



Dynamic Load Monitoring (UK) Ltd

DLM House, Bridgers Farm, Nursling Street, Nursling, Southampton, SO16 0YA

T: +44 (0)2380 741 700 E: sales@d1m-uk.com W: d1m-uk.com

TL3.0 OEM Integration Manual

(Modular Integration)



REGISTERED IN ENGLAND NO. 2924110.

REGISTERED OFFICE 14 BAKERS DROVE, ROWNHAMS, SOUTHAMPTON, SO16 8AD



Dynamic Load Monitoring (UK) Ltd

DLM House, Bridgers Farm, Nursling Street, Nursling, Southampton, SO16 0YA

T: +44 (0)2380 741 700 E: sales@dml-uk.com W: dlm-uk.com

REVISION HISTORY

Revision	Date	Changes
1.0	23.05.2019	Initial Release



REGISTERED IN ENGLAND NO. 2924110.

REGISTERED OFFICE 14 BAKERS DROVE, ROWNHAMS, SOUTHAMPTON, SO16 8AD

CONTENTS

Section		Page
1.0	Overview	4
1.1	Networks	5
2.0	Connections	7
2.1	Load Cell	7
2.2	LED	7
2.3	Switch	8
2.4	Antenna	8
2.5	Battery	8
2.6	Charger	8
3.0	Operation	9
3.1	Pairing	10
3.2	Charging	11
3.3	Batteries	12
4.0	Technical Specification	13
	4.1 Summary	13
	4.2 Wireless Specification	13
	4.2 Physical Specification	14
	4.3 Battery Specification	14
5.0	Service and Repair	15
6.0	Warranty	16
7.0	Standards and Declaration of Conformity	17
7.1	CE Marking	17
7.2	FCC	19



Dynamic Load Monitoring (UK) Ltd

DLM House, Bridgers Farm, Nursling Street, Nursling, Southampton, SO16 0YA

T: +44 (0)2380 741 700 E: sales@dIm-uk.com W: dIm-uk.com

1.0 OVERVIEW

The TL-3.0 Telemetry Transmitter is designed for use with strain gauge load cell devices. It communicates wirelessly to the DLM TW-3.0 Telemetry Handheld and any other product within the d+ range.

The TL-3.0 operates on a free band 2.4GHz frequency and utilises a bespoke frequency hopping protocol which hops frequency 20 times per second to help reduce interference.

The TL-3.0 is “paired” with a receiving device and can be viewed simultaneously on as many receiving devices as required.

The TL-3.0 has a wireless range of up to 800m; therefore to avoid interference when multiple TL-3.0 devices paired with their own individual display (i.e. another load cell and handheld pair within an 800m radius) they should be configured on different networks.

Some network setup examples are shown overleaf to illustrate the operation.



REGISTERED IN ENGLAND NO. 2924110.

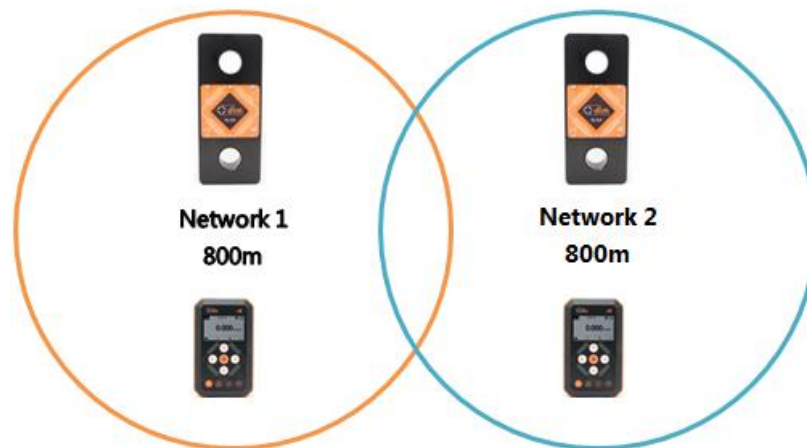
REGISTERED OFFICE 14 BAKERS DROVE, ROWNHAMS, SOUTHAMPTON, SO16 8AD

1.1 NETWORK SETTING EXAMPLES

Example 1: Using two TW-3.0 Handheld devices with two TL-3.0 Telemetry Transmitters within range of each other.

