



EMC Technologies (NZ) Ltd
47 Mackelvie St, Grey Lynn
Auckland 1021
New Zealand
Phone 09 360 0862
Fax 09 360 0861
E-Mail Address: aucklab@emctech.co.nz
Web Site: www.emctech.co.nz

TEST REPORT

Modweigh MD1 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 Limited

This Test Report is issued with the authority of:

A handwritten signature in black ink that reads "Andrew Cutler". The signature is written over a light blue rectangular background.

Andrew Cutler- General Manager



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 MD1 Industrial Weighing Equipment complies with EN 61326-1:2013.

2. RESULTS SUMMARY

The results from testing carried out in May and June 2018 are summarised in the following table:

Parameter	Criteria	Result
Radiated Emissions		
30 – 1000 MHz	Class A	Complies with a 0.1 dB margin at 449.960 MHz (Horizontal).
Conducted Emissions		
150 kHz – 30 MHz	Class B	Not applicable. DC powered device.
Flicker Harmonics		
Harmonic Current Emissions	-	Not applicable. DC powered device.
Voltage Fluctuations and Flicker	-	Not applicable. DC powered device.
Enclosure		
ESD Contact +/- 4 kV	B	Complies
ESD Air +/- 8 kV	B	Complies
Radiated Fields		
80 – 1000 MHz 10 V/m	A	Complies
1400 – 2000 MHz 3 V/m	A	Complies
2000 – 2700 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. DC powered device.
Surge	B	Not applicable. DC powered device.
Conducted RF	A	Not applicable. DC powered device.

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.

4. CLIENT INFORMATION

Company Name	EMC Industrial Group Ltd
Address	56 Tardale Grove, Rosedale
City	Auckland 0632
Country	New Zealand.
Contact	Mark Armstrong

5. DESCRIPTION OF TEST SAMPLE

Brand Name	Modweigh
Model	MD1
Product	Industrial Weighing Equipment
Manufacturer	EMC Industrial Group Ltd
Country of Origin	New Zealand
Serial Number	53358

6. SETUPS AND PROCEDURES

Standard

The sample was tested in accordance with EN 61326-1:2013 Table 2 – for equipment intended to be used in an industrial electromagnetic environment, 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.

General Set Up

The device was powered from a 24 VDC lead acid battery.

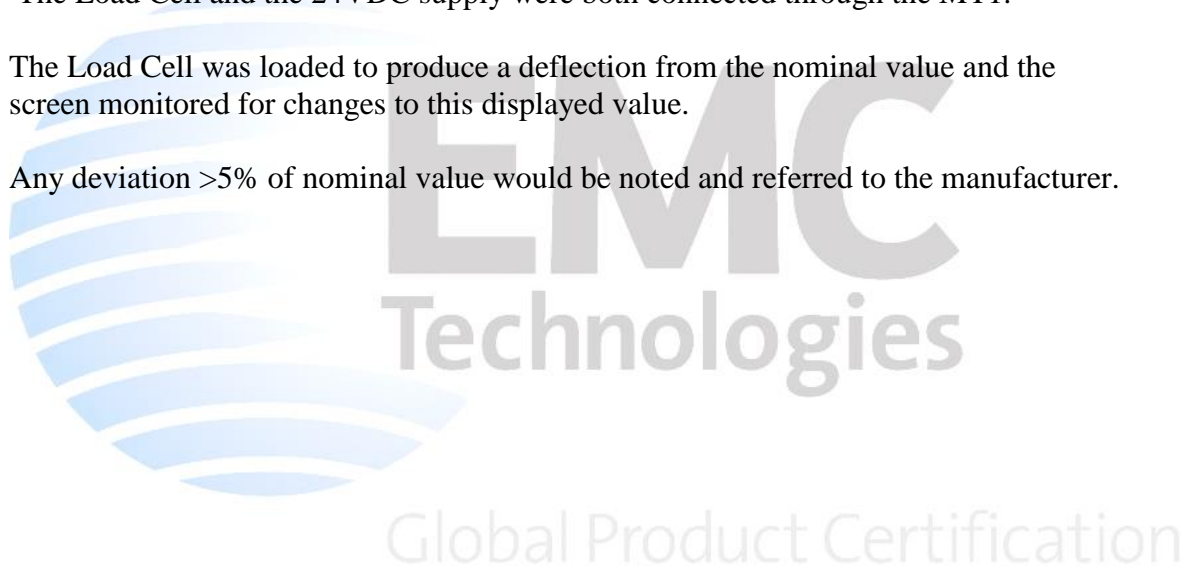
The System comprised of the MD1 Display and main unit, connected directly to a MR1 (ModWeigh Receiver).

