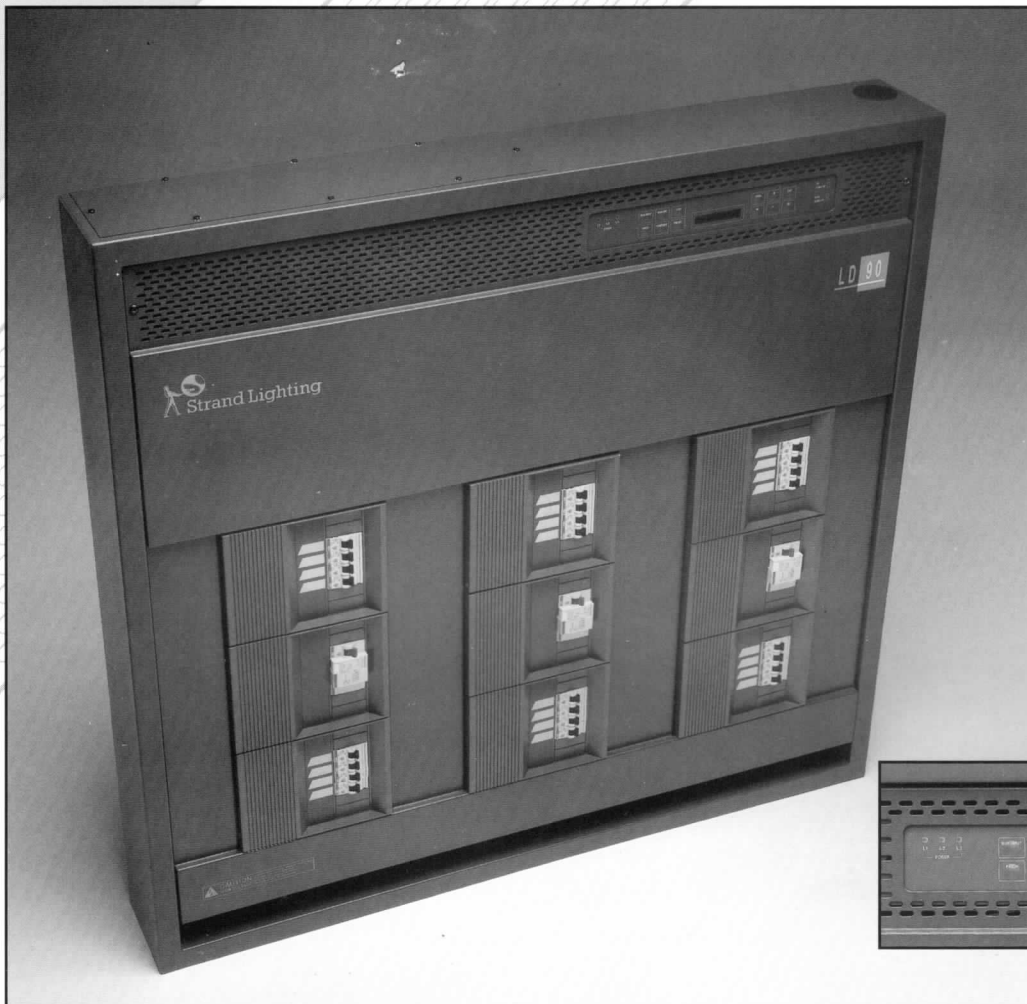


LD90 DIGITAL DIMMING SYSTEM



LD90 is a digital dimmer system designed specifically for entertainment and architectural lighting. Dimmer blocks of varying wattages and capabilities may be included in the LD90 rack, offering a large number of features.

The LD90 offers a large number of user selectable features, controlled from the keypad.

