



Dynamass is a range of high-performance in-motion weighing systems for rail traffic. From low to high speed, from check weighing to legal metrology standards and from locally to remotely operated systems, there is a Dynamass weighing system to match your needs.

Developed and refined wholly in South Africa since the early 1990's, Dynamass systems have enjoyed a reputation for cost effectiveness, accuracy, reliability and practicality.

The scalable nature of the technology allows you to upgrade from the most basic to the most advanced system economically and easily

The technology is fitted to the existing rail section, making rail cutting and any invasive operation such as ballast modification unnecessary. Rail traffic is left completely undisturbed during installation and maintenance. No protruding track switches are used, enhancing reliability to previously unobtainable levels



***MASSIZE-08 INSTALLION SHOWING SENSORS AND TRACKSIDE ENCLOSURE***



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## The Choices

Dynamass weighbridges are in-motion systems designed for use on either high-speed main lines, or alternatively on low speed sidings and marshalling yards.

All installations are retrofitted to existing track sections, and are comprehensively lightning protected.

**Dynamass LITE**, the most basic weighbridge, is a microprocessor based system. It is specifically designed for remote operations where buildings do not exist, and has a solar powering option. The weighing speed is up to 15 KPH, at a typical accuracy of 1 percent. A typical application is for internal auditing purposes on mines where the weighbridges are geographically dispersed, and data retrieval is achieved via GSM networks on a daily basis.

**Dynamass-2** is a 2 cell PC based weighing system that is typically used for locally operated applications, where immediate reporting and printouts are required. The weighing speed is up to 15 KPH, and the typical accuracy is 1 percent. Data communications from this weighbridge to other networks is fully supported. The processor is typically housed in a weather-proof building or container.

**Dynamass-4** is a PC based system much like Dynamass-2, but with higher accuracy and speed. It is used as either a high-speed check weighing system, or an accurate slow speed system. It is capable of check weighing to within 2 percent at 80 KPH, and 0.3 percent at speeds up to 20 KPH. Data communications from this weighbridge to other networks is fully supported. The processor is typically housed in a weather-proof building or container.

Dynamass-4 is currently under evaluation for trade metrology approval.

**Massize-08** is the flagship weighbridge, offering unsurpassed accuracy and speed performance. It is currently the only SABS trade metrology approved weighbridge that allows speeds of up to 35 KPH. The typical accuracy figure is an exacting 0.2 to 0.3 percent over the entire speed range.



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## General System Description

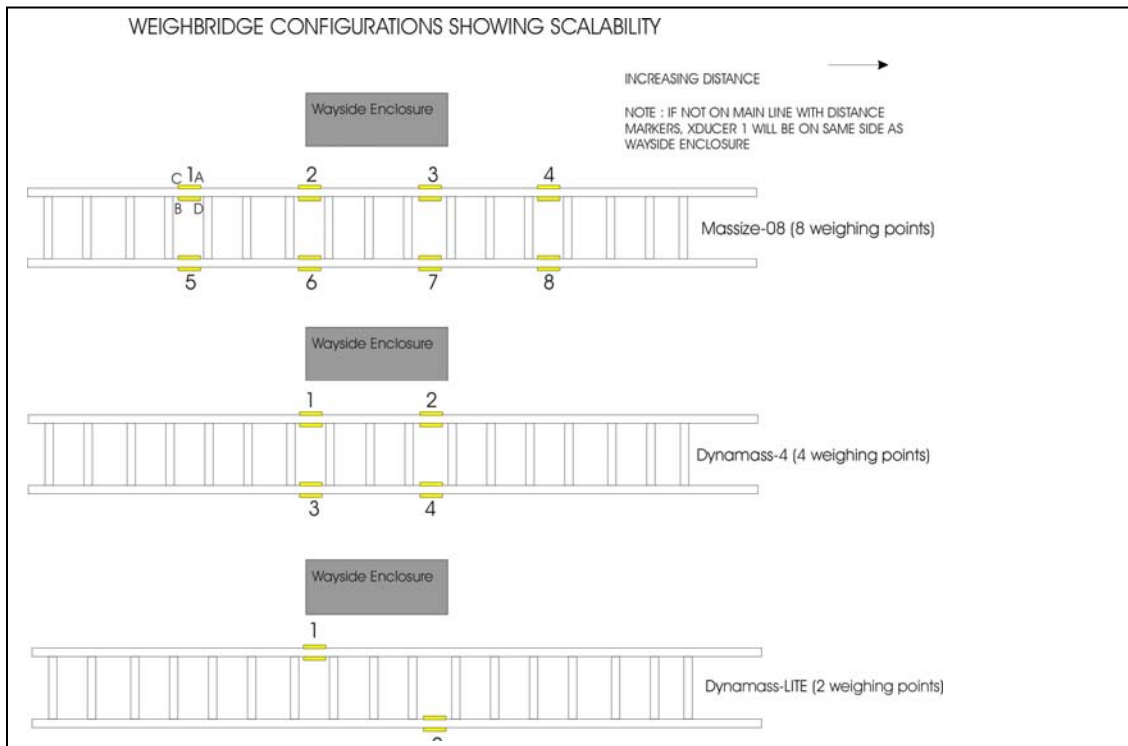
All DYNAMASS systems use pre-encapsulated sensors that are retrofitted to existing track section. Different numbers of weighing points are employed for different models of weighbridge. Cabling from the sensors is fed via armoured hydraulic hosing to the trenching point, and then via conduit to the trackside enclosure, where the processor is housed.

