9 STAGEMAKER RADIO LOAD CELL SYSTEM

9.1 Why load monitoring on stage is so important?

Tons of equipment above people: Hanging tons of sound and lighting equipment above spectators and performers is a serious matter, especially in light of the trend of ever increasing load weight and movement.

Statically Indeterminate Structure: Each time there are more than two hoists on a truss or more than three hoists in a structure, it become *statically indeterminate*, resulting in an unpredictable load distribution. In most cases this will cause a load imbalance, in which some of the hoists may reach overload while others carry only a smart part of the load.

The visually leveled truss illusion: The belief that visually leveling a structure will automatically create an even load distribution is a dangerous misconception; no connection exists whatsoever between a visually leveled structure and one with an even load distribution . Because of the unpredictable load distribution, overload situations might happen to the most experienced riggers,

Weather conditions: This phenomenon may be exacerbated by weather effects such as strong winds or snow build-up on a roof. These conditions might reduce the overload tolerance of the structure which carries the rigging.

The solution: In order to ensure safe installations and shows, real-time load monitoring and overload detection is a must - from installation and throughout the entire show until dismantle.

9.2 Advantages of Stagemaker radio load cell system

Safety:

> Continuous load monitoring: Up to 5000 hour battery life (optional 10,000) “always on” continuous monitoring. Absolutely no sleep or stand-by modes which are not acceptable from a safety perspective as continuous monitoring is curtail to prevent overloads.
> Fatigue rated load cells: All STAGEMAKER load cells are fatigue rated, an important feature especially for fixed and long-term installations. The load cell's ability to withstand successive load cycles for long periods of time without the risk of failure or damage to the steel, affords peace of mind for the user.
> Reliable, independent data flow from each load cell: Every load cell reports data independently and directly to the Central Receiver, eliminating the danger that damage to a single load cell will affect the rest of the system's ability to function. This feature is part of both our wired and wireless systems.
> Wireless Multi-channel transmission to ensure reliable and continuous load monitoring.
> Verification mechanism: An internal safety check ensures that the displayed data is always an exact match to that being transmitted by the load cells.
> High quality materials: Including load cells made of aerospace quality, high-strength alloy steel.
> Perpendicular design: 90° between shackle holes eliminates external moment's influence and therefore increases safety and accuracy.
> Proven wireless and load cell technology since couple of decade.

Performance:

> Practically unlimited number of load cells. Up to 200 load cells per laptop monitoring station and an unlimited number of monitoring stations.
> Longer battery life: Up to 5000 hour battery life (optional 10,000) with a transmission rate of once per second.
> Longer transmission range: Up to 150 m en standad or couple of kilometer if required (optional).
> Works with any controller to provide automatic E-stop and overload/under-load alarm (visual and audible).
> Slave-Master option: For increased range, harsh conditions, and the ability to monitor several halls in one control room.
> Web server based enables load monitoring to be viewed from anywhere worldwide.
> Tablet and smart phone compatibility allows for portable browsing.
> Real time load map. All wireless and wired load cells are displayed on one laptop screen as a real-time load map, overlaid on the stage-plan layout, enabling the rigger to immediately identify the location of an overload and take swift preventative action. In addition, the set points enable immediate motor stop in case of overload occurrence
> Multiple groups: Up to 15 groups, each with its own overload setting and display.
> Continuous unlimited data logging: Downloadable data log of months of continuous measurements
> Group screen view: for viewing individual group rigging plans, each with a specific background. (Included in orders of 50 load cells and up) – option.
> Real time cellular SMS alert on overload occurrence (options)

Options:

- **Additional channels**: 2 standard channels – up to 4 optional channels (recommend for large numbers of load cells and/or harsh conditions.
- **Suitcase for storage and transportation of load cell (for 4 or 8 load cells)**

