EC 90 SUPERVISOR Product Specification

Summary of Main Features

- Plug-in modular digital dimming system for mid to high specification applications.
- Two rack sizes: Large with up to 72 X 3kW, 36 X 6kW or 18 X 10kW dimmers per rack, and Small with 36 X 3kW, 18 X 6kW, 9 X 10kW dimmers per rack.
- Dual electronics option for full redundant tracking backup with selectable auto-switchover.
- 4 levels of dimmer performance are available: Standard, Standard with *Status Reporting*, High-specification, and High-specification with *Status Reporting*.
- High specification modules use hard firing thyristors to control transformer, cold cathode and very low wattage loads.
- High specification modules have 450μs filter chokes to meet BBC PID1171 (TV 304).
- All power modules have POWER ON and *proportional* OUTPUT mimic LED's. Status Reporting modules have flashing red ERROR LED indicators.
- *Status Reporting* modules (including contactors) detect: No load, Overload, Overtemp., Excess DC, Internal fault, MCB trip, Thyristor short, and Load profile errors. In addition, live status reporting of RMS output voltage and current, module temperature and DC output voltage, per dimmer.
- Reporting modules have the ability to detect a *load change*, down to 10% of dimmer's power rating detecting failure of an individual element of a paralleled load. Contactors also detect load changes.
- Reporting modules may perform Load Cable Compensation, using the programmed cable resistance (per circuit) and load characteristic to continuously compensate for voltage drop.
- A rack may contain a mixture of dimmer types including reporting and non-reporting. Rack construction is identical for reporting and non-reporting systems.
- 3kW contactor module options to switch motors, HMI ballasts and other non-dimmable equipment.
- Load status reporting to Strand 430 / 530 consoles or PC using the *Reporter™PC* software program. Reporting systems will report total rack current and voltage per phase.
- "Panic" function, to bring selected dimmers to full, operational without processor and can be actuated manually or automatically (e.g. by a fire alarm system).
- Precision line voltage regulation to minimise output changes when the supply voltage fluctuates.
- Extensive input control logic capabilities, ensuring system design flexibility and capability for future additions and upgrades.
- Opto-isolated dual Mux. inputs with individual patches provided *as standard*. Mux A is SMX/DMX512/D54/AMX192, Mux B is SMX/DMX512.
- Up to 32 analogue +/- 10V inputs per rack, patchable to any dimmer.
- 99 SWC™ memories for additional preset and backup use, using simple "snapshot" recording.
- Direct Circuit and preset control by hand-held System Wide Control (SWC™) programmer with specialised riggers functions. Control of SWC presets by 8 or 16 button stations.
- 16 room (zone) by 8 preset Outlook™ architectural lighting control for auditorium, front of house and other "zoned" uses. Up to a total of 25 Outlook and SWC stations per system.
- Library of 6 fixed and 5 downloadable dimmer curves, programmable per dimmer.
- Fully programmable thresholds for Non-dim & fluorescent curves, programmable per dimmer.
- Smooth 16 bit digital fade processing.
- Opto-isolated dry contact inputs to control SWC presets, Master/backup processor, panic set and reset.
- LED Outputs for remote Overtemp/Fanfail, Panic and Active processor (dual systems).
- 12 independent fully programmable +10V analogue signal outputs (large processor only).
- Complies with all mandatory European safety and EMC regulations.

Racks

Fully assembled, welded construction, finished in dark grey (BS4800 "Storm Grey") powder coat paint.

Two sizes: large takes 6 crates (36 single-width modules); small takes 3 crates (18 modules).
Racks may be installed side-to-side and back-to-back (front access only required).
Racks may be bolted to the floor.
Electrical contracting may be achieved through large (400 x 400mm) top plate or similar bottom plate.

Twin tangential cooling fans.
Variable or continuous fan speed control for minimum acoustic noise, and maximum fan life.
A single cooling fan failure forces the second fan to full.
Fan fail warning indicator on rack, remote console or PC, module overheat with *Reporting* modules.