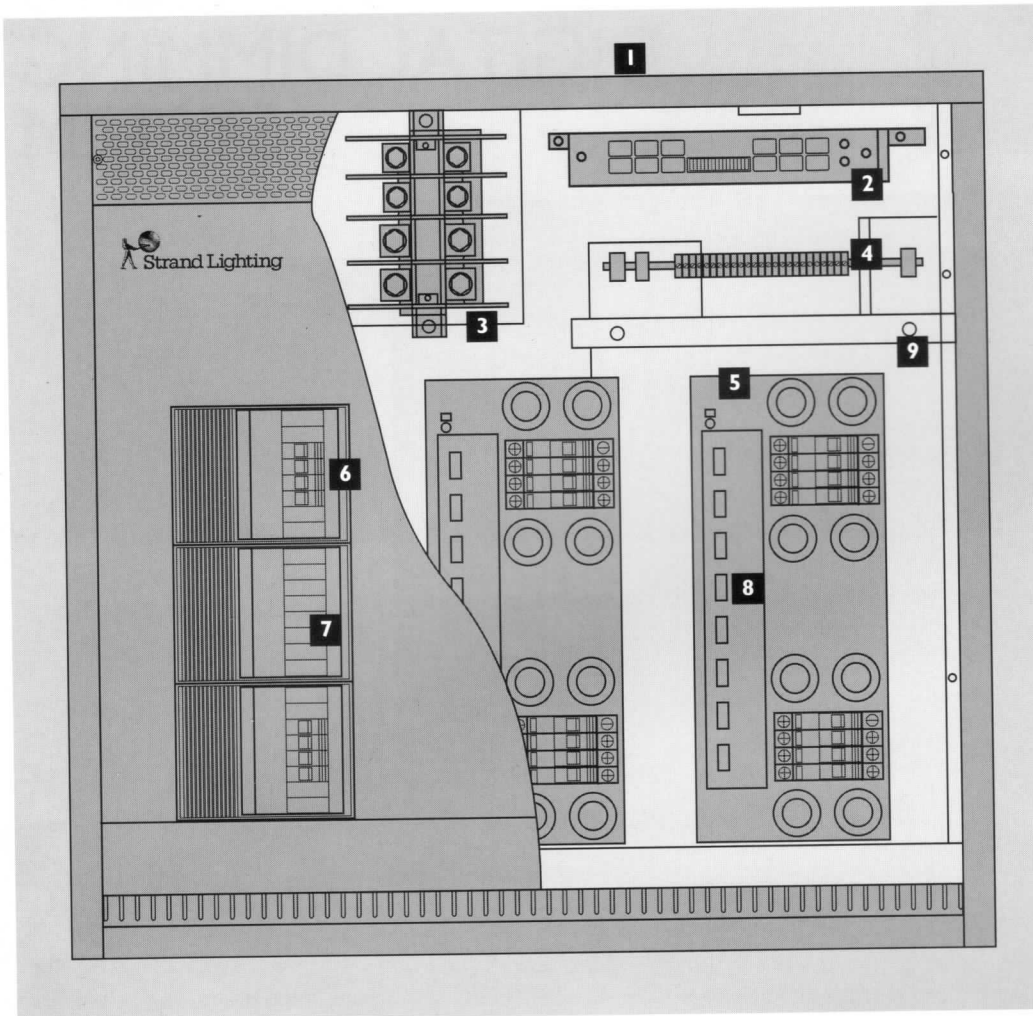
The LD90 supports System Wide Control from an optional hand held programming unit or from the SV90 dimmer supervisor PC program.

- All digital system with analogue signal input and output capability
- 2000 step fade resolution at 50Hz voltage input - eight times smoother than DMX
- System Wide Control (SWC) by handheld SWC Programmer or PC
- 99 Programmable preset memories on a rack or SWC basis

- Multiplex and analogue control input as standard
- Second DMX control input option
- Many programmable features per dimmer
- Fluorescent control modes
- Convection cooled -no fans- quiet and maintenance free
- Easy installation and service access
- Complies with mandatory European Safety and EMC regulations
- Earth leakage breaker (RCD) option
- Data security - setup data can be stored on a personal computer

LD 90

A Guide to the LD90



- 1 Rack
- 2 Processor Unit
- 3 Mains Input Terminations
- 4 Earth bus bar
- 5 Power block
- 6 Miniature Circuit Breakers (MCB)
- 7 Position for optional RCD
- 8 Dimmer load Terminations
- 9 35mm x 7.5mm Top Hat (DIN) Rail

Why Digital Dimming ?

Price - with fewer components, the cost of the dimmer reduces.

Reliability - since the number of electronic components are reduced.

Accuracy - exact control of levels is guaranteed again and again for duration of the life of the dimmer.

Regulation - keep your light output constant while your mains power supply may vary.

Adaptability - your life line - with a dimmer that will not let you down in the future when, who knows what demands are made on your lighting system!

Rack Specifications

● **Construction** The LD90 consists of a welded metal rack enclosure with positions for three power blocks and one processor unit. The power blocks are available in a number of wattages and MCB versions. The racks may be wall or floor mounted, and may be placed side-by-side, back-to back, or one above the other, provided installation instructions are followed.