- **Set point, for integration of STAGEMAKER RADIO LOAD CELL SYSTEM system with any controller** activates E-stop and/or audio visual alarm in case of overloads or underloads.
- **Real time cellular SMS alert on overload occurrence**
- **Single wire option for the wireless receiver**
- **Slave and master STAGEMAKER Central radio receiver:** for increased range, harsh conditions, and the ability to monitor several halls in one control room
- **Group screen view:** for viewing individual group rigging plans, each with a specific background. (Included in orders of 50 load cells and up)

STAGEMAKER SR10 with shackles load cell

SRLM STAGEMAKER RADIO LOAD CELL

STAGEMAKER SR10 with integrated load cell

SRLI STAGEMAKER RADIO LOAD CELL

Model	0 kg	250 kg	500 kg	1000 kg	2000kg	Dedicated hoist
SRLM 25						Stagemaker SR2
SRLI 25						Stagemaker SR2
SRLM 50						Stagemaker SR5
SRLI 50						Stagemaker SR5
SRLM 100						Stagemaker SR10
SRLI 100						Stagemaker SR10
SRLM 200						Stagemaker SR10
SRLI 200						Stagemaker SR10

Options:

- **Additional channels**: 2 standard channels – up to 4 optional channels (recommend for large numbers of load cells and/or harsh conditions.
- **Suitcase for storage and transportation of load cell (for 4 or 8 load cells)**

- **Set point, for integration of STAGEMAKER RADIO LOAD CELL SYSTEM system with any controller** activates E-stop and/or audio visual alarm in case of overloads or underloads.
- **Real time cellular SMS alert on overload occurrence**
- **Single wire option for the wireless receiver**
- **Slave and master STAGEMAKER Central radio receiver:** for increased range, harsh conditions, and the ability to monitor several halls in one control room
- **Group screen view:** for viewing individual group rigging plans, each with a specific background. (Included in orders of 50 load cells and up)

9.4 SRLM Stagemaker radio load cell system / Description

“Designed for quick instillation and versatile use”

Technical specifications:

R.F.: 2.4 GHz range – other ranges available.
R.F. transmission range: Up to 450' /150m in normal operation conditions (outdoors line of sight). Longer transmission ranges are optional.
Safety Factor: 5:1 Standard. 10:1 and higher safety factors are available.
Safety features: Fatigue rated load cells that can withstand successive load cycles for long periods of time without the risk of failure or damage to the steel.
Proof load: 200%.
Accuracy: ± 0.1% of full range.
Capacities: SRLM with schakles: 250 kg, 500 kg, 1000kg, 2000 kg
Display: Using a laptop or PC, the operator can monitor and control the loads of up to 200 load cells per monitoring station simultaneously, having on one single screen all the relevant information derived from the load cells: Sum (group sum and total structure sum), Max, Tare, Zero, Group (LC), Overload detection, Stage-plan layout, Low battery indication etc.
Functions: Sum, Max, Tare, Zero, Group (LC), Overload detection and alert (visual and audible), Low battery indication, Reports data base, User calibration, Group functions (Sum, Max, Zero, Tare, Overload and customized overload detection), Plan/layout archiving.
Additional Features: Web server based, tablet and smart phones compatible.
Units: Selectable units feature with the following choice of measurement readings: Tons, Kgs, Lbs.
Load Cell Material: Made of high-strength, aerospace quality low alloy steel, polyurethane coated.
Power: 4 x AA ("finger") 1.5 Volt Alkaline disposable batteries rated 3AH for each load cell. Batteries will function up to 5000 hours (optional 10,000 hours). Optional 110/220 VAC operation .
Calibration: User calibration. Initial factory calibration, certified and fully traceable to NIST.
Temperature Range: Load cell: -15°F to +175°F / -25°C to+80°C.
Environmental: Weatherproof, Nema 4, IP 65. Higher sealing levels available.