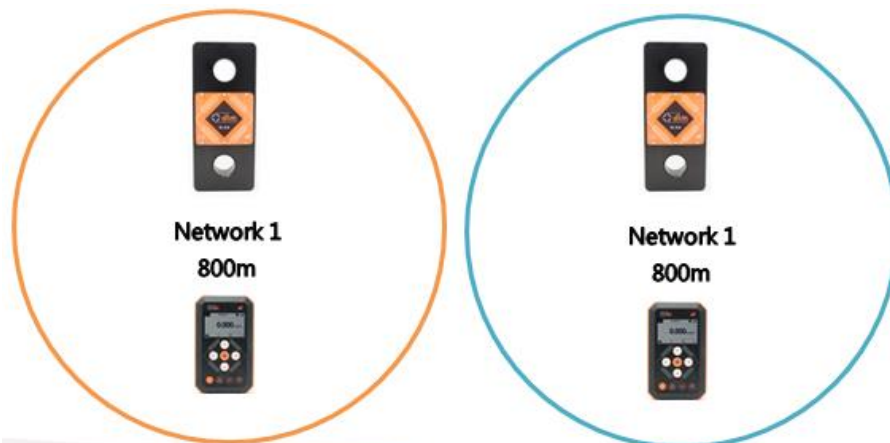
Pair 1 needs to be paired on a network, i.e. **Network 1**

Pair 2 needs to be paired on a different network, i.e. **Network 2**



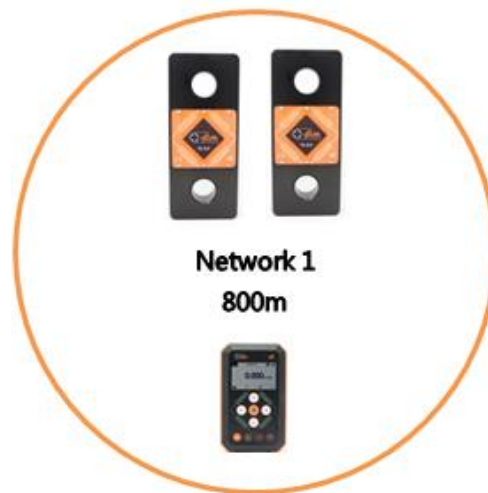
Example 2: Using two TW-3.0 Handheld devices with two TL-3.0 Telemetry Transmitters outside of the range of each other.

Both pairs can be paired on the same network as they are far enough apart that interference will not occur.



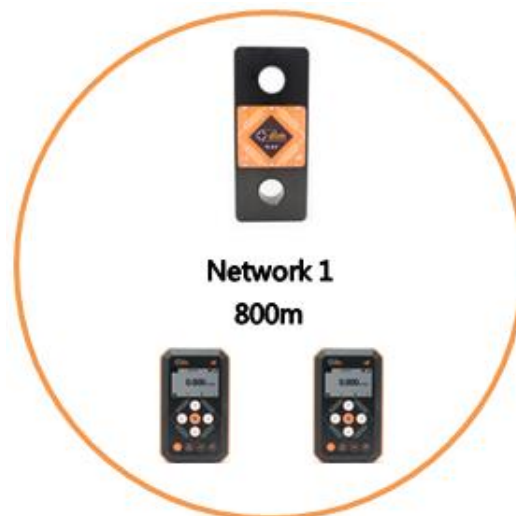
Example 3: Using one TW-3.0 Handheld device with two TL-3.0 Telemetry Transmitters.

The TW-3.0 is set to operate on network 1 and both TL-3.0 Telemetry Transmitters are paired, as channel 1 and channel 2 to the TW-3.0.