● **Connections** Power and control wiring access is by removing the rack front panel. Load and power input cable entry is through one large gland plate on the top left hand side of the rack. Control wiring entry is on the top right hand side of the rack. Power live and neutral input cables are connected to a three phase terminal. Earth input and load earth cables are terminated on a common earth bus bar. Load live and neutral cables are terminated on the power blocks. The control signals are terminated on two-part connectors on the processor unit. Auxiliary equipment may be attached to an internal 35 x 7.5mm top hat rail (DIN rail), or to contractor supplied plates attached to fixing screw holes provided.

● **Cooling** The enclosure is convection cooled and does not require fan cooling under normal operating conditions. Ventilation grilles at the top and bottom of the front panel must be kept clear at all times during operation.

● **Power Rating** Input power supply is three or one-phase live plus neutral and earth, with a maximum of 100 Amps per phase in three phase operation, or 300 A in one phase operation, at 50/60Hz. The dimmer is functional with a power supply voltage between an absolute minimum of 90V and an absolute maximum of 270V. Dimmer racks are supplied with wiring for star power supplies, but may be ordered wired for delta power supply operation after consultation with Strand Lighting.

● **Protection Devices** Each dimmer output circuit is protected by a thermo-magnetic breaker. MCBs used may be Single Pole (SP), Single Pole with Neutral switch (SPN) or Double Pole (DP). The MCB rated fault currents are 10,000A, excepting the SPN breakers that are rated at 3,000A.

Rack Specifications continued

● **Phasing** The dimmer rack is designed to accept one or three phases, and may be re-phased in groups of 8 (for 2.5kW blocks) or groups of 4 (for 5kW blocks). Dimmer phase numbering can be arranged in three user selectable phase layouts based on; (i) incrementing dimmer number by power block; (ii) incrementing dimmer number by alternate phases by dimmer power, and; (iii) incrementing dimmer number by alternate phases only.

● **Control Input** LD90 accepts the following multiplex protocols; DMX512(1990), SMX, or D54. LD90 will also accept 26 analogue (+/-10V) signals on a highest level takes precedence (HTP) basis with other inputs as standard. An optional second DMX 512 input may be fitted on a HTP basis. Internally stored presets may be active simultaneously with any of the above control inputs on a HTP basis. Dimmer levels may also be controlled with the "set" command from the rack keypad, the System Wide Control (SWC) programmer or from the SV90 dimmer supervisor PC program.

● **Control Output** LD90 provides the facility to control two extra +10V analogue outputs for auxiliary equipment such as additional dimmers. These may be controlled as a logical dimmer number by any control input. These outputs are assigned to two of the analogue inputs and may be patched to either or both of the available multiplex inputs and may, additionally, be controlled by the internal presets, the SWC programmer and by the SV90 dimmer supervisor PC program.

● **User interface** Each rack has a display and keyboard area from which the rack can be programmed and the rack status can be determined. The display is a 16 character, one line liquid crystal display (LCD) unit. Programming facilities are available after entering relevant security codes. There are a number of LED indicators showing; presence of phases 1, 2 and 3, A-mux OK, processor OK, Over temperature, B-mux fitted and OK and B-mux OK. A SWC programmer is available to set dimmer levels, program presets and preset fade times and to play back selected presets. The SV90 dimmer supervisor program is available to enable system setup on a SWC basis, to view rack status on a SWC basis and to store setup data for security purposes. Either the programmer or the SV90 may be used at one time.

Programmable features per rack

- 99 programmable presets
- Preset mode selection on failure of mux inputs; hold forever or fade to preset x
- English, French or German language
- Calibration of +/-10V analogue control input signals for signal matching
- Calibration of D-54 analogue mux signal
- Calibration of the two +10V analogue out signals for aux dimmers

Programmable features per mux input

- Rack start address
- Individual dimmer patch

Programmable features per dimmer

- Set dimmer level to 0% (disable), xx% or INPUT
- Maximum output voltage setting
- Set minimum level 0-25%
- Non-dim programming at any trigger level
- Fast, standard and slow dimmer response times
- Linear power, square or s-law selection
- Fluorescent mode with programmable top set and bottom cut-off points
- Selectable electronic ballast "kick-start" mode
- Five character dimmer identification field for use with SV90, SWC, or geographic numbering schemes.

