uniquely versatile approach to professional dimming.**

- Plug-in dimmers changeable on full load.
- Wide choice of options available as standard.
- Meets all filtering requirements.

MCM is the versatile Thyristor dimmer system for broadcast TV studios, repertoire theatres and other intensive-use environments where the highest standard of performance, reliability and accessibility are demanded.

MCM - Modular Crate Mounted - plug-in dimmer modules are offered in dual 2.5kW, or 5kW, or double-width 10kW max. ratings; each of these are also available with a choice of various control signal input to power output characteristics, to suit the very different responses of the electronic and the human eye. Closed-loop options which stabilize the chosen output from fluctuations in the incoming supply are available.

"Full" racks contain five crates of six modules giving a total dimming capacity of 150kW. The alternative 'Low' rack houses three crates of six modules and has a total dimming capacity of 90kW.

All racks incorporate as standard complete internal power distribution.

MCM modules are in continuous production, and together with crate and other sub-assemblies, are all stocked in depth so that racks can be assembled to meet the specific requirements of each installation without the high cost and protracted delivery usually associated with custom built equipment.





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## MCM - The System

MCM benefits from the considerable tooling investment made by Strand to avoid the otherwise inevitable inconsistencies associated with fabrication from piece parts. Careful attention to detailed design and a wealth of experience ensures a very attractively priced and reliable system, but one offering a wide range of customer choice, not only of dimmer ratings but also of various dimmer laws and output stabilisation, which can meet the most demanding international specifications.

For large installations full-height, 5-crate racks, which each accommodate up to 150kW of same or different dimmer module ratings, provide a high packing density which can save considerable floor area - so often at a premium. The alternative 3-crate racks can help in older buildings where high floor loading may be impractical.

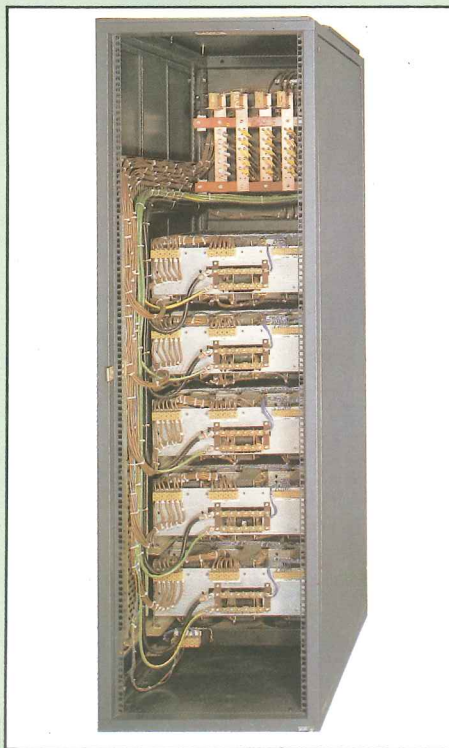
The choice of dual 2.5kW, 5kW or 10kW dimmer modules ratings, which can be mixed with minimum restrictions, will be determined by the nature and scale of the lighting installation, as will the choice of dimmer law, which is the transfer relationship between the percentage control signal and the dimmer output.

'S' law is normally used in the theatre, where the human eye is the receptor, because the rate of change is slower at low light levels.

Linear law is similar to the response of an auto-transformer dimmer because the output voltage varies linearly with the magnitude of the control signal.

Square law produces a transfer best suited to the response of television cameras - the basis is that the light output is proportional to the square of the control signal.

The pair of power Thyristors are hard-fired to ensure stable operation for low wattage loads, such as set dressings, and also to enable non-resistive loads to be used, for example transformer-fed lamps in slide projectors. Linear and Square law controlled modules incorporate closed-loop control circuitry using feedback from the dimmer output to maintain intermediate intensity levels and limit maximum output voltage in spite of fluctuations in the supply. This added sophistication is very desirable for television applications.



## MCM Dimmer Racks

The 19-inch equipment racks used, house either 5 or 3 crates of dimmer modules, and each forms a complete distribution system. All racks are only 560mm wide and 835mm deep. A number of racks can be mounted side by side in a bay in which case intermediate side panels can be omitted.