The MR1 was in turn connected to the MT1 (ModWeigh Transmitter) module.

The Load Cell and the 24VDC supply were both connected through the MT1.

The Load Cell was loaded to produce a deflection from the nominal value and the screen monitored for changes to this displayed value.

Any deviation >5% of nominal value would be noted and referred to the manufacturer.



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 Self Test and 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 with the Class A limits being applied

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 below 1 GHz.

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 (dB μ V/m) = Receiver Reading (dB μ V) + Antenna Factor (dB/m) + Coax Loss (dB)

Measurement uncertainty with a confidence interval of 95% is:

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

Radiated Emissions 30 – 1000 MHz

The device was powered from a 24 Vdc lead acid battery.

The device was positioned upright in the centre of the turntable.

All system modules were positioned vertically on top of the turntable.

Frequency (MHz)	Vertical (dBuV/m)	Horizontal (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result	Antenna
61.120	16.8		40.0	23.2	Pass	Vertical
62.240	15.8		40.0	24.2	Pass	Vertical
90.000	26.6	22.3	40.0	13.4	Pass	Vertical
102.500	26.1		40.0	13.9	Pass	Vertical
179.960	30.8	33.8	40.0	6.2	Pass	Horizontal
269.960	26.9	30.9	47.0	16.1	Pass	Horizontal
334.680		26.3	47.0	20.7	Pass	Horizontal
359.960	29.9	39.2	47.0	7.8	Pass	Horizontal
449.960	39.6	46.9	47.0	0.1	Pass	Horizontal
539.920	29.5	39.3	47.0	7.7	Pass	Horizontal
629.920	24.6	38.3	47.0	8.7	Pass	Horizontal
719.920	35.7	36.8	47.0	10.2	Pass	Horizontal
809.920	37.9	33.0	47.0	9.1	Pass	Vertical
899.920	33.4	35.3	47.0	11.7	Pass	Horizontal

The level at 449.960 MHz is derived from the following.

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

$$46.9 \text{ (dB}\mu\text{V/m)} = 28.2 \text{ (dB}\mu\text{V)} + 16.2 \text{ (dB/m)} + 2.5 \text{ (dB)}$$

No further emissions were 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
HCP	No effects observed	Pass
VCP – Front Screen MD1	No effects observed	Pass
MD1: “Device” port surround	-ve discharges: MD1 Restarts. Weight display unchanged.	Pass
MD1: USB Host port surround	MD1 Restarts – Weight display unchanged	Pass
MD1: Rear Screws	MD1 Restarts – Weight display unchanged	Pass
MD1: Rear Cover	MD1 Restarts – Weight display unchanged	Pass
MR1: Cover	Load cell deviation with discharge. Returns to nominal after application.	Pass
MR1: Rear Screws	Load cell deviation with discharge. Returns to nominal after application.	Pass
MT1: Cover	General Comms Failure, reconnects automatically and returns to normal operation and nominal weight display	Pass
Mt1: Rear Screws	General Comms Failure, reconnects automatically and returns to normal operation and nominal weight display	Pass

Electrostatic Discharge Testing cont.