3 phase neon indicators on front of rack.
Panic On/Off switch on front of rack, with panic indicator.
SWC socket on front of rack for SWC programmer.
RS232 connector on front of rack for PC configuration or operating software download.

Module removal requires use of a tool.
Processor housed in fully enclosed chassis.
Max. ambient temperature 40° C.
800ms processor hold-up time at 230V.

Dimensions	Large rack	Small rack
Height	1,964 mm (77.3")	1,162 mm (45.8")
Width	910 mm (35.8")	910 mm (35.8")
Depth	510 mm (20.1")	510 mm (20.1")

Max. Weight	Large rack	Small rack
Empty	205 kg (460 lb.)	135 kg (300 lb.)
+ Standard modules	310 kg (690 lb.)	185 kg (415 lb.)
+ High Spec. modules	370 kg (825 lb.)	215 kg (480 lb.)

Electrical

Rack power input_____220V to 240V 3 phase star, neutral + earth.
600A per phase maximum.
50Hz / 60Hz.
Bus bars rated at 50kA fault current.

Provision for optional 4-pole rack isolator.
Standard load wire terminal size $10mm^2$ for 3kW, $16mm^2$ for 6kW, and $25mm^2$ for 10kW dimmers.

Phasing

Single phase by strapping busbars, with max. current 600A per rack.
3-phase Delta to special order.
Crates are normally 3-phase, Single phase available to special order.
Most requirements for custom dimmer phasing are possible to special order.

Conforms to all mandatory European safety and EMC standards, including IEC950, EN50081, EN50082.
A rack can be supplied with most power and protection combinations.

Crates

Each row of consists of one Crate capable of housing six dual 3kW or six single 6kW or three double-width 10kW modules.
Each crate is supplied with the same circuit protection for each dimmer.
Any 3kW dimmer (including *reporting* types) can fit in any 3kW crate, any 6kW in 6kW crate etc.
RCDs may be added to crates as per the table below:

Crate	Crate type	Circuit Protection	RCD option
6 x dual 3kW	12 x 3kW, SP	Single Pole	-
	12 x 3kW, SPN	Single Pole fault detection with Neutral disconnect	yes
	12 x 3kW, DP	Double Pole	-
6 x 6kW	6 x 6kW, SP	Single Pole	-
	6 x 6kW, DP	Double Pole	yes
3 x 10kW	3 x 10kW, SP	Single Pole	-
	3 x 10kW, DP	Double Pole	yes

Power Modules

All modules have POWER ON and *proportional* OUTPUT mimic LED's.
Status Reporting modules have flashing red ERROR LED indicators.
Power modules are class 2, double insulated.
Dimmer power efficiency at least 97% at full load.
No-load loss of 3V RMS for standard 3kW dimmers.
Contactors are used for Non-Dims - not thyristors.
Modules are keyed preventing wrong type insertion.
Any 3kW dimmer (including *reporting*) can fit in any 3kW crate, any 6kW in 6kW crate etc.

Each circuit is protected by a MCB with 10,000A fault current rating.
MCBs conform to all mandatory European standards.

Power devices are Firm Fired (standard) or Hard Fired thyristors (high-specification).
DC component of output is normally less than 0.5V.
Each module shuts down automatically under an overheat condition.

Power	Firing Type	Rise Time, µs	Breaker Rating
Dual 3kW	Firm	100 µs	2 x 16 A
Dual 3kW	Hard	450 µs	2 x 16 A
6kW	Hard	450 µs	32 A
Double width 10kW	Hard	450 µs	50 A
3kW dimmer & contactor	Hard + c	450 µs	2 x 16A
3kW contactor & dimmer	c + Hard	450 µs	2 x 16A
Dual contactor	-	-	2 x 16A

Each power module is available with or without *Status Reporting* functionality.