### Close Excess-Current Protection

A recessed panel at the top of the rack houses a single pole fuse for each dimmer channel, either Reyrolle 440v rated Pullcap with shrouded-contacts, or Neozed DO.2. Size/rating and layout corresponds with the ratings of the crates of dimmer modules fitted.

The corresponding fuse-links provide close excess-current protection without excessive costs for fuse-link replacements.

### Busbars

5-crate racks are fitted with 600A 3-phase, neutral and earth busbars with cable clamps for the incoming supply. 3-crate racks have 400A busbars. Single phase, 3-phase sequential, or any specified phasing of dimmer modules is readily available.

### Cable Entry

Large easy access removable plates adaptable to any wiring system are provided both at the top and in the bottom of each rack towards the rear. All external connections are by means of terminal blocks.

### Rear Access

Hinged, lift-off doors at rear of rack, provide generous access for all external connections, and allows saving of space at rear of racks.

### Ventilation

A fan unit at the base of each rack provides forced ventilation from bottom to top. The fan unit consists of four axial fans each moving 50 litres/second. Air input temperature must not exceed 35°C; in some situations and climates it may be necessary for others to provide air-conditioning for the dimmer room to achieve 35°C max. ambient; maximum heat dissipation from fully loaded racks is 3kW for the 5-crate rack and 2kW for the 3-crate rack.

### Internal Wiring

All internal wiring is provided with cable loom at left hand side when facing rear. All connections to crates are separable to allow crates to be temporarily removed to assist on-site handling.

### Crate Runners

Substantial back to front runners are provided for each crate of dimmer modules. Crate Blanks are available to fill any space not filled by dimmer module crates.



## MCM Crates

All crates have the same overall size but internal detail varies to house either six dual 2.5kW modules (12 dimmer channels) or six single 5kW modules, or three double-width 10kW modules. Also available is a hybrid crate to accept three 5kW and three dual 2.5 kW modules (a total of 9 dimmer channels).