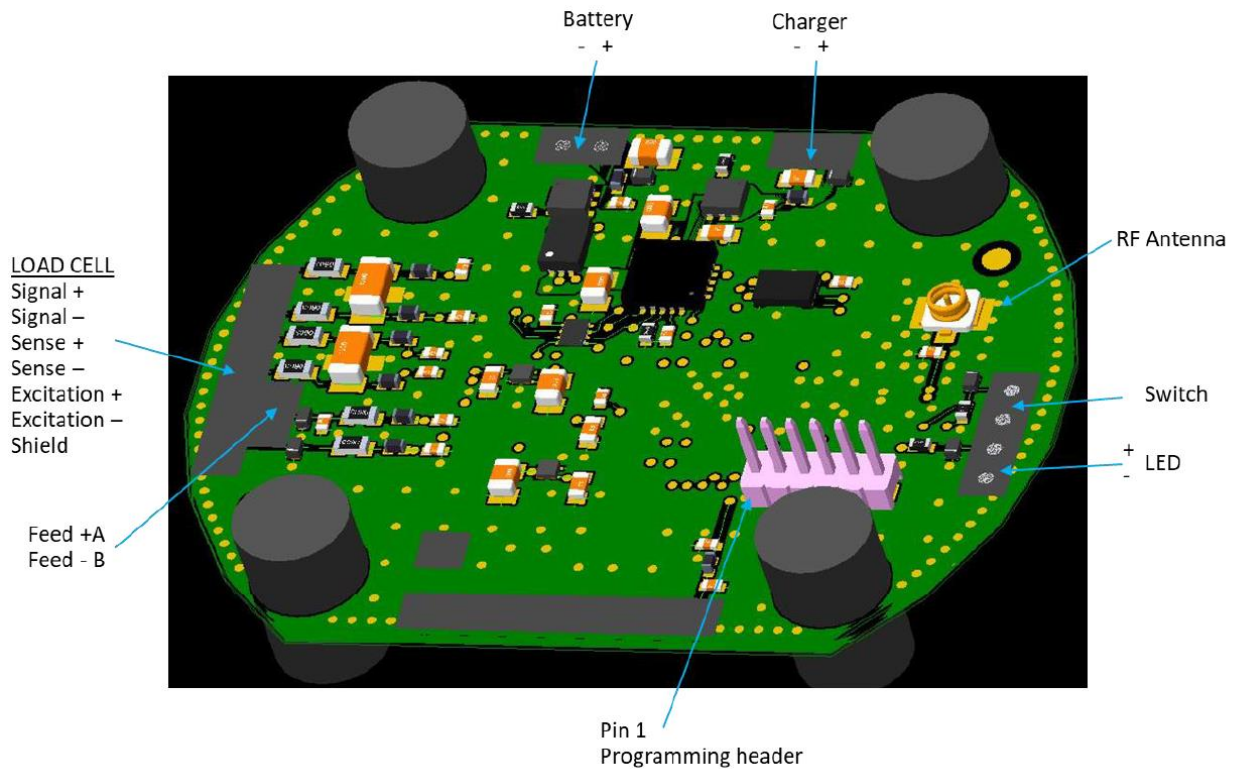


Example 4: Using two or more TW-3.0 Handheld devices with one TL-3.0 Telemetry Transmitter.

One TW-3.0 is set to Master on network 1, the second TW-3.0 is set to a Slave on network 1 and the TL-3.0 is paired on channel 1.



2.0 CONNECTIONS



2.1 LOAD CELL CONNECTION

The load cell can be wired as either a 4-wire or 6-wire strain bridge.

- 1) 6-wire connection – Connect as the picture above. Connections to A and B are not made. Shield is optional.
- 2) 4-wire connection – Use Signal + and signal -, Sense + and Sense -. Make a link between Excitation + and A, and Excitation - and B. Shield is optional.

2.2 LED CONNECTION

Connect the LED anode to LED+ and the LED cathode to LED –

The LED should be 2VDC with an internal resistor.



2.3 SWITCH CONNECTION

The operation is designed for a push button momentary switch.

2.4 ANTENNA CONNECTION

The antenna connection is a U.FI receptacle and is designed for use with the Molex 47950-0011 antenna and no other antenna may be used

2.5 BATTERY CONNECTION

The battery is connected to the TL-3.0 via the 2pin JST connector on a 2.54mm pitch. The part numbers for connectors are:

Part	Part Number	Manufacturer
Connector	XHPX-2J	JST
Inserts	XHPX-2	JST

2.6 BATTERY CHARGER CONNECTION

The battery charger connection requires a 3.7 - 5VDC connection. There is internal current regulation and protection on the PCB. The charger connection should not be used to apply permanent power.



