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TEST REPORT

ModWeigh MT3 Industrial Weighing Equipment

tested to the specification

EN 61326-1:2013

Electrical equipment for measurement, control and laboratory use – EMC requirements

Part 1. General requirements

for

EMC Industrial Group Ltd

This Test Report is issued with the authority of:

Andrew Cutler- General Manager

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

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1. STATEMENT OF COMPLIANCE

The **ModWeigh MT3 Industrial Weight Equipment** complies with EN 61326-1:2013 as a Class A device

2. RESULTS SUMMARY

The results from testing carried out in February and March 2020 are summarised in the following table:

Parameter	Criteria	Result
Radiated Emissions		
30 – 1000 MHz	Class A	Complies with a 6.4 dB margin at 359.960 MHz (Vertical).
Conducted Emissions		
150 kHz – 30 MHz	Class A	Not applicable. DC powered device.
Flicker Harmonics		
Harmonic Current Emissions	-	Not applicable. DC powered Class A device.
Voltage Fluctuations and Flicker	-	Not applicable. DC powered Class A device.
Enclosure		
ESD Contact +/- 4 kV	B	Complies
ESD Air +/- 8 kV	B	Complies
Radiated Fields		
80 – 1000 MHz 10 V/m	A	Complies
1000 – 2000 MHz 3 V/m	A	Complies
Power Frequency Magnetic		
30 A/m, 50 Hz	A	Complies
AC Power		
Dips	B/C	Not applicable. DC powered device.
Short Interrupts	C	Not applicable. DC powered device.
Burst	B	Not applicable. DC powered device.
Surge	B	Not applicable. DC powered device.
Conducted RF	A	Not applicable. DC powered device.
DC Power		
Burst	B	Complies
Surge	B	Complies
Conducted RF	A	Complies
I/O		
Burst	B	Complies
Surge	B	Complies
Conducted RF	A	Complies
I/O to Mains Supply		
Burst	B	Not applicable.
Surge	B	Not applicable.
Conducted RF	A	Not applicable.

3. INTRODUCTION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification.

The client selected the test sample.

This report relates only to the sample tested.

This report contains no corrections or erasures.

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

All compliance statements have been made with respect of the specification limit with no reference to the measurement uncertainty.

All testing was carried out as per the standard in the worst-case configuration with no deviations being applied.

4. CLIENT INFORMATION

Company Name	EMC Industrial Group Ltd
Address	56 Tarndale Grove Rosedale AUCKLAND 0632
Country	New Zealand.
Contact	Mark Armstrong

5. DESCRIPTION OF TEST SAMPLE

Brand Name	ModWeigh
Model	MT3
Product	Industrial Weighing Equipment
Primary Function	Loadcell Transmitter
Manufacturer	EMC Industrial Group Ltd
Country of Origin	New Zealand
Serial Number	55554
Frequencies in use	XTAL: 12 MHz MAIN_PLL: 240 MHz USB_PLL: 480 MHz MCU: 120 MHz

General set up

The device under test is described as a Load Cell Transmitter.

Testing was carried out at 24Vdc using a client supplied load cell.

An MD1 display unit was wired as auxiliary equipment to allow the monitoring of the load cell and signals.

During the testing the connected display and device LED indicators were visually monitored for changes in displayed weight and for any disruption of normal behaviour.

6. SETUPS AND PROCEDURES

Standard

The sample was tested in accordance with EN 61326-1:2013 which calls up testing to the following base standards.

Test Method	Standard
Conducted and Radiated Emissions	EN 55011
Harmonic Current Emissions	EN 61000-3-2
Voltage Fluctuations and Flicker	EN 61000-3-3
Electrostatic Discharges	EN 61000-4-2
RF Radiated Immunity	EN 61000-4-3
Electrical Fast Transient bursts	EN 61000-4-4
Surges	EN 61000-4-5
Radio Frequency Conducted Immunity	EN 61000-4-6
Power Frequency Magnetic Immunity	EN 61000-4-8
Voltage Dips & Interruptions	EN 61000-4-11

The following performance criteria have been applied

Performance Criterion A:
The apparatus shall continue to operate as intended during the test.

No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion B:
The apparatus shall continue to operate as intended during the test.

No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended.

During the test, degradation of performance is allowed however.

No change of actual operating state or stored data is allowed.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion C:

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

7. RESULTS

Radiated emissions

Radiated emissions testing was carried out over the frequency range of 30 to 1000 MHz.