No cutting of track is done, and no ballast stabilization is necessary. This is a unique technology implementation whereby no track occupation is required for either installation or repair. There is absolutely no disruption to rail traffic at any stage.

## Site Requirements

Straight Track Section	80m
Ballast	Normal, Stable
Power	110/220VAC
Rail Section	48, 57, 60 Kg/m
Trackside Enclosure	Weatherproof

## Weighbridge Geometry and Scalability



The Diagram above shows the configurations of the various weighbridges. It can plainly be seen that the systems are upgradeable and scalable by simply adding more sensors.

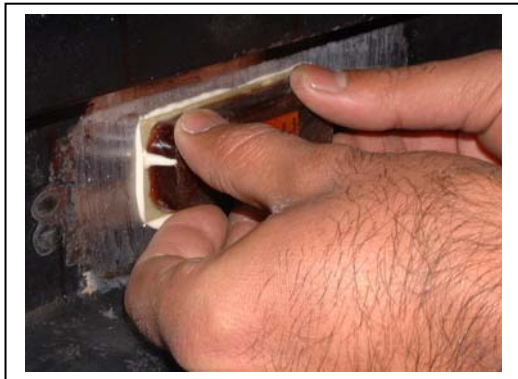


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## Sensor Mounting Geometry

4 sensors are fitted per weighing point, 2 sensors to each side of the meticulously prepared rail web. The dual sided mounting counteracts the effects of gauge spreading and lateral forces evident in in-motion applications, and doubles the number of weighing elements of more typical designs.

All sensors are sealed with the finest sealant available, and are guaranteed submersible for extended periods. Once they are applied and sealed, the sensors are protected by a 3mm cover plate that clamps onto the rail foot. No holes are drilled through the rail web.