3.0 OPERATION

An example of how the TL-3.0 can be housed is shown below with a description of operation.

Power On:

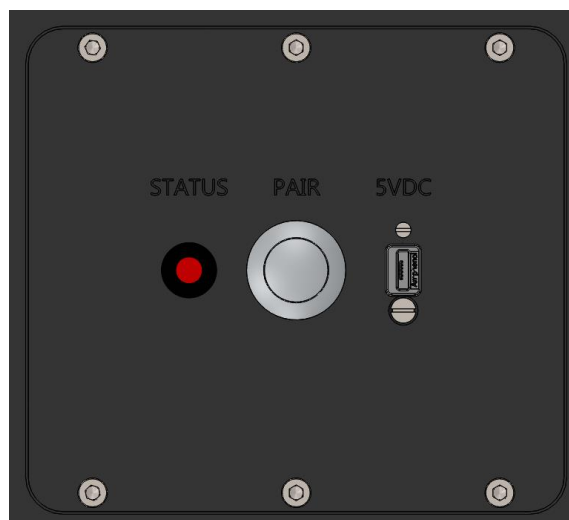
To power the TL-3.0 on for use follow the steps below:

1. Press and hold the PAIR button until the LED becomes solid
2. The LED will flash once every 3 seconds if the TL-3.0 is connected to a receiving device such as the TW-3.0 Handheld Display.
3. The LED will flash once per second if the TL-3.0 is not connected to a receiving device

Power Off:

To power the TL-3.0 off for use follow the steps below:

1. Press and hold the PAIR button, the LED becomes solid and then after 2 seconds turn off



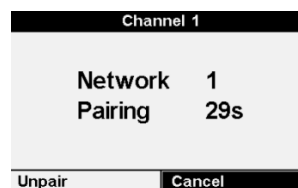
Low Power Mode:

When the TL-3.0 is powered but not connected to a receiving device, it will enter a low power mode which will look for signal once every 30 seconds. This is to conserve battery life when the receiving device is powered off, but it is not possible to reach the TL-3.0 to power it off.

3.1 PAIRING

The TL-3.0 needs to be paired with a receiving device, in order to establish communication with a new device such as the TW-3.0 Handheld follow the steps below:

1. Press the MENU button on the TW-3.0
2. Select the CHANNELS menu
3. Select the CHANNEL with which the new device is to be paired to
4. Scroll down to the PAIR menu option
5. On the device to be paired with the TW-3.0 locate the PAIRING button
6. Ensure the device is powered off
7. Press and hold the PAIR button for 8secs until the LED flashes twice per second
8. Press the PAIR function on the TW-3.0 Handheld
9. A 30 second count down timer will be initiated to search for the new device



10. Once the device has been paired the TW-3.0 will exit the pairing screen and the LED on the new device will blink at once per second briefly

This completes the pairing process; the new device will now be present on the paired channel.

3.2 CHARGING

If the TL-3.0 is being powered by a battery pack then a suitable 5VDC power source can be connected to the charging connection described in section 2.6. The power source can be supplied from any PC/laptop or any mains to USB charger plug of suitable quality that provides a 5VDC output and 500mA current.

WARNING! DO NOT CHARGE BELOW 0°C

It is the responsibility of the OEM to ensure the battery being used is suitable for the application and to determine if it can be charged. DO NOT CHARGE ALKALINE BATTERIES.

WARNING: Cheap charging devices often fail to meet the requirements of the Electrical Equipment Regulations Act 1994, as a minimum any charger plug must have a CE mark (shown right) and it is the responsibility of the operator to ensure any charger plug is safe to use.



The time taken to fully charge the TL-3.0 will depend on the type of charger, a simple calculation is:

$$\text{Charge Time (hours)} = \text{Battery capacity (mAh)} \div \text{charging current (mA)}$$

For example:

2000mAh battery capacity charging from a laptop at 500mA:

$$2000 \div 500 = 4 \text{ hours}$$

The battery life of the TL-3.0 depends on the how it is being used, the lower the sample rate the longer the battery life will be. One example is:

Sample rate	Ambient Temperature	Battery Life
1Hz	20°C	700Hours

3.3 BATTERIES

The TL-3.0 allows connection of a multiple battery types which are connected as described in section 2.5.