Testing was carried out at the laboratory's open area test site - located at 670 Kawakawa Orere Rd, RD5 Papakura, New Zealand.

Before testing was carried out, a receiver Internal Calibration was undertaken along with a check of all connecting cables and programmed antenna factors.

The device was placed on the test tabletop, which was a total of 0.8 m above the test site ground plane.

Measurements of the radiated field were made by manually scanning between 30 and 1000 MHz in 100 kHz steps while aurally and visually monitoring for emissions.

Measurements were made at a distance of 10 meters between 30 – 1000 MHz.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height with an automated antenna tower.

The emission is measured in both vertical and horizontal antenna polarisations using a Quasi Peak detector with a bandwidth of 120 kHz.

During the test, a number of ambient emissions are identified (list of which can be provided upon request).

The emission level is determined in field strength by taking the following into consideration:

Level (dBµV/m) = Receiver Reading (dBµV) + Antenna Factor (dB/m) + Coax Loss (dB)

For example, if an emission of 30 dBµV was observed at 30 MHz.

45.5 dBµV/m = 30.0 dBµV + 14 dB/m + 1.5 dB

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 1000 MHz) ± 4.1 dB

Radiated Emissions 30 – 1000 MHz

The device was tested when powered at 24 Vdc using 2 x 12 Vdc lead acid batteries that were placed on the turntable skirt.

The device was positioned in the centre of turntable with the load cell placed alongside.

The Loadcell and full colour display were included as part of the full system with the loadcell cable being draped down in a 40 cm bundle.

The display unit was placed below the turntable and away from device at the full extent of cable length

Frequency (MHz)	Vertical (dBuV/m)	Horizontal (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result	Antenna
32.320	16.5		40.0	23.5	Pass	Vertical
32.760		14.5	40.0	25.5	Pass	Horizontal
41.680	14.8		40.0	25.2	Pass	Vertical
58.840	12.6		40.0	27.4	Pass	Vertical
66.680	22.4		40.0	17.6	Pass	Vertical
89.960	24.6	16.8	40.0	15.4	Pass	Vertical
112.120	17.6	16.9	40.0	22.4	Pass	Vertical
115.320	18.1	15.3	40.0	21.9	Pass	Vertical
179.960	22.1	21.6	40.0	17.9	Pass	Vertical
269.960	26.5	30.1	47.0	16.9	Pass	Horizontal
359.960	40.6	33.3	47.0	6.4	Pass	Vertical
449.960	34.6	36.5	47.0	10.5	Pass	Horizontal
539.920	25.6	26.5	47.0	20.5	Pass	Horizontal
629.920	38.5	35.9	47.0	8.5	Pass	Vertical
719.920	30.3	32.1	47.0	14.9	Pass	Horizontal
899.920	37.3	37.8	47.0	9.2	Pass	Horizontal

No further emissions detected within 15 dB of the limit when measurements were attempted between 30 - 1000 MHz using both vertical and horizontal polarisations.

Result: Complies.

Electrostatic Discharge Testing

Electrostatic Discharge testing was carried out as described below.

The device is required to meet performance criteria B

The calibration uncertainties for Electrostatic Discharge to EN 61000-4-2 are:

- DC Voltage 1%
- Peak Current 5%
- Rise Time 6%
- Curve decay points at 30 and 60 ns 5%

Observations:

10 x ± 2 kV, ± 4 kV contact discharges were applied at one second intervals as follows:

Point of Contact	Observation	Result
Horizontal Coupling Plane	No effects observed	Pass
Vertical Coupling Plane	No effects observed	Pass
Load Cell Body	No effects observed	Pass
MT3 - Top Cover	No effects observed	Pass
MT3 - Rear Cover	No effects observed	Pass
MT3 - rear screws x4	No effects observed	Pass
HOST USB Port surround	No effects observed	Pass
Device micro USB Port Surround	No effects observed	Pass

10 x ± 2 kV, ± 4 kV ± 8 kV air discharges were applied at one second intervals as follows:

Point of Contact	Observation	Result
Load cell cable	No discharges occurred	Pass
"P" Port	Discharged to metal case. No effects observed.	Pass
"T" Port	Discharged to metal case. No effects observed.	Pass
"J" Port	Discharged to metal case. No effects observed.	Pass
"E" Port	Discharged to metal case. No effects observed.	Pass

Result: Complies.

