

ARRI[®]

LIGHTING

SmartRack

Digital dimming systems for
permanent
installation
or touring



-  All-new, all-digital design
-  Highly accurate regulation scheme
-  Compact wall-mounting enclosure
-  Optional plug-in modular version
-  2.5kW, 5kW and 10kW ratings
-  Standard or high risetime choke options
-  DMX512 (1990) as standard
-  Circuit breaker protection as standard
-  Optional RCD protection
-  Optional main circuit breaker
-  Test and diagnostic features
-  Individual curve and response settings

ARRI SmartRack is a family of all-digital dimmer racks, fully covering the requirements of professional theatre, television, touring and architectural lighting.

The SmartRack system comprises a menu of options which may be configured to suit a vast number of dimming applications. SmartRack is very compact, and may be wall-mounted three high, for really effective packing densities, or flightcased for the road. Dimmers may be optionally supplied as plug-in modules, and a range of choke ratings is available to suit the needs of every application.

And SmartRack is smart! Aside from being an extremely accurate and dependable digital dimmer, SmartRack allows you to select response speeds and curves, non-dims and hot-patch settings, as well as a full range of test and diagnostic features.

SmartRack – the digital solution

The ARRI engineering team had the task of creating a fully digital dimmer which would meet the toughest television specifications – and could be afforded by the local community hall. The solution was SmartRack.

SmartRack is an entirely new concept in entertainment dimming – you specify the style of dimming you want, and we put it together for you using SmartRack's wide range of power section options.

Starting with a simple wall-mounting enclosure, containing SmartRack's electronic 'brain', up to three power assemblies may then be fitted. Each power assembly can be either 12 x 2.5kW, 6 x 5kW or 3 x 10kW, and may be equipped with standard or high risetime chokes, depending on individual requirements. The power assemblies may optionally be provided with plug-in dimmer modules; either quad 2.5kW, dual 5kW or single 10kW. Any combination of power assemblies may be installed in the same rack, and RCD protection may be specified for each power assembly as a factory fitted option.

SmartRack is small and neat – only 85cm wide, 65cm high and 30cm deep. SmartRack is normally fixed to a wall, and may be stacked up to three high, to make up a column of up to 108 dimmers, less than 2m high. SmartRacks may also be fixed back to back in an island formation, or mounted in flightcases, for touring and outside broadcasts.

Installation is simplicity itself, with all access from the front, and wiring from above or below. With ample wiring space and integral cable ways, SmartRack's modular design significantly reduces installation costs.

SmartRack smarts

The heart of the system is an entirely new digital control card, capable of processing up to 36 dimmers on one, two or three phases. Using robust microprocessors developed for the hostile environment of

racing car engine management systems, SmartRack constantly calculates dimmer levels at very high speed, continuously adjusting for mains voltage fluctuations, to keep your lighting rock steady, even on soft mains supplies or generators.

The SmartRack control panel, which is protected by a simple access code, allows the user to set and display the start address of the rack, and to raise individual dimmers to levels for test purposes. It also includes a range of diagnostic indicators and controls to set the basic parameters of the rack.

A choice of twelve different transfer curves may be selected for each dimmer, including non-dims and hot patch. Response speed may be adjusted between 30ms and 500ms, to meet varied requirements for different types of load. In addition, an 'offline' service mode is provided for maintenance purposes, and to set the reference voltage to be used for full output.

SmartRack stays cool...

SmartRack is designed for cool operation and easy thermal management in situ, with air intake and exhaust vents both on the front panel.

Each power assembly is fitted with an ultra-quiet brushless dc fan, computer controlled to provide cooling only when required. In the event of an uncomfortable rise in temperature, SmartRack warns the user by way of an indicator led that things are getting hot. Should any part of the rack overheat, the processor simply closes down the affected channels

until normal temperature has been regained. The temperature warning leds may be remotored out to a control room panel, for easy monitoring.