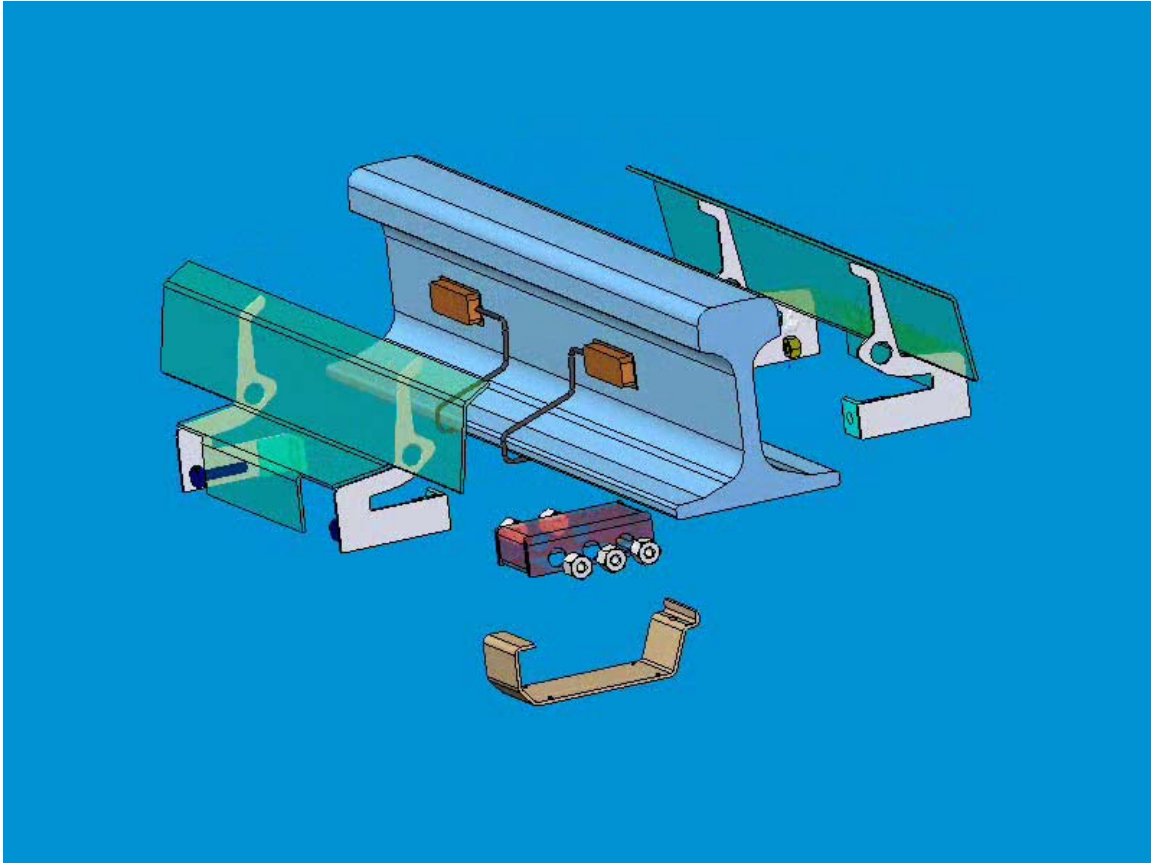


***PRE-ENCAPSULATED SENSOR***



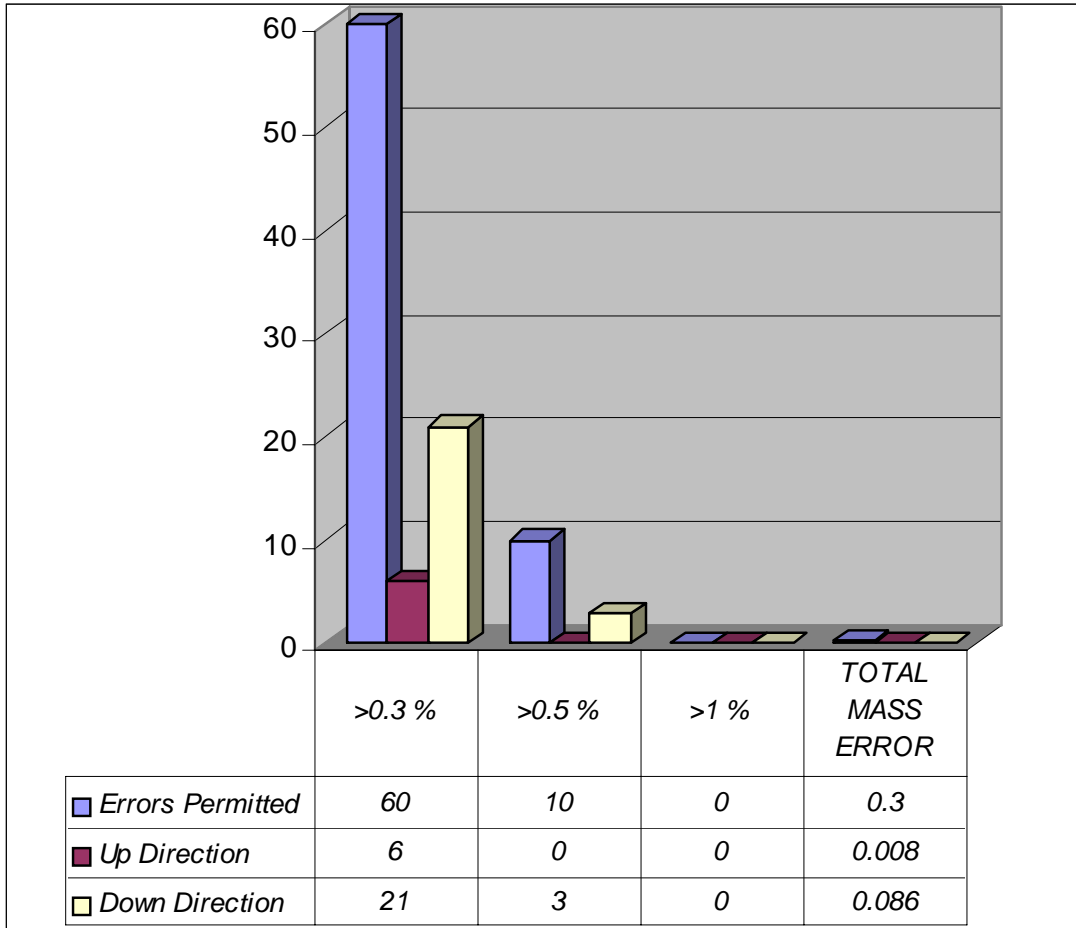
***COVER PLATE OVER SENSORS***

Shown below is an exploded view of the sensor mounting, the junction box and the cover plate. As can be clearly seen, this discrete type of construction is very suitable for on-site repairs. From a maintainability angle, even the most severe damage takes a matter of hours to repair, with absolutely no interruption to the rail operation. Being composed of discrete weighing sensors, the system is also very economical to repair.