Power Block Specifications

● **Construction** The power blocks are single phase units mounted on an aluminium extrusion acting as heatsink and as a mounting base for the dimmer power circuits. The extrusion provides fixing for MCBs, RCDs, auxiliary DIN equipment, chokes, firing devices and suppression circuits. The extrusion also acts as the fixing point for the moulded covers through which the MCBs and optional RCDs protrude for access when the front panel is in place.

● **Connections** Live and neutral power supply cables run from the rack input terminals to each module. Live and neutral dimmer load cables are connected directly onto the module by compression screw terminals. There are two pairs of terminals for each dimmer allowing parallel circuits to be wired without the need to share terminals.

Power Ratings

The blocks are available in the following variants:

- 8 x 2.5kW with Single Pole MCB
- 8 x 2.5kW with Single Pole MCB and Neutral Disconnect Terminals (NDT)
- 8 x 2.5kW with Single Pole Neutral Switch (SPN) MCB.
- 4 x 5kW with Single Pole MCB
- 4 x 5kW with Double Pole MCB

There is an additional blanking/custom block without any dimmers, enabling auxiliary equipment to be mounted on up to 24 blank DIN unit positions for contractors use, eg. for branch breakers.

An optional RCD (earth leakage breaker) may be fitted onto each power block. The RCD has a trip threshold of 30mA.

● **Power Filter** The LD90 rack and dimmer power and radio frequency filtering circuits conform to newly legislated European standards on Electro Magnetic Compatibility, EMC. Ripple rejection is built-in as standard. The power filter voltage rise time for both the 2.5kW and 5kW dimmers is 200 microseconds measured between 10% and 90% amplitude at 90° conduction angle at full load.

● **Patching** Each multiplex input can be programmed to have a separate mux start address. Additionally, each mux input has a separate patch, allowing any logical dimmer in the rack (power dimmers and the two analogue control outputs) to be patched to any valid DMX and SMX address and to any valid D54 address providing that the spread of D54 addresses is not greater than 52.

Optional Equipment

● **SWC programmer** The programmer is a lightweight, hand held remote control unit, consisting of a 40 button keypad and a 2 line LCD (Liquid Crystal Display) with 16 characters on each line. The programmer may be connected to a serial link that can control up to 20 LD90 dimmer racks and controls the following functions:

- Set dimmers at a level or to input
- Record preset number
- Record preset fade time
- Execute preset

● **SV90 dimmer supervisor PC program** The SV90 is a package, including an adaptor and software disc, that allows an IBM compatible PC to be connected to a serial link that can control up to 20 LD90 dimmer racks. This allows the user to:

- Set dimmer levels
- Record and play back presets
- Program dimmer setup data
- Access dimmer rack status information
- Upload and download dimmer setup data for security

● **Second mux input** This optional pcb is fitted to the processor unit. This may only be done by a qualified engineer. The pcb enables a second control DMX512 or SMX multiplex input.

● **RCD** One RCD (Residual Current Device) earth leakage breaker may be fitted to each power block, and will protect 8x 2.5kW dimmer circuits or 4 x 5kW circuits. The RCD is delivered complete with appropriate cabling to fit the central section of the power block. Three RCDs are required to protect a rack with three power blocks.

● **Single phase kit** The single phase kit consists of a linking bar which fits to the mains input terminals, allowing the rack to be run on one phase.

● **Wall bracket** The LD90 rack may be wall mounted off the floor using this bracket.

● **8 and 16 preset wall panels and remote socket panel** 8 and 16 pushbutton and XLR socket panels, delivered complete with back box intended for flush panel mounting (see dimensional drawings on the back page).

Technical Specifications

Main power input

- **Nominal Voltage:** 220/240V, 50/60Hz
- **Max current:** 100A three-phase, neutral and earth
300A single phase, neutral and earth
- **Entry:** Top gland plate, 490mm x 110mm
- **Termination:** 300A terminals for one phase and neutral are provided with M12 nuts and bolts. 100A terminals for second and third phase are provided with M8 nuts and bolts.