The TL-3.0 is designed to be used with the following battery chemistries:

	Min	Nominal	Max	Unit
Quantity	1			
Chemistry	Li-Po			
Voltage	3.4	3.6	3.9	V
Quantity	1			
Chemistry	Li-Ion			
Voltage	3.4	3.6	3.9	V
Quantity	3			
Chemistry	Ni-MH			
Voltage	1.0	1.2	1.4	V
Quantity	3			
Chemistry	Alkaline			
Voltage	1.2	1.5	1.6	V

WARNING! DO NOT CHARGE BELOW 0°C

4.0 TECHNICAL SPECIFICATIONS

4.1 SUMMARY

Bridge Resistance	350Ω, 700Ω or 1000Ω
Battery	3.7V Li-Po Rechargeable battery 3.7V Li-Ion Rechargeable battery 3x 1.2V Ni-MH AA/AAA batteries 3x 1.2V Alkaline AA/AAA batteries
Battery Life	700 hours continuous based on a 2Ah battery (2 years storage)
Charger	USB/5VDC
Operating Temperature	-20°C to +60°C
Frequency	2.4GHz
Range	Up to 800m line of sight
Approvals	CE approved and FCC compliant

4.2 WIRELESS SPECIFICATION

	Minimum	Maximum	Unit
License	2.4GHz Licence Exempt		
Radio Type	Transceiver		
Modulation	FHSS		
Frequency	2.402	2.480	GHz
Power		<100	mW
Channels	79		

4.3 PHYSICAL SPECIFICATION

	Specification	Unit
Dimensions	45 x 35 x 10	Overall L x W x D in mm
Weight	19	g

4.4 BATTERY SPECIFICATION

	Min	Nominal	Max	Unit
Quantity	1			
Chemistry	Li-Po			
Voltage	3.4	3.6	3.9	V
Quantity	1			
Chemistry	Li-Ion			
Voltage	3.4	3.6	3.9	V
Quantity	3			
Chemistry	Ni-MH			
Voltage	1.0	1.2	1.4	V
Quantity	3			
Chemistry	Alkaline			
Voltage	1.2	1.5	1.6	V



Dynamic Load Monitoring (UK) Ltd

DLM House, Bridgers Farm, Nursling Street, Nursling, Southampton, SO16 0YA

T: +44 (0)2380 741 700 E: sales@dlim-uk.com W: dlim-uk.com

5.0 SERVICE AND REPAIR

The OEM is responsible for generating suitable service and repair instructions applicable to their application. If there are any issues surrounding firmware operation the unit should be returned to Dynamic Load Monitoring (UK) Ltd for inspection.

General points of consideration should be:

- 1) Prevention of water ingress onto the PCB
- 2) Prevention of dust ingress onto the PCB
- 3) Prevention of excessive heat to the batteries or PCB

If the TL-3.0 is no longer required it should be disposed of correctly, including batteries, and not placed into land fill.



REGISTERED IN ENGLAND NO. 2924110.

REGISTERED OFFICE 14 BAKERS DROVE, ROWNHAMS, SOUTHAMPTON, SO16 8AD



Dynamic Load Monitoring (UK) Ltd

DLM House, Bridgers Farm, Nursling Street, Nursling, Southampton, SO16 0YA

T: +44 (0)2380 741 700 E: sales@dlim-uk.com W: dlim-uk.com

6.0 WARRANTY

Subject to the terms and conditions set out below, Dynamic Load Monitoring (UK) Ltd (hereinafter '**DLM**' or 'the company') warrants its products against defects in materials or workmanship for a period of one year from the date of original purchase.

Should a circumstance or condition be observed which might give rise to a claim under this warranty; the user should immediately take the unit out of operation. The item should then be returned carriage paid (including any and all taxes and duties) to **DLM**. It is advisable to notify **DLM**, by telephone or fax, of the details of the case prior to dispatch.