The device displayed immunity to Electrostatic Discharges during testing and did not change state or lose stored data.

The device operated normally after the test.

Radio Frequency Electromagnetic Field

Testing was carried out between 80 – 1000 MHz with a dwell time of 3 seconds and between 1000 – 2700 MHz with a dwell time of 5 seconds at 3 V/m in 1% steps using both vertical and horizontal polarisations.

The RF signal was 80% AM modulated using a 1 kHz tone.

The antenna was positioned 155 cm above the floor surface with the tip of the antenna being 2 meters from the device under test

During the test the RF field was continuously monitored using an isotropic field probe which was placed close to the device under test.

The Radiated RF was injected into the top, rear and left hand faces of the device.

The device is required to meet the performance criteria A.

The calibration uncertainties for Radiated Susceptibility to EN 61000-4-3 are:
80 - 2700 MHz +/- 1.1 V/m

Observations:

No effects were observed.

Result: Complies.

The device displayed immunity to Radiated RF Electromagnetic Fields during the test and did not change state or lose stored data.

The device operated normally after the test.

Electrical Fast Transient/Burst (EFT/B)

Testing was carried out on the DC power port directly at ± 2 kV and on any signal ports with cables that will exceed 3 metres using a capacitive clamp at ± 1 kV for periods of 3 minutes while the device was being operated.

The device is required to meet performance criteria B.

The calibration uncertainties for Electrically Fast Transient Bursts to IEC 61000-4-4 are:

-Peak Output Voltage Upeak	3.0 %
-Rise Time tr	2.5 %
-Pulse Width tw	2.0 %
-Burst Frequency fb	1.0 %
-Burst Duration tb	1.0 %
-Burst Period trep	1.0 %

Observations

DC Supply Port

Coupling	Observations	Result
Postive	Intermittent Communications errors detected by the equipment. Alarms observed. Returns to normal operation after the test..	Pass
Negative	Intermittent Communications errors detected by the equipment. Alarms observed. Returns to normal operation after the test.	Pass
Positive and Negative	Intermittent Communications errors detected by the equipment. Alarms observed. Returns to normal operation after the test.	Pass

Load Cell Cable

Coupling	Observations	Result
Clamp	No effects observed	Pass

Result: Complies.

The device displayed susceptibility to electrical fast transient bursts during the test but returned to normal operation once the tests were completed, with no permanent loss of function or information.

The device meets Performance Criteria B and complies with the EN61326-1 standard for Electrical Fast Transient Bursts.

Surges

Surge testing was carried out on the DC mains port as described below:

± 2.0 kV Positive to Earth. 5 pulses each polarity.
± 2.0 kV Negative to Earth. 5 pulses each polarity.
± 1.0 kV Positive to Negative. 5 pulses each polarity.

A one-minute interval occurred between each surge.

The device was required to meet performance criteria B.

The calibration uncertainties for Surges to EN 61000-4-5 are:
- Open circuit peak voltage U_{peak} 2%
- Short circuit peak current I_{peak} 2%
- Risetime t_r 2.5%
- Pulse width t_w 2.5%

Observations

Line/Port Tested	Observation	Result
Positive to Earth	No effects observed	Pass
Negative to Earth	No effects observed	Pass
Positive to Negative	No effects observed	Pass

Result: Complies.

The device displayed immunity to Surges throughout the test.

The device continued to operate normally after the test.

Conducted RF Susceptibility

Conducted RF susceptibility testing was carried out between 150 kHz and 80 MHz at 3 V_{rms} with a 1000 Hz tone 80% AM modulated.

Testing was carried out in 1% steps with a dwell time of 3 seconds

The device is required to meet performance criteria A.

The calibration uncertainties for Radio frequency continuous conducted susceptibility to EN 61000-4-6 are: 0.15 – 80.0 MHz ± 1.42 dB

Observations:

Port Tested	Method	Observations	Result
DC Cable	DC2 CDN	No effects observed	Pass
Load Cell cable	FCC BCI	No effects observed	Pass

Result: Complies.

The device displayed immunity to Conducted RF Electromagnetic Fields throughout the test.

The device continued to operate normally after the test.

Power Frequency Magnetic Fields

As the device can be used in 50 Hz and 60 Hz areas, testing was carried out at 50 Hz & 60 Hz.