Control input

- **Mux A:** DMX512 (1990), SMX or D54
- **Optional mux B:** DMX512 (1990), SMX
- **Analogue:** 26 analogue inputs +/-10V, top set adjustable between 7V and 13V
- **SWC:** Hand held programmer
- **SWC:** 8 or 16 preset wall panel
- **SWC:** SV90 dimmer supervisor program

Control output

- **Outputs:** Two 0 to +10V, max 1mA outputs to allow control of auxiliary equipment

Load cables

- **2.5kW dimmers:** up to 4mm² wiring cable as standard
up to 6mm² wiring cable using supplied pin crimp terminals
- **5kW dimmers:** up to 6mm² wiring cable as standard
- **Optional:** 4 circuits x 16mm² wiring termination kit may be mounted on the internal 35 x 7.5mm (DIN) rail

Dimmer protection

- **13A Single Pole:** 10,000 A max fault current
- **25A Single Pole:** 10,000 A max fault current
- **25A Double Pole:** 10,000 A max fault current
- **13A Single Pole/neutral switch (SPN)** 3,000 A max fault current

Heat dissipation

- Maximum 2% of connected load

Safety and Electro Magnetic Compatibility (EMC)

Complies with EC directive on EMC: 89/336/EEC

- **EMC emissions:** EN50081-1, EN55014,
- **EMC immunity:** EN50082-1, IEC 1000-2-2
- **Safety:** EN60950, EN60439 Part 1 (also part 12, BS5486)
- **Ingress protection:** IP20 to EN60529

Environment

- **Operating temp:** 0 to 35°C ambient
- **Humidity:** 10% to 95% non-condensing
- **Storage temp:** -25°C to +55°C
- **Fire resistance:** Plastic materials are self-extinguishing to UL94V0

Phasing

Racks may be connected to three or one-phase supplies. Each power block is single phase only. Logical dimmer numbering can be selected in three phasing layouts

- **Phasing A:** Incremental dimmer number by power block
- **Phasing B:** Incremental dimmer number by alternate phase and by balancing phase power
- **Phasing C:** Incremental dimmer number by alternate phase only