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

Point of Contact	Observation	Result
Screen	No discharges occurred	Pass
Keypad	No discharges occurred	Pass
Cable MD1 – MR1	No discharges occurred	Pass
Cable MR1 – MT1	No discharges occurred	Pass
Load Cell Cable	No discharges occurred	Pass
MR1 Ribbon Cables	No discharges occurred	Pass
MT1 Ribbon Cables	No discharges occurred	Pass

Result: Complies.

The device displayed susceptibility to Electrostatic Discharges during testing but returned to normal operation and nominal weight display without user intervention.



Radio Frequency Electromagnetic Field

Testing was carried out between 80 – 1000 MHz at 10 V/m with a dwell time of 3 seconds and between 1400 – 2700 MHz at 3 V/m with a dwell time of 9 seconds 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 front, left hand and rear faces of the device's modules.

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 2 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 power port ± 2 kV (5/50 ns, 5 kHz)

Port Tested	Observations	Result
+ve:PE	No effects observed	Pass
-ve:PE	No effects observed	Pass
+ve:-ve	No effects observed	Pass

Signal power port ± 1 kV (5/50 ns, 5 kHz)

Port Tested	Observations	Result
Load cell	No effects observed	Pass

Result: Complies.

The device displayed immunity to Electrical Fast Transients/Bursts (EFT/B) during the tests.

The device continued to operate normally after the test.

Surges

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

- ± 1.0 kV Line to Line;
- ± 2.0 kV Line to Earth;
- ± 1.0 kV Signal lines; direct coupling. Not applicable.

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
+ve:PE	No effects observed	Pass
-ve:PE	No effects observed	Pass
+ve:-ve	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 $3 V_{\text{rms}}$ 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 \pm 1.42 dB

Testing performed with chassis grounded via M1 CDN with 50 Ω impedance.

Observations:

Port Tested	Method	Observations	Result
DC port	DC2 CDN	No effects observed	Pass
Load Cell	FCC BCI Clamp	No effects observed	Pass
MD1: MR1 connector cable	FCC BCI Clamp	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 operates at 24 Vdc 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	E1426
Field Probe	Holaday	HI-4433-GRE	00051528	E3789
Harmonic/Flicker Test System	California Instrumentm	5001ix / PACS-1	57533A / 72500	EMC080907
Interference Test System	Keytek	EMC Pro Plus	S012233	E3788
Isotropic Field Monitor	Amplifier Research	FM2000	14417	
Magnetic Field Strength 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.