Testing was carried out using a 1m x 1m loop that was placed around the device in the X, Y and Z planes.

The device was required to meet Category A.

Testing was carried out at 30 A/m.

50 Hz

Planes	Observations	Result
X plane	No effects observed	Pass
Y plane	No effects observed	Pass
Z plane	No effects observed	Pass

60 Hz

Planes	Observations	Result
X plane	No effects observed	Pass
Y plane	No effects observed	Pass
Z plane	No effects observed	Pass

Result: Complies.

The device displayed immunity to Power Frequency Magnetic Fields tests.

The device continued to operate normally after the test.

8. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref
Aerial Controller	EMCO	1090	9112-1062	RFS 3710
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708
Anechoic Material	Rantec	ERP24 2" Cones	-	-
Anechoic Material	Rantec	Ferrite tiles	-	-
Artificial Mains Network	Rohde & Schwarz	ESH 2-Z5	881362/032	3628
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3696
Bilog Antenna	EMCO	3141	9707-1071	E1596
Coupling Network	Schaffner	CDN 801-6/M3	154	-
Current Clamp	FCC	F-120-6A	42	E3790
ESD Gun	Schaffner	NSG 435	1261	EMC4028
Field Probe	Holaday	HI-4433-GRE	00051528	E3789
Harmonic/Flicker System	California Instrumemts	5001ix / PACS-1	57533A / 72500	EMC080907
Interference Test System	Keytek	EMC Pro Plus	S012233	E3788
Isotropic Field Monitor	Amplifier Research	FM2000	14417	
Magnetic FS Meter	EMDEX	SNAP	157035	3803
Measurement Receiver	Rohde & Schwarz	ESCS 30	847124/020	E1595
Mircowave RF Amplifier	Ophir	5263FE	1002	-
Power Amplifier	Amplifier Research	30W1000B	-	EMC4022
Power Amplifier	IFI	M75	B373-1098	RFS 3773
Signal Generator	Rohde & Schwarz	SML 02	-	EMC4013
Signal Generator	Rohde & Schwarz	SMP 04	1035 5005.04	E1560
Turntable	EMCO	1080	9109-1578	RFS 3709

All test equipment was within calibration at the time of testing.

9. ACCREDITATIONS

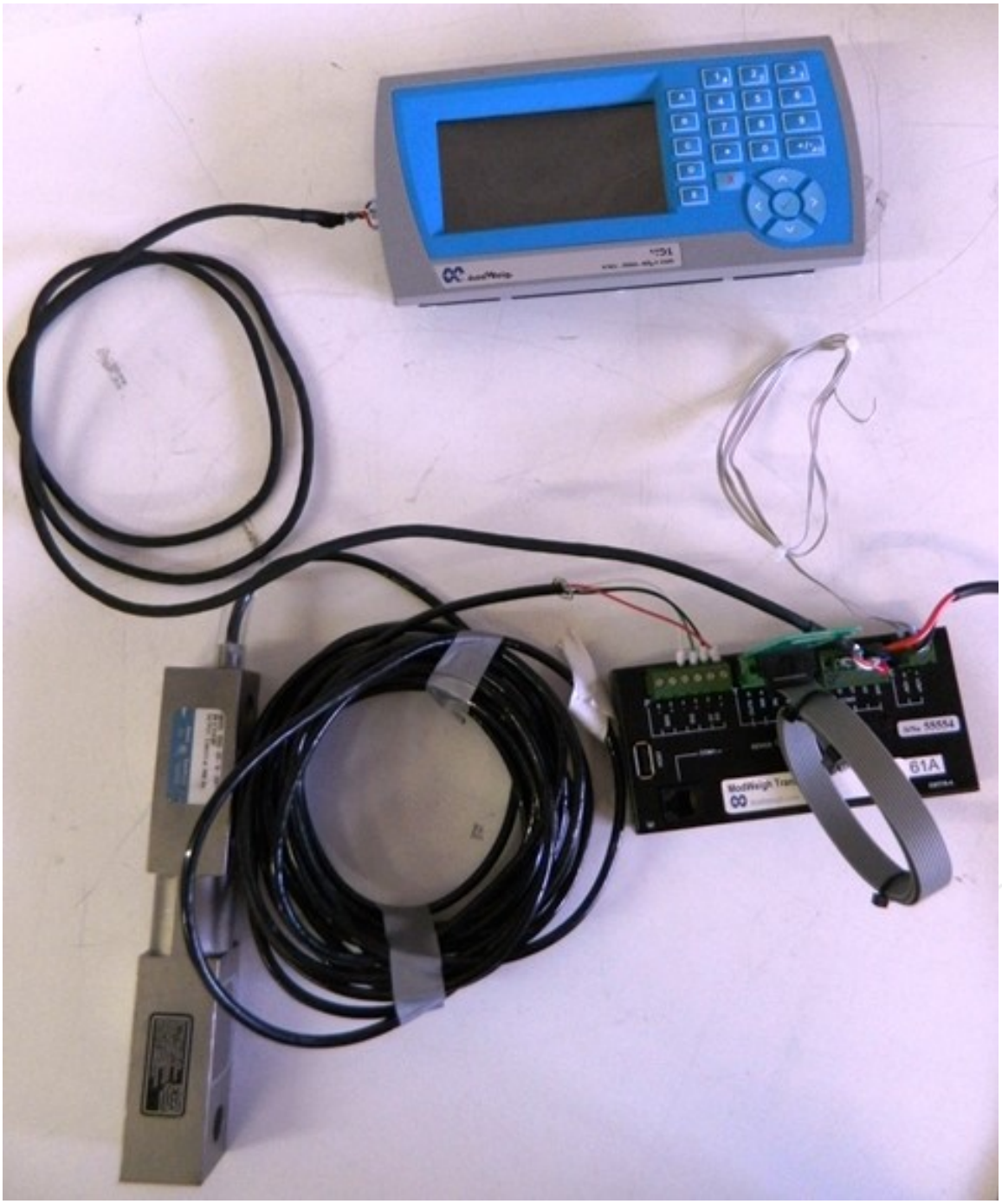
The tests were carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ ISO 17025.