9.5 SRLI Stagemaker radio load cell system Description

"Low headroom– no shackles needed"

Technical specifications:

R.F.: 2.4 GHz range – other ranges available.
R.F. transmission range: Up to 450' /150m in normal operation conditions (outdoors line of sight). Longer transmission ranges are optional.
Safety Factor: 5:1 Standard. 10:1 and higher safety factors are available.
Chain size for SRLI: load cell integrated on lifting chain

Capacity (kg)	Version	Chain	
		Diam. nm max	Pitch mm min.
250	SRLI	4	11
500	SRLI	5	14
1000	SRLI	7	20

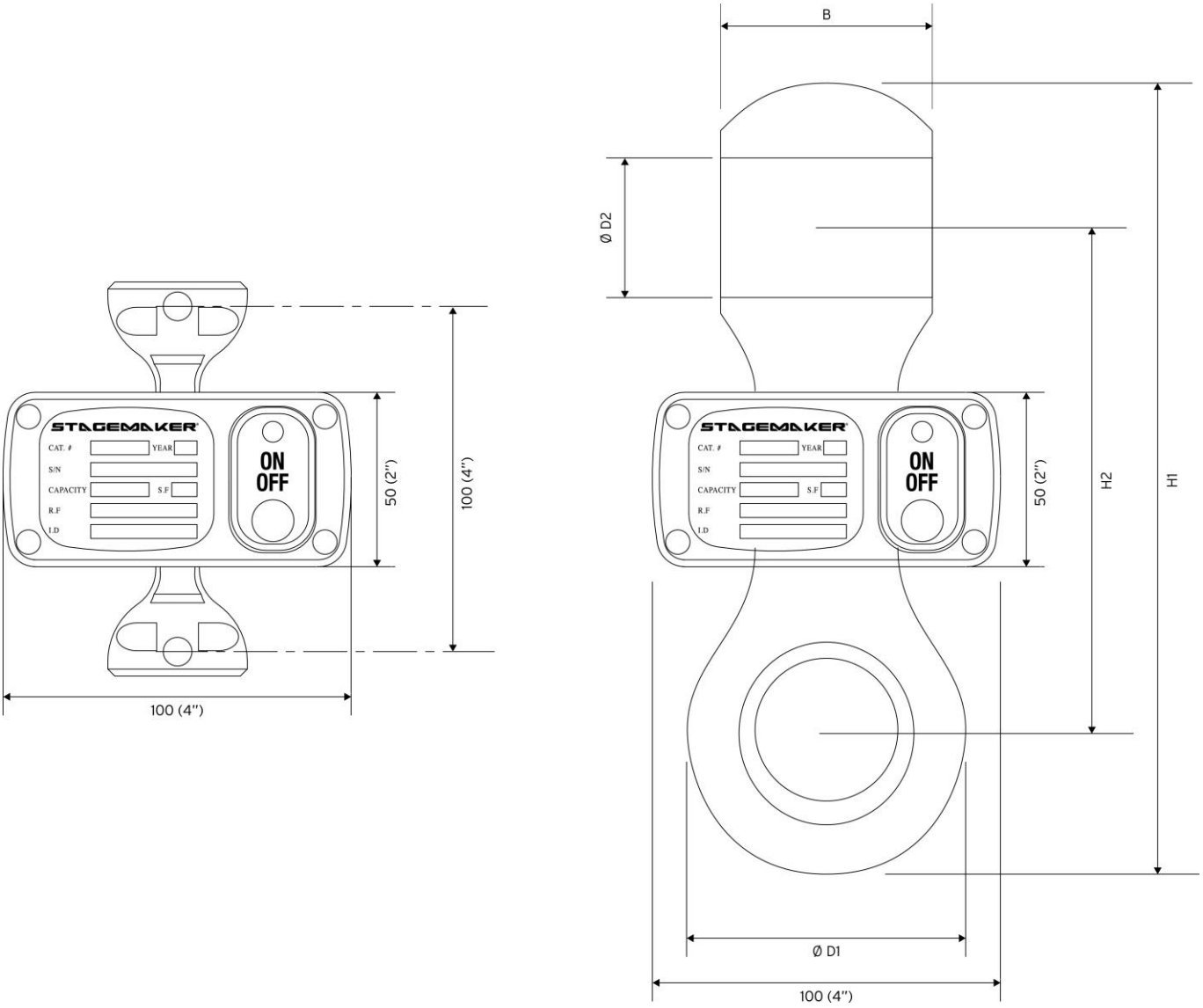
Safety features: Fatigue rated load cells that can withstand successive load cycles for long periods of time without the risk of failure or damage to the steel.
Proof load: 200%.
Accuracy: ± 0.1% of full range.
Capacities: SRLM Hoist integrated: 250 kg, 500 kg, 1000kg, 2000 kg
Display: Using a laptop or PC, the operator can monitor and control the loads of up to 200 load cells per monitoring station simultaneously, having on one single screen all the relevant information derived from the load cells: Sum (group sum and total structure sum), Max, Tare, Zero, Group (LC), Overload detection, Stage-plan layout, Low battery indication etc.
Functions: Sum, Max, Tare, Zero, Group (LC), Overload detection and alert (visual and audible), Low battery indication, Reports data base, User calibration, Group functions (Sum, Max, Zero, Tare, Overload and customized overload detection), Plan/layout archiving.
Additional Features: Web server based, tablet and smart phones compatible.
Units: Selectable units feature with the following choice of measurement readings: Tons, Kgs, Lbs.
Load Cell Material: Made of high-strength, aerospace quality low alloy steel, polyurethane coated.
Power: 4 x AA ("finger") 1.5 Volt Alkaline disposable batteries rated 3AH for each load cell. Batteries will function up to 5000 hours (optional 10,000 hours). Optional 110/220 VAC operation .
Calibration: User calibration. Initial factory calibration, certified and fully traceable to NIST.
Temperature Range: Load cell: -15°F to +175°F / -25°C to+80°C.
Environmental: Weatherproof, Nema 4, IP 65. Higher sealing levels available.