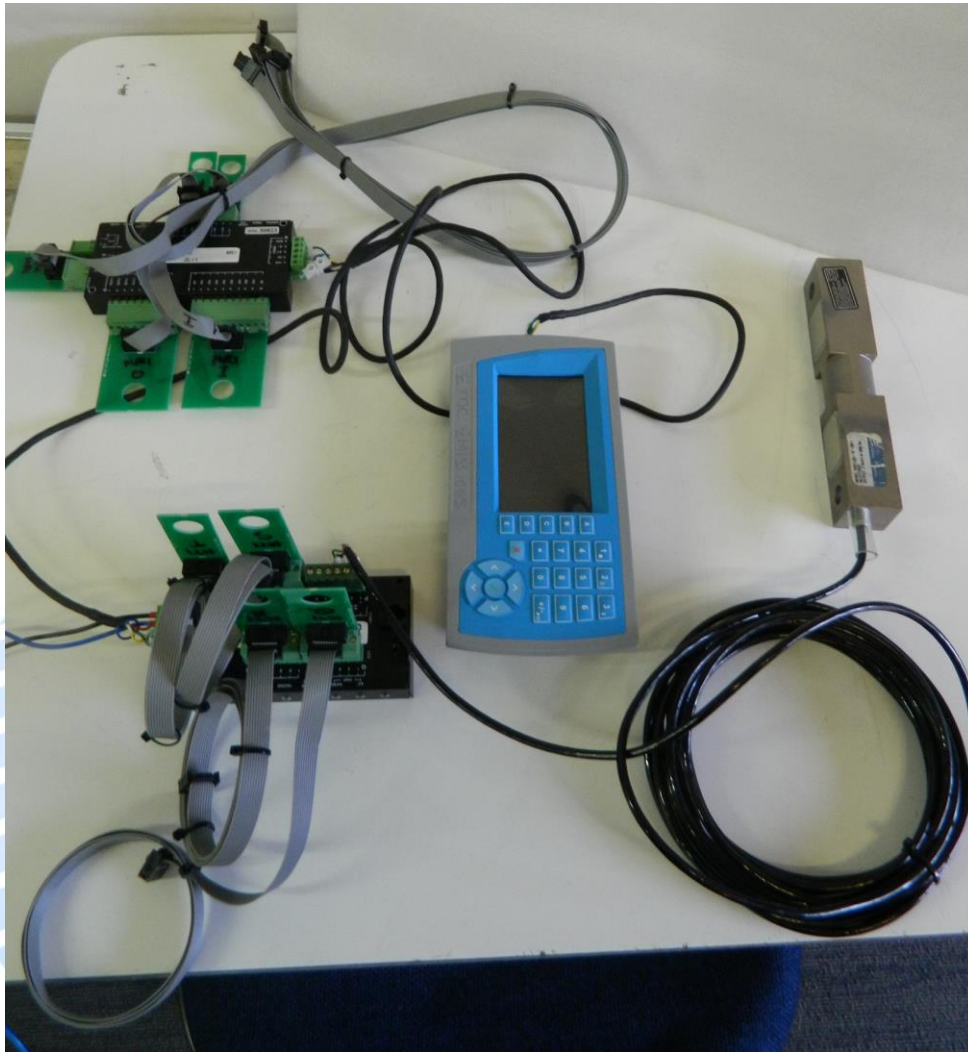
9. ACCREDITATIONS

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



Global Product Certification