Status Reporting module features
In addition to the above features, Status Reporting modules detect the following events:

No load	Load profile error
Overload	MCB trip
Overtemperature	Thyristor short
Excess DC	Internal fault

Status reporting dimmers also provide the live status of the following: RMS output voltage and current, module temperature and DC output voltage, per dimmer.

Status Reporting dimmers operate by "learning" the load profile over at least 100 points in the operating envelope. This gives the reporting modules the ability to detect a *load change*, down to 10% of dimmer's power rating, to detect the failure of an individual element of a paralleled load.

Reporting modules may perform Load Cable Compensation, using the programmed cable resistance (in m Ω, per circuit) and load characteristic to continuously compensate for load dependent voltage drop.

Miscellaneous Modules
Bypass module for any dual 3kW or single 6kW slot.
Blank power module
Blank processor module

Processor Module

All rack control is by one plug-in processor module, using an advanced 32MHz RISC processor and SMT technology throughout.

Programmed features held in battery-backed RAM for a minimum of 6 months.

Dual processor option for fully Redundant Tracking backup, with programmable auto-switchover. The backup processor automatically tracks the master to ensure that all programmable options are copied.

Two processor types:

Processor	Tracking backup	Max. dimmers	Max. analogue inputs	Max. analogue outputs
72-way	yes	72	32	12
36-way	no	36	16	0

Control Electronics - Specification

General
Completely digital dimmer processing.
6 button keypad to program all rack functions on processor module
2 line by 8 character back lit LCD display on processor module
Languages, user selectable:
    English
    Spanish
    French
    German
Connector on front of rack for local configuration, control *and Operating Software upgrades* using suitable PC and Reporter program
Date and time clock for dimmer event logging.

Control inputs
Dimmer control:
    Mux A: DMX512 or D54 or AMX192 or SMX
    Mux B: DMX512 or SMX
    Analogue: 72 dimmer processor and dual electronics processor: 32 inputs, +/-10V
                    36 dimmer processor: 16 inputs, +/-10V

Remote control (system-wide):

    Control of Circuits and SWC™ presets using hand held programmer unit.

    Up to 25 SWC™ 8 or 16 button preset panels to record and playback presets*.

    Outlook™ 16 room (zone) by 8 preset stations to provide integrated architectural control*.

    Windows™ based Reporter™ PC program for remote configuration and status reporting.

    Remote status reporting to Strand 430/530 console.

    *Outlook and SWC stations require 1 optional power supply per system, located in a rack.

Local control (per rack):

    Rack processor keypad and LCD display with full functionality, and optional keypad lock

    Switch for rack PANIC control

    RS232 port for local PC control:

        Rack configuration using the Reporter PC program.

        Library and backup rack set-up storage on PC, via Reporter PC program.

        Operating software upgrades via DOS PC program.

External dry contacts:

    Select main or backup processor (dual processor systems)

    Select mux A or mux B (with appropriate control logic mode)

    Set or Reset PANIC

    SWC preset 1 GO

    Next SWC preset GO

Control outputs

12 analogue +10V signals (72-way processor only).

External LED drive signals for:

    Processor Active (dual electronics systems only).

    Panic Active.

    Fan Fail/Overtemp (Overtemp for *Status Reporting* dimmers only).

Presets

99 user programmable SWC presets, plus preset 0 (blackout).

Snapshot recording of SWC presets from keypad, any remote preset panel, SWC hand held programmer or Reporter PC Program.

Individual SWC preset crossfade time recording from keypad, hand held programmer or Reporter program.

One user assignable SWC backup preset on loss of both mux inputs.

16 rooms (independent zones), each with 8 Outlook presets, plus on/off, per room.

Electrical

All signal terminations use two-part plug-in screw terminal connectors at one easily accessible point at the top of the rack, together with Panic programming DIP switches.

Loop-through connectors for easy daisy chaining signals between racks.

Status LEDs on rack front panel for:

    5V opto isolation power OK.

    Auxiliary power supply OK.