Left: SmartRack plug-in Quad 2.5kW Dimmer Module, showing led indicators for the control level of each dimmer. Modules are mechanically keyed to prevent insertion into positions of the wrong rating.

Above: Modular SmartRack, using one 12 x 2.5kW, one 6 x 5kW and one 3 x 10kW power assembly, with plug-in dimmer modules. Note the optional main circuit breaker fitted above the control panel.

Protection

SmartRack is fitted as standard with high quality miniature circuit breakers, to protect power circuitry and load cabling. In addition, RCD (Residual Current Device) protection may be specified, to protect people and reduce fire risk from faulty wiring and lights. Each SmartRack may optionally be fitted with a four-pole 125 or 160 amp circuit breaker, to isolate the rack and protect feeder cables.

Whatever the task, for broadcast, touring, opera or a hotel ballroom, ARRI SmartRack provides the elegant digital solution.



SmartRack to go – any SmartRack may be easily flightcased for top quality dimming on the road and for outside broadcasts.

The following outline specification of the ARRI SmartRack gives an indication of the power and scope of the system. For a more detailed specification, please contact ARRI (GB) Ltd or your authorised dealer.

Physical Characteristics

Each SmartRack shall be a steel enclosure, 85cmW x 65cmH x 30cmD, with hinged front door, supporting the control electronics and operator interface for up to 36 dimmers. Enclosures may be supplied to accept either basic or plug-in-modular dimmer power assemblies (see below). The enclosure shall be finished with a hard-wearing textured epoxy powder coating.

Each SmartRack may contain up to three power assemblies, which are supplied separately and installed on site. Power assemblies are available in the following ratings:

- 12 x 2.5kW @ 230Vac $\pm 12.5\%$
- 6 x 5kW @ 230Vac $\pm 12.5\%$
- 3 x 10kW @ 230Vac $\pm 12.5\%$

Power assemblies may be specified with any of the following options:

- Basic or modular construction
- Standard or high risetime chokes
- Residual Current Device (RCD) — three phase systems only

Any combination of power ratings may be mixed in a single SmartRack, but basic and modular power assemblies may not be combined in the same enclosure. Unused power assembly positions must be fitted with a power assembly blanking plate.

Each SmartRack may optionally be factory fitted with a 125amp or 160amp 4-pole circuit breaker on the incoming feeder lines, with 25kA fault current rating. SmartRacks are intended for wall mounting, and may be stacked up to three racks high (overall height 195cm). Racks may alternatively be mounted back-to-back, or in mobile flight cases.

Electrical

SmartRacks shall normally operate on four wire single, two or three phase supplies at 230Vac $\pm 12.5\%$ per phase. Delta systems shall be available to special order. A good quality appropriately rated earth connection is essential.

Each dimmer outlet shall be protected against overcurrent by a single pole miniature circuit breaker (MCB) rated at 6kA rupture capacity and for 415Vac. MCBs with higher fault current rating, double pole and neutral disconnect MCBs may be supplied to special order.

The power devices shall be generously overrated solid state switching devices, assembled in sealed modules, as follows:

- 2.5kW Quad 40amp device
- 5kW Dual 40amp device
- 10kW Single 75amp device

These power devices shall be affixed to large extruded aluminium heatsinks fitted to the power assembly (basic) or the dimmer module (modular version).

Plug-in dimmer modules shall each contain one power device, and one led indicator per dimmer, which shall

fade to give a visual indication of the dimmer's current level. Connectors shall mate in the sequence: Earth then power/load then control, and break in the opposite sequence. Module construction shall be of plated steel, with a plastic front panel.

Filtering and Interference

At full rated load the dimmer's insertion loss shall not exceed 5Vrms. At any control setting and with full rated load, the DC content of the output waveform shall not exceed ± 1 Vdc.