Options:

- **Additional channels**: 2 standard channels – up to 4 optional channels (recommend for large numbers of load cells and/or harsh conditions.
- **Suitcase for storage and transportation of load cell (for 4 or 8 load cells)**

- **Set point, for integration of STAGEMAKER RADIO LOAD CELL SYSTEM system with any controller** activates E-stop and/or audio visual alarm in case of overloads or underloads.
- **Real time cellular SMS alert on overload occurrence**
- **Single wire option for the wireless receiver**
- **Slave and master STAGEMAKER Central radio receiver:** for increased range, harsh conditions, and the ability to monitor several halls in one control room
- **Group screen view:** for viewing individual group rigging plans, each with a specific background. (Included in orders of 50 load cells and up)

9.6 Stagemaker radio load cell system / Dimensions



Load cell type	SWL	Safety factor	Resolution	Load Cell weight	H1 (max.)	H2 (max.)	B (max.)	D1 (max.)	D2 (min.)	Shackle Size*
	(kg)		**(kg)**	**(kg)**	**(mm)**	**(mm)**	**(mm)**	**(mm)**	**(mm)**	**inch**
SRLM25 SF5 - SRLI25 SF5	250	5	0.5	1.1	140	100	19	38	21	5/8, 1/2
SRLM25 SF10 - SRLI25 SF10	250	10	0.5	1.1	140	100	19	38	21	5/8, 1/2
SRLM50 SF5 - SRLI50 SF5	500	5	0.5	1.1	140	100	19	38	21	5/8, 1/2
SRLM50 SF10 - SRLI50 SF10	500	10	0.5	1.1	140	100	19	38	21	5/8, 1/2
SRLM100 SF5 – SRLI100 SF5	1000	5	1	1.1	140	100	19	38	21	5/8, 1/2
SRLM100 SF10 – SRLI100 SF10	1000	10	1	1.1	140	100	19	38	21	5/8, 1/2
SRLM200 SF5 – SRLI200 SF5	2000	5	2	1.1	140	100	19	38	21	5/8, 1/2
SRLM200 SF10 – SRLI200 SF10	2000	10	2	1.2	150	105	26	45	23	3/4, 5/8 **

*) Shackles not included with load cell, datas given are Recommended dimensions,

USE SHACKLES WITH S.W.L . (SAFE WORKING LOAD) EQUAL TO, OR GREATER THAN SYSTEM'S FULL RANGE.