    PANIC active.

    Fan Fail/Overtemp (Overtemp for *Status Reporting* dimmers).

The following inputs are opto-isolated to 2500VAC:

    MUX A & B, when used for SMX or DMX512.

    Reporter PC.

    SWC / Digital Network (for Outlook).

    Dry contact inputs.

Control Electronics - Programmable Features

General

Programmable function on loss of both mux inputs: HOLD, or fade to a selected SWC preset after a programmable delay.

Date and time.

Slot types (Auto for Reporting dimmers).

Fan speed control - fixed or variable.

AUTO-BACKUP (dual processor systems only).

Calibration functions, factory set and password protected.

Patching

User programmable patches for Mux A and B inputs.

User programmable rack start address with following dimmers automatically sequenced.

Free format patching - any dimmer to any mux input and address for total flexibility.

User programmable 5-digit Circuit ID for sequential numbering of systems larger than 512 circuits.

Patch any analogue +/- 10V input to any circuit(s).

"Room" to channel to dimmer patch for Outlook architectural control.

Programmable dimmer characteristics

Set max. output voltage, 50V to 250V in 1V steps.

Set min. output level, 0 to 99%.

Library curves:

Square

S-curve

Linear power output

User programmable curves

Non Dim - trigger level 0 to 99%

Fluorescent - electronic ballast, with kick-start mode and programmable min. and max. voltages.

Fluorescent - magnetic ballast, with delay and programmable min. and max. voltages.

5 user defined curves via Reporter PC.

Response time

Fast (30 ms)

Normal (100 ms)

Slow (300 ms)

Dimmer status reporting enabled or disabled (Reporter modules only)

Cable Resistance in mΩ, for use with Reporting dimmers and Cable Compensation feature.

5 digit Circuit ID.

Status Reporting

Status Reporting modules "learn" the load profile upon command from the rack keypad or remotely via the Reporter PC. The whole system or individual circuits, including non-dims may be instructed to learn the connected load (25% of circuits at full max.). Load size is reported in W or kW per circuit. Status Reporting may be enabled or disabled per circuit. The types of event reported are listed above under *modules*.

Status Reporting to Strand Galaxy™

Request latest information.

PANIC function

Any of the 72 or 36 dimmer outputs and 12 analogue outputs (not on the 36 dimmer processor) may be user selected to go fully ON upon activation of the rack PANIC switch or an external switch, or failure of the processor, if programmed.

Activation is by hardware only - no processor is needed.

AUTO PANIC on processor failure (requires optional power supply)

PANIC operation forces cooling fans on at full.

Control Electronics - Performance

Fast dimmer update rate, 16 ms (60 Hz) or 20 ms (50 Hz).

Line regulation maintains dimmer output levels to within +/- 1V of set output within the range of the control electronics (220V to 240V nominal), providing that the set level is not higher than the power input voltage less the dimmer voltage loss. Line regulation acts on each individual dimmer to maintain dimmer curve parameters (set curve, max. level and min level).

Automatically compensates for frequency variations 45 Hz to 62 Hz.

Up to 8 point interpolation between DMX values to smooth console fade steps.

Processor will operate on any ONE phase.

Processor Hold-up time of 800ms at 230V input.

Reporter PC™

The Reporter program is available to run on an IBM compatible desktop or laptop PC of the following specification:

Function	Minimum PC Specification	Preferred PC Specification
Processor	Intel 486DX2™ 50	Intel Pentium™ Processor
Memory	8 Mb RAM	> 8 Mb RAM
Monitor	VGA 640 x 480 monochrome	SVGA 800 x 600 colour
Operating System	Windows™ 3.1	Windows™ 3.1 or or 3.11

General Information

The program provides a sophisticated Windows user interface to configure and report on a complete system's status. The racks are configured as a system, allowing powerful configuration of patches, Circuit ID's and other set-ups across multiple racks of differing types. Much of this information may be printed out in Report forms if hard copy is required. System set-ups may be saved and downloaded for each show.