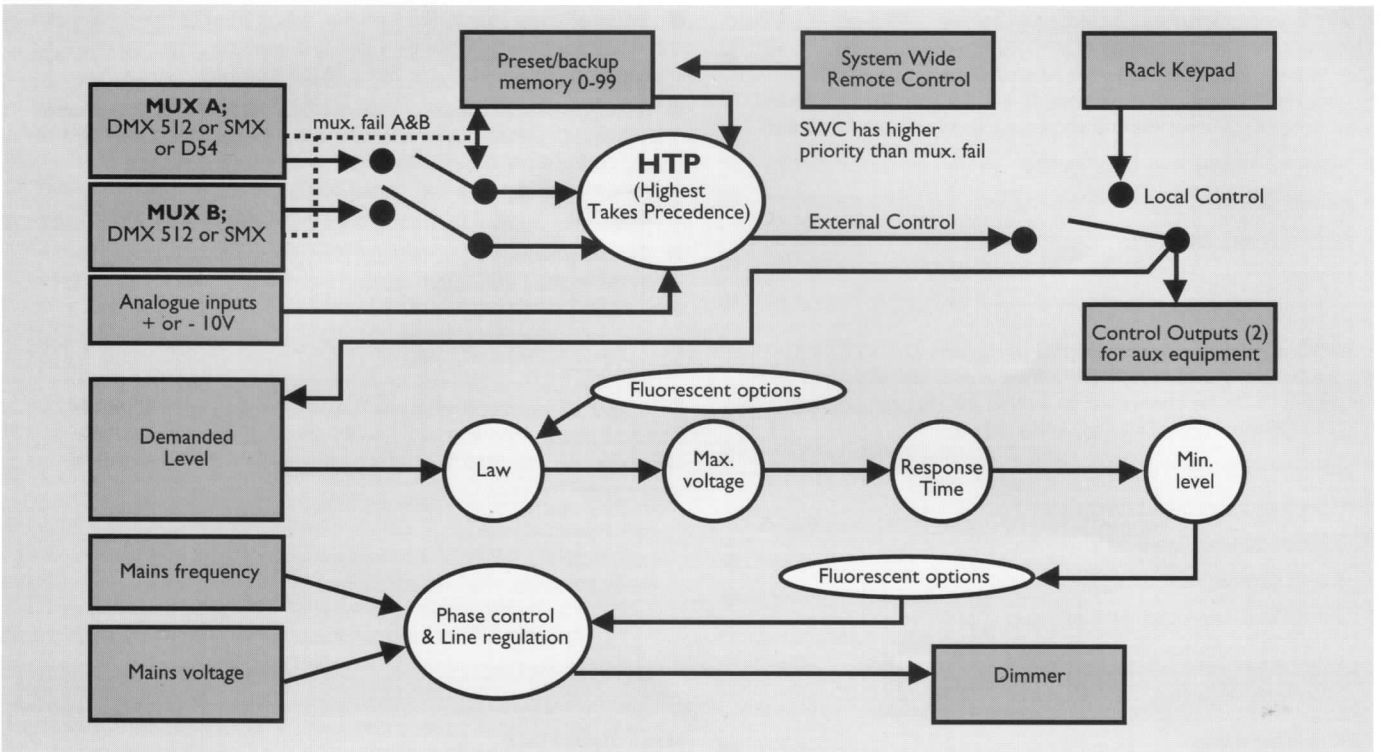
Dimensions

- **Rack:** mm 1050 wide, 995 high, 150 deep
inches 41.4 wide, 37.6 high, 5.9 deep