## Calibration

Calibration is done both statically and in-motion. Static calibration is performed with a static press and a pre-calibrated load cell. This type of calibration is suitable for mid accuracy, slow speed calibration. In-motion calibration is far more accurate. This method uses pre-weighed wagons at different speeds and in both directions to build up a calibration table. Typical accuracies of 0.2 percent result from this. The following graph shows a test that was done on the system against the SABS trade metrology regulation.





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Clearly, the graph shows that the specification is very easily exceeded. The 'Up' and 'Down' directions show very different accuracies. This is because the 'Down' direction was measured with the train being pushed over the weighbridge. This will seldom happen in reality, but it nonetheless passes the test comfortably.

In terms of stability, the weighbridge is required to be sealed and untouched for a period of 6 months, and then re-tested. This was no problem either, resulting in Trade Metrology approval (SA1350). Tests have subsequently shown that the system is stable for at least a year. Calibration intervals of less than 1 year are thus not necessary.

## Specifications (Mechanical)

Sensors per weighing point	4
Active elements per sensor	2
Total active elements per weighing point	8
Total weighing points(Massize-08)	8
Total weighing points(Dynamass-4)	4
Total weighing points(Dynamass-2/LITE)	2
Total active elements(Massize-08)	64
Total active elements(Dynamass-4)	32
Total active elements(Dynamass-2/LITE)	16
Bridge Length (Massize-08)	10 spacings (approx 6.5m)
Bridge Length (Dynamass-4)	4 spacings (approx 2.5m)
Bridge Length (Dynamass-2/LITE)	4 spacings (approx 2.5m)
Sensor Dimensions	80x30 mm
Transfer plate material	Brass Shim
Sensor Sealing	IP67
Temperature Compensation	Internal
Sensor Spacing	250mm
Sensor mounting height	Neutral Axis
Cover Plate	3mm Galvanised Mild Steel
Connecting cable	5mm, 4 core plus screen
Cable Protection	6.35mm Hydraulic Hose
Sensor Bonding Agent	HBM
Sealing Agent	HBM ABM75, AK22
Trenching Depth	450 mm



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## Specifications (Electrical)

Bridge Impedance	700 Ohms
Temperature Compensation	40 Ohms
External Connections	Purified Beeswax sealed junction box mounted on underside of rail foot

### Lightning Protection

Type	Surgetek COPA-8
Channels per module	2

### Amplifier

Type	TLC SGA-4
Number of channels per card	4
Signal to Ground CMMR	80db
Output Isolation	1.5 kV
Excitation Voltage	8V
Available Excitation Current	100mA
Amplifier Gain (preset)	1250 (0.8 mV/V)
RF Susceptibility	SABS 1649, 26-1000Mhz
Environmental Testing	SABS 5-40 C, 85% humidity

### Digitiser

Type	NI PCI 6023
Resolution	12 bit
Input Voltage Range	10 V bipolar
Used Channels	8, 4, 2
Sampling Speed	2500Hz per channel
Grounding	Single Ended



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## Processor

Type	Intel Celeron
Hard Drive	10 GB min.
Memory	128K

## Speed and Accuracy Specifications

Minimum Weighing Speed (Massize-08)	3 KPH
Maximum Weighing Speed (Massize-08)	35 KPH

Minimum Weighing Speed (Dynamass4)	1 KPH
Maximum Weighing Speed (Dynamass-4)	80 KPH

Minimum Weighing Speed (Dynamass-2)	1 KPH
Maximum Weighing Speed (Dynamass-2)	15 KPH

Direction of Weighing	Both
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Accuracy (Massize-08) < 35 KPH	<0.3% error
Accuracy (Massize-08) < 80KPH	<0.8 % error
Accuracy (Dynamass-4)<20 KPH	<0.3 % error
Accuracy (Dynamass-4)<80 KPH	<2 % error
Accuracy (Dynamass-2) < 15 KPH	<1 % error

Communications	Ethernet, RS232
Connectivity	TCP/IP, ITCMS
Min Temperature	-10 C
Max Temperature	55 C
Humidity	85 percent
Trade Metrology Approval (Massize-08)	SABS 1350