### Construction

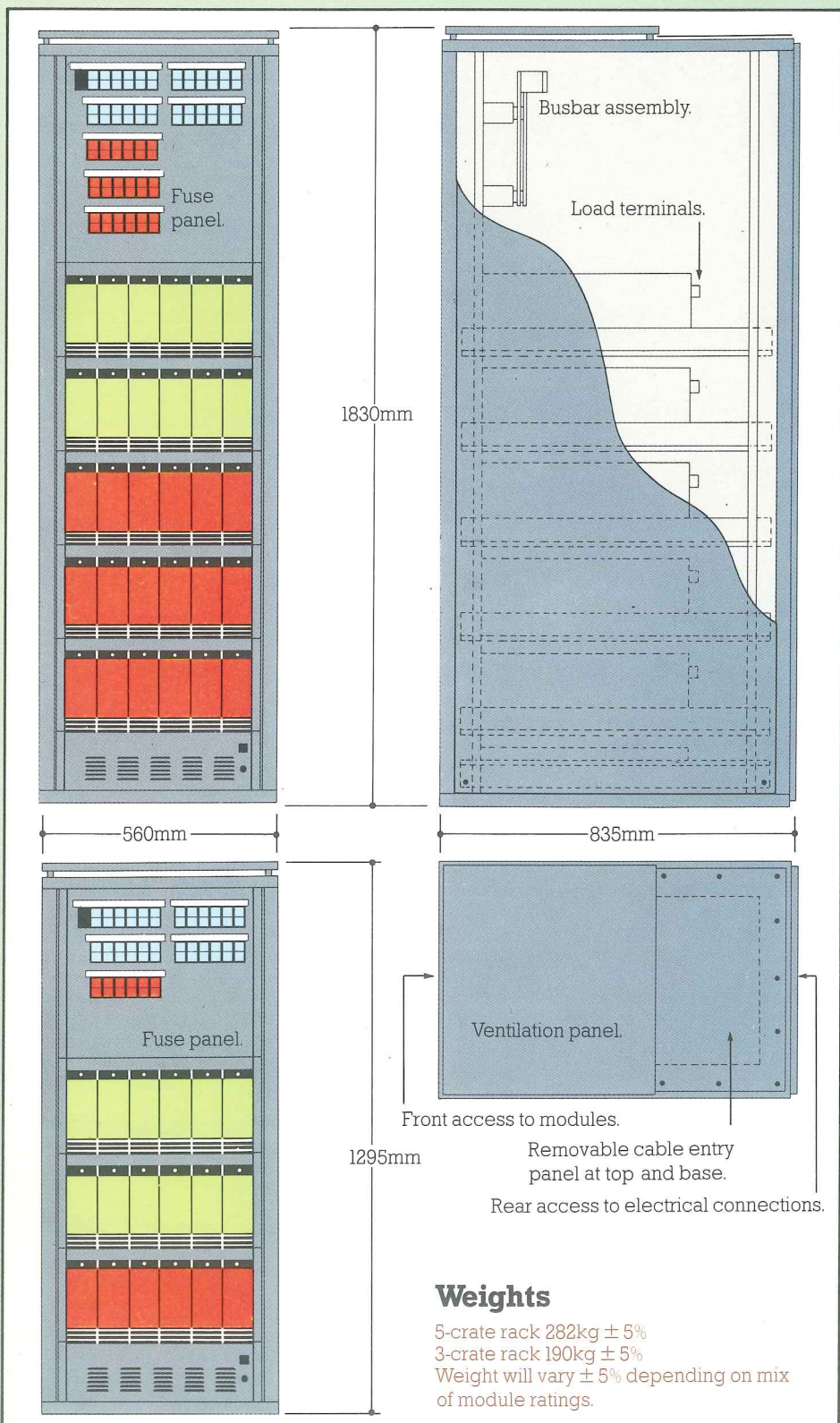
Each crate is a strong framework constructed from preformed aluminium alloy sections and includes guide rails for the six (or  $3 \times 10$  kW) modules, Noryl SE.1 injection-moulded sockets for the power and control signal connections to the modules, plus a substantial filter for each dimmer channel.

### Filters

The inductive filters are to the demanding standards of broadcast TV studios ensuring a risetime in excess of 1 millisecond at full rated load and at  $90^\circ$  conduction angle. In addition R.F.I. suppression is incorporated in each dimmer module.

### Internal Wiring

Each crate is fully wired with all connections external to each crate to generous-sized pressure-pad terminals at the rear. Load, Neutral and Earth terminals are together at the centre rear; control signal terminals are at the right-hand side and individual channel power-in terminals are at the left-hand side. Power-in terminals enable crates to be easily disconnected from the rack cable loom and temporarily removed, if necessary, to ease on-site positioning.