All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ ISO 17025.

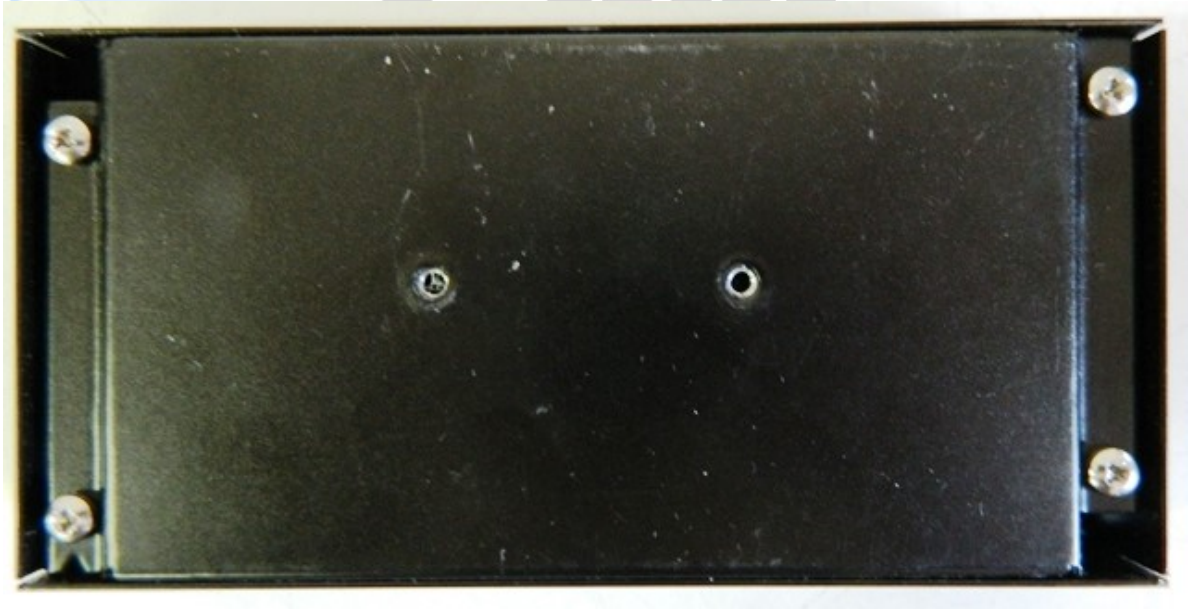
International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

10. PHOTOGRAPHS

Overall view of the system



Device under test – MT3



Ancillary Device – Display unit

Ancillary Device – Load Bar