The configuration may be prepared off-line for later downloading. A low-cost off-line editor is available.

Security

Given the power of the program, sophisticated password security is provided with several levels of privileges, providing complete freedom at the top end and "view only" at the bottom end, where no password is required.

Communications

The racks continuously communicate with Reporter PC over a bi-directional RS485 link supporting up to 20 racks per PC. An RS485 - RS232 converter is provided to connect to an unused COM port on the PC.

Live Control

The software can issue commands to the racks to record and replay SWC and Outlook presets, swap active processor from master to backup and vice-versa, and control dimmer levels directly.

Status Reporting

Status reporting is provided in two ways:

- *Scrolling historical log display.* The log may be examined, events may be deleted (depending on permission) or cleared (i.e. masked, but available for later analysis). The log has coloured bar entries giving clear indication of event priority: RED for urgent, GREEN for OK, YELLOW for important, but not show-stopping, and BLUE for internal system events. Events auto-clear if they "subside" naturally, but remain logged.

- *Geographic Event Grid.* Each dimmer may be represented by a geographically placed screen icon indicating its live status. Each icon will mimic the dimmer's current status according to the colours listed above. The geographic layout provides immediate and powerful indication of system status to the operator.

A sound card may be fitted to the PC to provide audible warning of certain events.

Reporter PC™ - Configuration

System, rack and dimmer configuration and data storage to disk.
Download or Upload on System or individual rack basis.
Dimmer type / slot assignment.
Mux, analogue control input patching.
Outlook room/channel/dimmer assignments.
Circuit ID configuration.
Max. voltage. and min. level per dimmer.
Dimmer response time.
Dimmer curve.
SWC preset recording and playback
Outlook preset recording and playback.
User curve definition.

Reporter PC™ - Standard Reporting

Dimmer level (%)
Input line voltage per phase.
Mux A or B input failure.
Fan-fail warning.

Reporter PC™ - Load Status Reporting (Reporting modules only)

System current Overload (user set warning and overload levels)
Load per dimmer (W)
Each dimmer may report:

No load	Load profile error
Overload	MCB trip
Overtemperature	Thyristor short
Excess DC	Internal fault

Live interrogation of RMS output current and voltage, module temperature and DC output level on an individual dimmer basis.

Intel486DX2 and Pentium are trademarks of Intel Corporation. Windows is a trademark of Microsoft Corporation.

Strand Lighting Ltd. reserves the right to supply any variation to the above specifications.

Product Item Number Summary

Complete Pre-configured Racks

Item no	Description	Rack size	Number of circuits	Power kW	Choke μs	Reporting
74461	EC90sv, 72 x 3kW, standard, R	large	72	3.0	100	✓
74462	EC90sv, 72 x 3kW, standard	large	72	3.0	100	
74463	EC90sv, 36 x 3kW, standard, R	small	36	3.0	100	✓
74464	EC90sv, 36 x 3kW, standard	small	36	3.0	100	
74471	EC90sv, 72x3kW, hi-spec., R	large	72	3.0	450	✓
74472	EC90sv, 72x3kW, hi-spec.	large	72	3.0	450	
74473	EC90sv, 36x3kW, hi-spec., R	small	36	3.0	450	✓
74474	EC90sv, 36x3kW, hi-spec.	small	36	3.0	450	
74481	EC90sv, 36x6kW, hi-spec., R	large	36	6.0	450	✓
74482	EC90sv, 36x6kW, hi-spec.	large	36	6.0	450	
74483	EC90sv, 18x6kW, hi-spec., R	small	18	6.0	450	✓
74484	EC90sv, 18x6kW, hi-spec.	small	18	6.0	450	

Customer Configured Racks

Item no	Description	Rack size	Max. number of dimmers	Analogue inputs	Analogue outputs
74411	Large EC90sv rack with single processor	large	72	32	12
74412	Large EC90sv rack with dual processors	large	72	32	12
74413	Small EC90sv rack with single processor	small	36	16	0
74414	Small EC90sv rack with dual processors	small	36	32	12