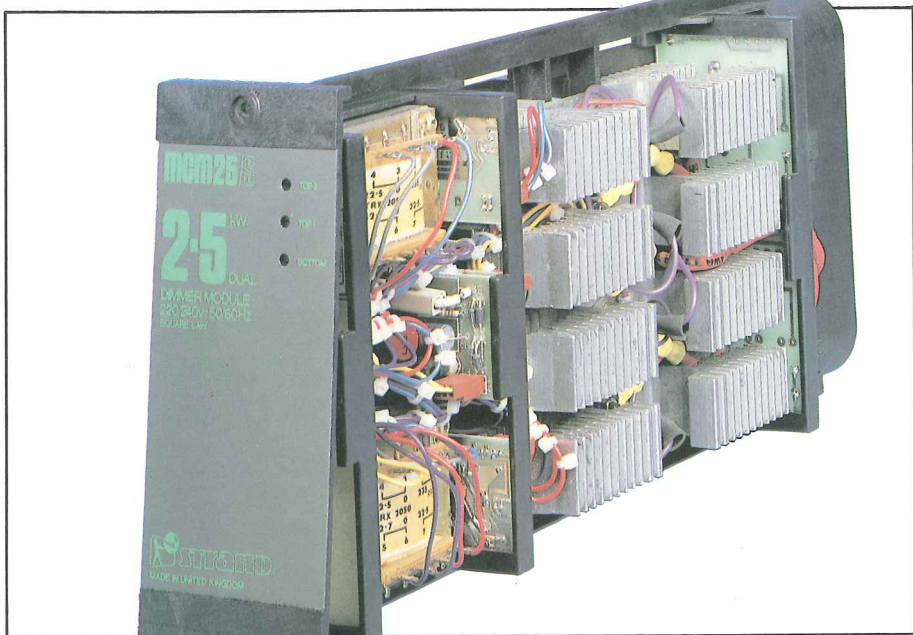




# MCM Dimmer Modules and Non-Dim Modules

Each module contains either one 5kW, or two 2.5kW max. dimmers; 10kW max. dimmers are double module width. The principal performance features of these modules, and the available variations of 'dimmer law' are summarised in the table opposite. Also available are MCM 25 ND dual 2.5kW, and

MCM 50 ND 5kW, Non-Dim modules incorporating contactors energised by a dimmer control signal. Non-Dim modules may be interchanged with dimmer modules (of the same power rating) as required. Blank modules are also available to fill any unused crate spaces.



## Construction

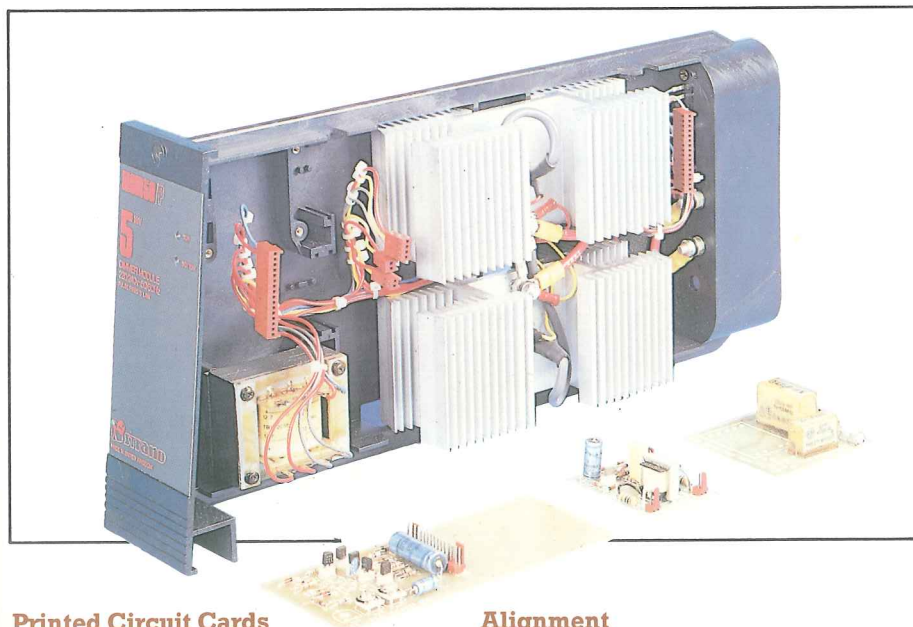
Each module chassis is a one piece injection moulding manufactured from self-extinguishing grade Noryl SE.1 which has high impact strength and a UL94 rating of V1. The all-insulated chassis incorporates a faceplate with integral handle, top and bottom mounting runners and shrouded power and control signal connection pins. Handle, runners and deep shroud combine to ensure positive location with ease of insertion or withdrawal. A captive screw in the faceplate prevents transit movement and satisfies any requirement for tool-only access.

## Connection Pins

Any dimmer module can be withdrawn or inserted on-load. Power and control signal connections are at the rear of each module and are fully shrouded to prevent mechanical damage. Solid power connection pins are size and position coded to differentiate the various ratings available and to ensure the appropriate close excess-current protection.

## Thyristors

A pair of Thyristors for each dimmer are fully tungsten-surge rated and mounted on generous finned heatsinks.