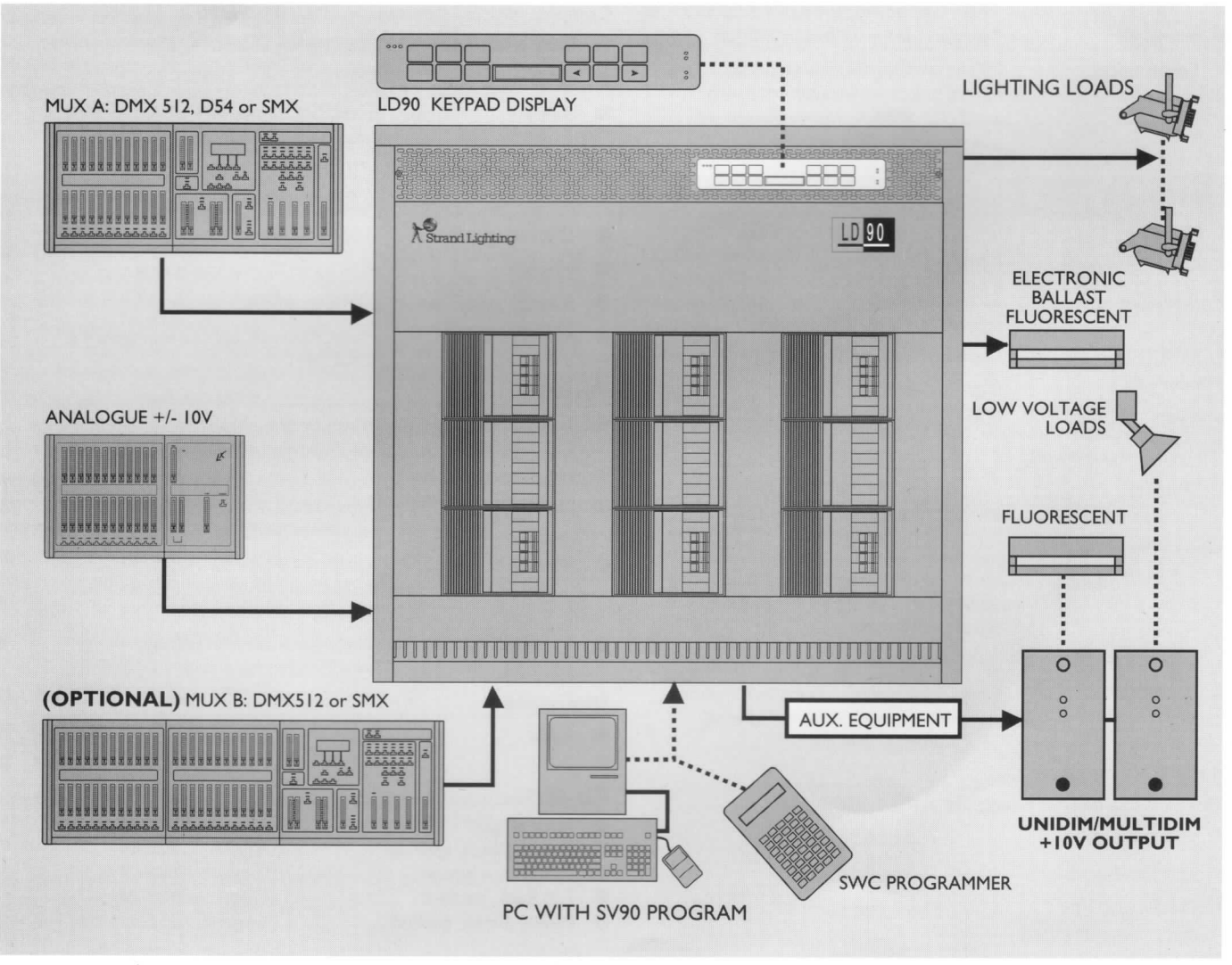
Weights

- **Rack empty:** 41.5 kg 91.5 lb
- **Power Block, approx:** 10.0 kg 22.5 lb
- **Full Rack, approx:** 76.0 kg 168.0 lb
- **Full Rack, packed:** 135.0 kg 298.0 lb
- **Power Block, packed:** 11.6 kg 25.5 lb

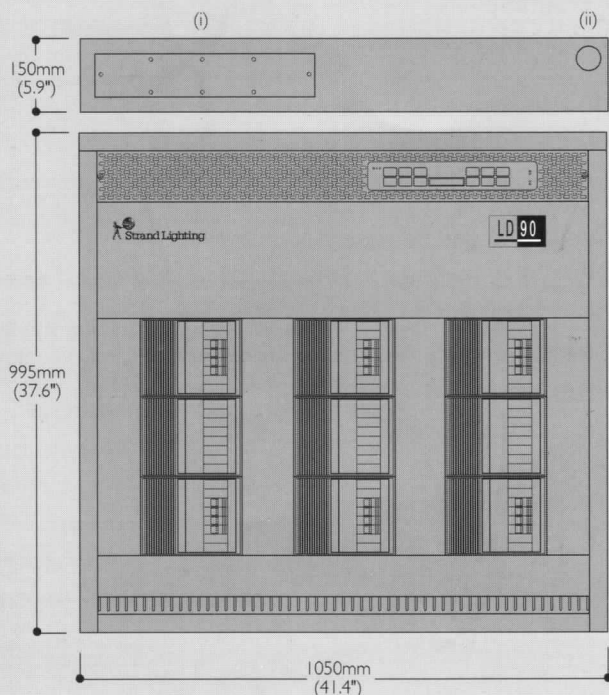
Control Path Diagram



System Configuration

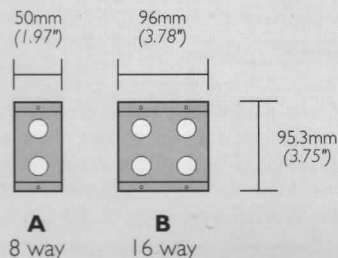


Dimensional Drawings



- (i) - Mains and load cable entry: 490mm x 110mm
- (ii) - Control cable entry: 50mm diameter

Back Box Sizes for preset wall panels (Depth : 63.5mm (2.5"))



Ordering Information

Complete dimmer racks	Item No
24 x 2.5 kW Single Pole MCB rack	05 001 02
24 x 2.5 kW Single Pole MCB and (NDT) rack	05 001 04
24 x 2.5 kW Single Pole (SPN) MCB rack	05 001 05
12 x 5 kW Single Pole MCB rack	05 001 03
12 x 5 kW Double Pole MCB rack	05 001 06
Optional Accessories	
Wall mounting bracket	05 003 14
SWC programmer remote unit*	07 001 02
2nd DMX option	05 003 09
RCD option; one per power block	05 003 10
Single phase kit	05 003 13
4 circuits x 16mm ² termination kit	05 003 12
8 preset pushbutton panel, flush mounting*	05 003 15
16 preset pushbutton panel, flush mounting*	05 003 16
SWC remote socket box*	05 003 20

System building blocks Power Blocks of different ratings and capabilities may be mixed in one rack. Strand Lighting recommend that you contact your Strand Distributor for advice on mixed rack configurations.

System Building Blocks	Item No
Empty rack with processor unit	05 001 01
8 x 2.5 kW Single Pole MCB Power Block	05 002 03
8 x 2.5 kW Single Pole MCB and (NDT) Power Block	05 002 04
8 x 2.5 kW Single Pole (SPN) MCB Power Block	05 002 06
4 x 5 kW Single Pole MCB Power Block	05 002 05
4 x 5 kW Double Pole MCB Power Block	05 002 07
Blanking/Custom block	05 002 08

(* available mid 1993 onwards)

The company reserves the right to make any variation in design or construction to the equipment described.
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Strand Lighting is a company within the Film and Television Division of The Rank Organisation plc, United Kingdom



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