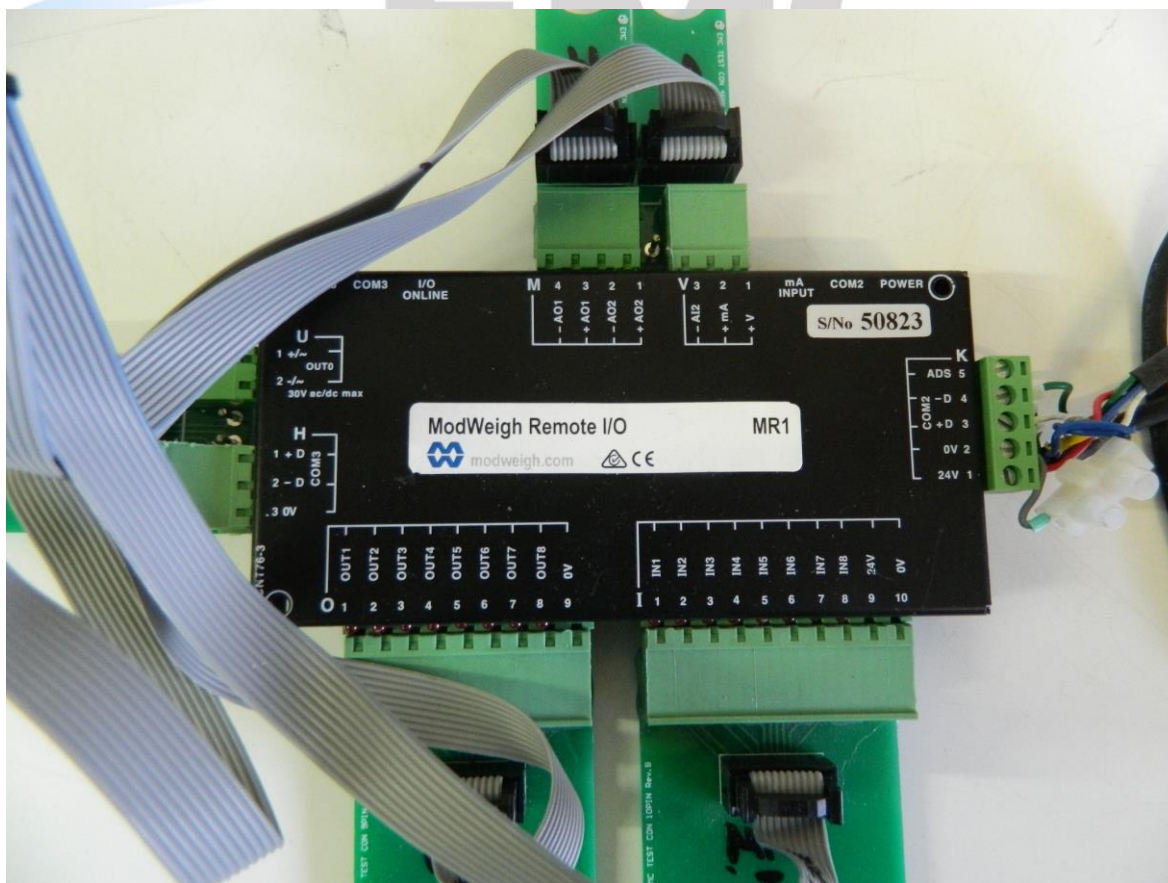
MD1



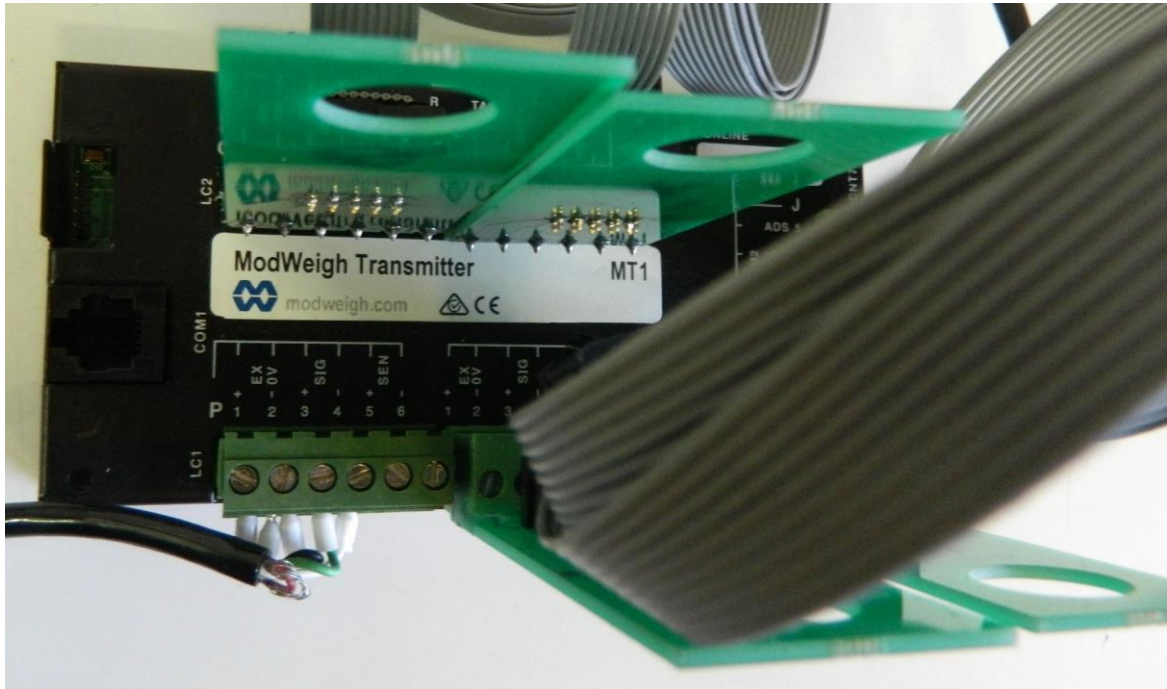
MD1 Rear



MR1



MT1



Loadbar



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