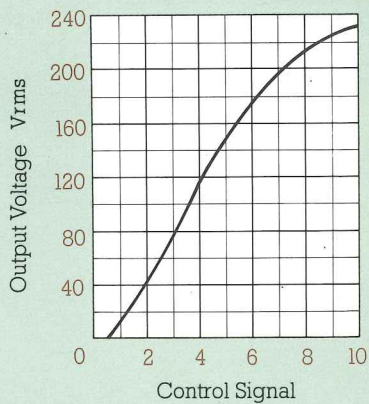
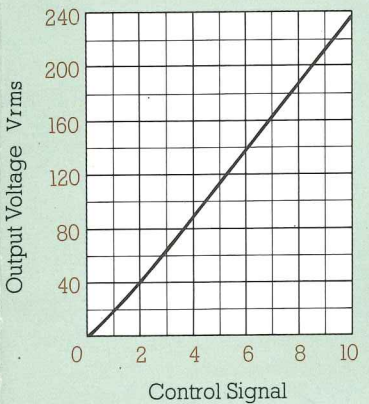
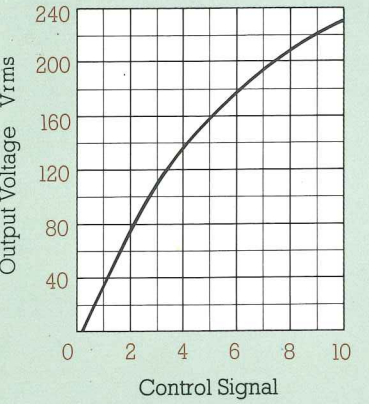
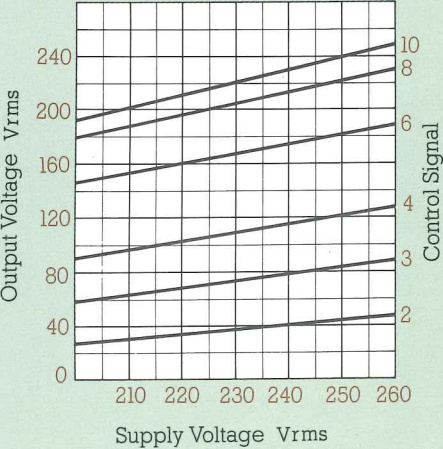
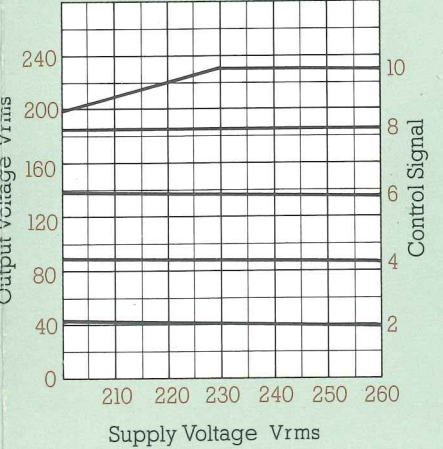
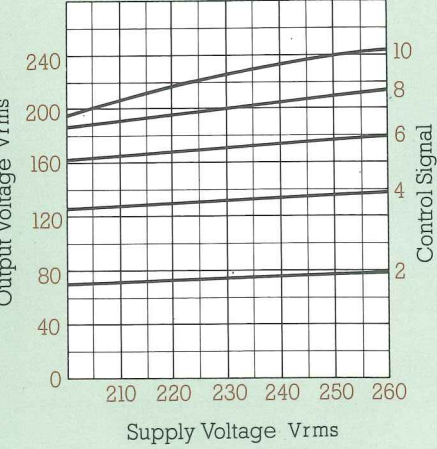
## Printed Circuit Cards

'S' law, 'Linear' law or 'Square' law trigger cards (see opposite), separate Thyristor-drive, and R.F.I. suppression, cards all have 1.6mm thick glass fibre base, FR4 grade, with roller tinned track. These are retained in moulded-in guides by snap-fit clips also moulded from Noryl SE.1. For fast maintenance access all connections are by press-on connectors.