**) *ALLOY 5 T for 10 :1 safety factor*

9.7 Stagemaker Central Radio Receiver

SYSTEM REQUIREMENTS

For Stagemaker radio load cell system optimal performance, the following are the minimum system requirements: PC or Laptop equipped with min. 256k cache, CD-ROM, USB 2.0 port, HD 40GB *, Windows (98 / Me / 2000 / XP/VISTA/Win7/Win8/Mac with Win emulator). Screen with resolution of 1024/768 **

* For using the REPORT feature (saving the data collected). The size of the HD will determine how much data (history) can be stored.
** For optimal graphic display (full screen).

DESCRIPTION

Located next to the PC, it receives the transmissions from the load cells and transfers the data to the control unit (PC) using the USB 2.0 connection.

Data Reception Indication (Blue)

PC Connection (Green)

On/Off Button (Yellow) And indication (Green)

Power Connection (Red), Illuminates when power cord in connected to the mains.

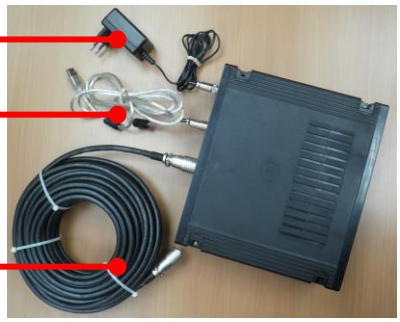
Set Point Connection (Blue)

CENTRAL RADIO RECEIVER CONNECTIONS

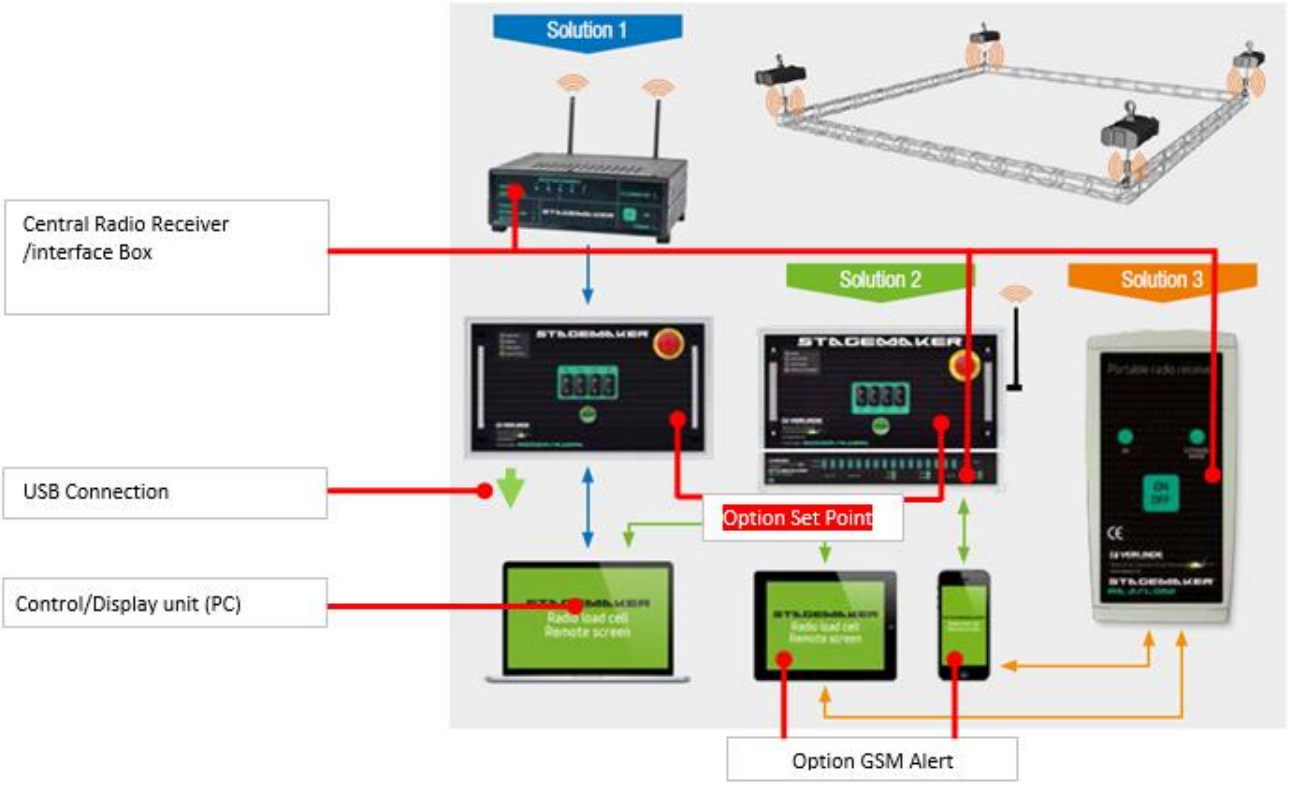
Power Supply – to the mains 85-240V -5Vcc.