Crates

Item no	Description	Crate type	Dimmer power	Breaker rating A	Breaker rating V	Breaker type
74421	EC90sv Master Crate 12x3kW SP	master	12x3kW	16	230	SP
74422	EC90sv Master Crate 12x3kW SPN	master	12x3kW	16	230	DPN
74423	EC90sv Master Crate 12x3kW DP	master	12x3kW	16	230	DP
74424	EC90sv Master Crate 6x6kW SP	master	6x6kW	32	230	SP
74426	EC90sv Master Crate 6x6kW DP	master	6x6kW	32	230	DP
74427	EC90sv Master Crate, 3x10kW, SP	master	3x10kW	50	230	SP
74428	EC90sv Master Crate, 3x10kW, DP	master	3x10kW	50	230	DP
74431	EC90sv Slave Crate 12x3kW SP	slave	12x3kW	16	230	SP
74432	EC90sv Slave Crate 12x3kW SPN	slave	12x3kW	16	230	DPN
74433	EC90sv Slave Crate 12x3kW DP	slave	12x3kW	16	230	DP
74434	EC90sv Slave Crate 6x6kW SP	slave	6x6kW	32	230	SP
74436	EC90sv Slave Crate 6x6kW DP	slave	6x6kW	32	230	DP
74437	EC90sv Slave Crate, 3x10kW, SP	slave	3x10kW	50	230	SP
74438	EC90sv Slave Crate, 3x10kW, DP	slave	3x10kW	50	230	DP

74451	EC90sv Blank Crate	blank	-	-	-

Standard Dimmer Modules

Item no	Description	Power kW	Choke µs	Dimmer Firing	Status Reporting
72411	EC90sv, Type A	dual 3kW	100	std	✓
72412	EC90sv, Type B	dual 3kW	100	std	
72421	EC90sv, Type C, hi-spec.	dual 3kW	450	hard	✓
72422	EC90sv, Type D, hi-spec.	dual 3kW	450	hard	
72431	EC90sv, Type E , hi-spec.	6kW	450	hard	✓
72432	EC90sv, Type F, hi-spec.	6kW	450	hard	
72435	EC90sv, Type G, hi-spec., (double-width)	10kW	450	hard	✓
72436	EC90sv, Type H, hi-spec., (double-width)	10kW	450	hard	

Contactor / Dimmer Modules

Item no	Description	Power kW	Choke µs	Dimmer Firing	Status Reporting
72441	EC90sv, Type U, hi-spec.	3kW + c	450	hard	✓
72442	EC90sv, Type V, hi-spec.	3kW + c	450	hard	
72443	EC90sv, Type W, hi-spec.	c + 3kW	450	hard	✓
72444	EC90sv, Type X, hi-spec.	c + 3kW	450	hard	
72445	EC90sv, Type Y	2xc (3kW)			✓
72446	EC90sv, Type Z	2xc (3kW)			

Miscellaneous Modules

Item no	Description	Power kW	Choke µs	Dimmer Firing	Status Reporting
72491	EC90sv Blank Module				
72492	EC90sv Bypass module	3kW / 6kW	n/a	n/a	
72493	EC90sv Blank Processor Module				

System Accessories

Item no	Description
76411	EC90sv Mux Link Daisy-Chain Cable (1 each for Mux A, Mux B)
76412	EC90sv Comms Link Daisy-Chain Cable (1 for SWC, 1 for Outlook)
76413	EC90sv Contact I/P Daisy-Chain Cable (1 per rack)
76421	EC90sv Supplementary PSU (Supplies 25 Outlook or SWC stations)
76423	EC90sv RCD 63A 3ph kit (1 per crate)
76425	EC90sv 250A rack isolator
76426	EC90sv 400A rack isolator
76427	EC90sv 600A rack isolator