## Alignment

Any adjustments necessary to internal settings on the trigger card can be made safely with power on, through the front faceplate of each module.



	S Law	Linear Law	Square Law
Ratings max/min	MCM 25 S 2 × 2.5kW/25W MCM 50 S 5kW/25W MCM 100 S 10kW/25W	MCM 25 CL 2 × 2.5kW/25W MCM 50 CL 5kW/25W MCM 100 CL 10kW/25W	MCM 25 CS 2 × 2.5kW/25W MCM 50 CS 5kW/25W MCM 100 CS 10kW/25W
	Tungsten lamp load(s) at, or up to 10% below, line voltage, or transformer-fed lamps		
Line Voltage	220–240V ± 10%	220–240V ± 10%	220–240V ± 10%
Line Frequency	45–65Hz	45–65Hz	45–65Hz
Output Voltage	Continuously variable between zero and 5V below line voltage		
R.F.I. Suppression	To BS.800 Part 3, VDE 0875, 7.71 grade N for supply terminal and grade G for load terminal		
Efficiency	Greater than 98%	Greater than 98%	Greater than 98%
Risetime (filter in crate)	Greater than 1mS at rated full load and at 90° conduction angle		
Control Voltage	–10V via 10k ohm resistor and silicon diode = Full; OV = off (or to special order)		
Control Current	2mA max.	2mA max.	2mA max.
Response Time	Virtually instantaneous – thermal lag of tungsten filament lamp loads more significant		
Dimmer Law	<p>'S' law transfer; near-linear between control voltage and conduction angle.</p> 	<p>Linear transfer between control voltage and output voltage.</p> 	<p>Square law transfer between control voltage and light output.</p> 
Alignment (front access)	Top and Bottom set to determine limits of output.	Top set only determines max output voltage. Automatic Bottom set.	Top set only determines max output voltage. Automatic Bottom set.
Temperature Range	0°–55°C (35°C maximum input to rack fan)		
Temperature Stability	Output voltage variation over 40°C excursion typically 2V, maximum 5V		
Thyristor Firing	Hard-fired, 4kV insulated opto-isolator coupling		
Output Stabilisation	<p>Open-loop, output varies with supply fluctuation.</p> 	<p>Closed-loop, output voltage near-constant.</p> 	<p>Closed-loop, output voltage near-constant.</p> 

Quotations

To prepare a quotation for MCM equipment Strand need to know the following:-

Full height 5-crate racks (total of 150kW max) or 3-crate reduced-height racks (total of 90kW max)?

Reyrolle or Neozed excess-current protection?

Type of dimmer law required  
.../S S law, open loop?  
or .../CL Linear law, closed loop?  
or .../CS Square law, closed loop?

Number of dual 2.5kW dimmer modules?  
Number of dual 2.5kW non-dim modules?  
Preferably totalling a multiple of 6 (12 channels)

Number of 5kW dimmer modules?  
Number of 5kW non-dim modules?  
Preferably totalling a multiple of 6

Number of 10kW dimmer modules?  
Preferably totalling a multiple of 3

Unless otherwise requested, and detailed, Strand will quote best-value crate combinations and will include any necessary crate blanks and/or blank modules, with dimmers wired in pairs to sequential phases (AA, BB, CC, etc.).

Caution

When installing wiring from dimmer racks, normal precautions should be taken to avoid interference from chopped waveform radiation.

Control Cables

Each MCM dimmer channel requires an individual control signal wire, with a common return wire for a group of dimmers. These wires, usually in the form of multicore cables, must be rated for the insulation required by local electrical regulations but are only required to carry 2mA per core at 10v. However, if they are run adjacent to other cables at higher voltage then full voltage insulation must be specified. Strand can supply a range of suitable multicore cables for these purposes.

When a Strand Control Desk is being provided at the same time as the dimmers, the company offer a manufacturing service for multicore cables terminated in the correct plugs to meet the situation.

The Company reserves the right to make any variation in design or construction to the equipment described.

Strand are Electrical Contractors and are always pleased to quote for installation of any electrical equipment on a world-wide basis.



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