The risetime of a dimmer's current waveform shall be controlled by one or more chokes in the power train. At full rated load and at 90° firing angle the risetime of the output current from 10% to 90% shall not be less than 200 μ s (standard choke) or 400 μ s (high risetime choke). Higher risetime versions are available to special order.

Standard risetime chokes shall achieve BBC304 interference specification for 2.5kW dimmers, and high risetime chokes shall achieve the same standard for 5kW and 10kW dimmers.

RFI performance shall meet or exceed the requirements of EN55014: 1987.

SmartRack control electronics shall be immune to disturbance by 20Vpp signals at frequencies above 10kHz. An optional ripple rejection board shall be available to offer immunity down to 183Hz.

Rack Control

The control electronics shall be mounted on a single pcb, mounted on the inside of the rack door. A separate operator interface pcb, with controls and indicators accessible through the front panel, shall be provided to allow the user to configure and test the SmartRack.

The control electronics shall function correctly even if one or more phases of a multi-phase supply are absent. The control electronics shall be protected by fuses accessible through the front panel.

Controls, protected by a simple security procedure, shall be provided to:

- a) set the starting DMX address of the SmartRack, in the range 1—512
- b) select one of 12 preprogrammed dimmer profiles, including three non-dim and one hot-patch (always on) setting to any or all dimmers in the rack.
- c) select a response speed between 30ms and 500ms for any or all dimmers in the rack
- d) nominate a reference voltage for the 'full' output level of the dimming system.
- e) access any or all dimmers and set to a level, using a rotary potentiometer on the front panel.
- f) reset the setup values to factory defaults.

Settings shall be recorded into long-term battery supported memory.

It shall be possible to instruct the SmartRack to disregard the DMX input, for service or to isolate a block of dimmers.

A 3-digit led indicator shall normally display the start address of each SmartRack, and shall also be used to display status in setup operations.

Thermal Management

SmartRack shall function continuously at full rated load in ambient (air inlet) temperatures up to 35° Celcius.

Air inlet and exhaust vents shall be situated on the front panel, so that SmartRacks may be stacked vertically and horizontally. Air inlet filters shall be available as an option.

One 12V brushless dc fan shall be integral to each power assembly, and shall be controlled by the rack control electronics, in response to temperature readings taken from sensors adjacent to each power device.

A normally green led indicator on the front panel shall turn yellow in the event that any power device runs at a high, albeit safe, temperature. If any power device reaches an unsafe temperature, it shall be switched off, and the temperature indicator led shall flash red.

A TTL signal, echoing the function of the temperature indicator, may be taken from each SmartRack, to enable the temperature status of the dimming installation to be monitored in the control room.

Digital Control Data

SmartRack receives RS485 digital data to the standard DMX512 (1990). Passive passthrough of DMX data is provided, so that the failure or dysfunction of one or more SmartRacks in a DMX circuit shall not affect the passage of DMX data to downstream devices. The DMX line shall be optically isolated to 2.5kV.

'Good data' and 'bad data' indicators on the front panel indicate the status of current DMX input. In the event of a DMX input failure or data corruption, the 'bad data' led shall flash and the last valid levels received shall continue to be used, until valid data is resumed.

Wiring

Wiring access shall normally be via steel plates on the top and bottom surfaces. Five 12mm stud terminals shall be provided for feeder cable lugs.

Screw terminals shall be provided to terminate load wiring to power assemblies, to the following maximum cable sizes: 4mm² (2.5kW), 6mm² (5kW) and 25mm² (10kW).

Accessory kits shall be available to increase 2.5kW and 5kW terminal capacity to 10mm² and 16mm² respectively. All power terminal screws shall face forward for easy installation and retensioning.

DMX512 (1990) input/output wires terminate to screw terminals on the control pcb.

Space shall be provided for through wiring for up to two further SmartRacks above or below.

Numbering

Self-adhesive numbering strips shall be provided to label dimmers with circuit numbers.

In order to maintain the highest possible standards, ARRI (GB) Ltd reserves the right to alter specifications without notice

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