USB 2.0 Connection to the PC

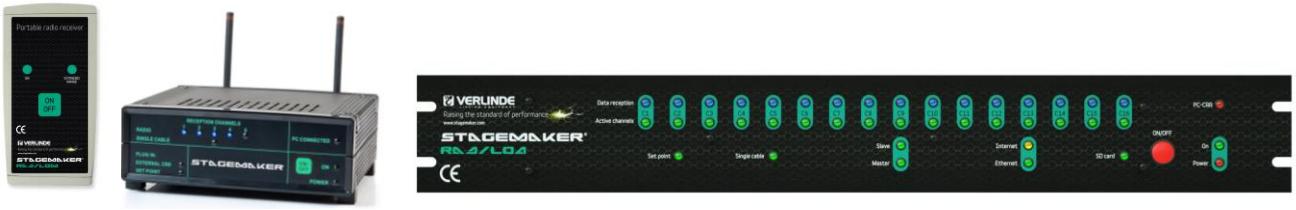
Option : Set point



CONTROL UNIT – This is essentially a PC or a laptop, which controls the data received from the CENTRAL RADIO RECEIVER, then processes and displays them on the PC or laptop screen and saves the information on the HD.



Central radio receiver	Load cell max	*Code*
Portable central Radio Receiver running with tablet or smartphone (non supply). Operating Manual.	**20**	**53420174**
Central Radio Receiver in carrying case, USB Connector, Laptop, Software, Operating Manual.	**200**	**53277419**
Central Radio Receiver in 19'' rack format 1,5U, USB Connector, Laptop, Software, Operating Manual.	**200**	**53420200**



POWER SUPPLY – The power supply unit's working range is between 85V and 240V from the mains. It is connected to the Central Radio Receiver box using a unique connector.

9.8 Options on Stagemaker radio load cell system / Description

- Set Point - This OPTIONAL feature allows the user to set and control the motors used (stop the motor/sin case of a hazardous situation). It can be applied on any kind of motor controller using a relay(interface unit – see photo below) using dry contact and a basic status of Normally Open or Normally Closed, per user requirement. The output may be applied on activation of any kind of alarm/alerting light along the motor controller stop command. Using the Rigger and the Theatre family Stagemaker controller – there is an optional direct connection from the controller to the set point interface.
- SMS Alert - This OPTIONAL feature is a remote control unit for the senior operative in charge. Used to inform the responsible person of any change/problematic status in the system installed when he absent from the installation site. Until formal update – this application does not operate in Vista OS.