The extent of the company's liability under the terms of this warranty shall be the repair or replacement of the defective product, or defective part thereof, and the decision whether to repair or replace shall be made by **DLM** at its sole discretion.

After completion of any remedial work / replacement, the company will return the goods carriage paid.

Exclusions

Defects arising from the following circumstances are excluded from the benefit of this warranty:

- Unauthorised modification;
- Misuse, mishandling, abuse;
- Improper or inadequate maintenance;
- Operation outside the environmental specifications of the product.



REGISTERED IN ENGLAND NO. 2924110.

REGISTERED OFFICE 14 BAKERS DROVE, ROWNHAMS, SOUTHAMPTON, SO16 8AD

7.0 STANDARDS AND APPROVALS

7.1 CE Mark

<p><i>Dynamic Load Monitoring (UK) Ltd</i> tímto prohlašuje, že tento <i>TL-3.0</i> je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 2014/53/EU.</p>
<p>Undertegnede, <i>Dynamic Load Monitoring (UK) Ltd</i> erklærer herved, at følgende udstyr <i>TL-3.0</i> overholder de væsentlige krav og øvrige relevante krav i direktiv 2014/53/EU.</p>
<p>Hiermit erklärt, <i>Dynamic Load Monitoring (UK) Ltd</i> dass sich das Gerät <i>TL-3.0</i> in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 2014/53/EU befindet.</p>
<p>Käesolevaga kinnitab, <i>Dynamic Load Monitoring (UK) Ltd</i> seadme <i>TL-3.0</i> vastavust direktiivi 2014/53/EL põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.</p>
<p>Hereby, <i>Dynamic Load Monitoring (UK) Ltd</i> declares that <i>TL-3.0</i> is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.</p>
<p>Por medio de la presente <i>Dynamic Load Monitoring (UK) Ltd</i> declara que el <i>TL-3.0</i> cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 2014/53/UE.</p>
<p>ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ, <i>Dynamic Load Monitoring (UK) Ltd</i> ΔΗΛΩΝΕΙ ΟΤΙ <i>TL-3.0</i> ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 2014/53/ΕΕ.</p>
<p>Par la présente, <i>Dynamic Load Monitoring (UK) Ltd</i> déclare que l'appareil <i>TL-3.0</i> est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 2014/53/UE.</p>
<p>Con la presente, <i>Dynamic Load Monitoring (UK) Ltd</i> dichiara che questo <i>TL-3.0</i> è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 2014/53/UE.</p>
<p>Ar šo <i>Dynamic Load Monitoring (UK) Ltd</i> deklarē, ka <i>TL-3.0</i> atbilst Direktīvas 2014/53/ES būtiskajām prasībām un citiem ar to saistītajiem noteikumiem,</p>
<p>Šiuo <i>Dynamic Load Monitoring (UK) Ltd</i> deklaruoja, kad šis <i>TL-3.0</i> atitinka esminius reikalavimus ir kitas 2014/53/ES Direktyvos nuostatas.</p>
<p>Hierbij verklaart, <i>Dynamic Load Monitoring (UK) Ltd</i> dat het toestel <i>TL-3.0</i> in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 2014/53/EU.</p>

<p>Hawnhekk, <i>Dynamic Load Monitoring (UK) Ltd</i>, jiddikjara li dan <i>TL-3.0</i> jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 2014/53/UE.</p>
<p>Alulírott, , <i>Dynamic Load Monitoring (UK) Ltd</i> nyilatkozom, hogy a <i>TL-3.0</i> megfelel a vonatkozó alapvető követelményeknek és az 2014/53/EU irányelv egyéb előírásainak.</p>
<p>Niniejszym <i>Dynamic Load Monitoring (UK) Ltd</i> oświadcza, że <i>TL-3.0</i> jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 2014/53/UE.</p>
<p><i>Dynamic Load Monitoring (UK) Ltd</i> declara que este <i>TL-3.0</i> está conforme com os requisitos essenciais e outras disposições da Directiva 2014/53/UE.</p>
<p><i>Dynamic Load Monitoring (UK) Ltd</i> izjavlja, da je ta <i>TL-3.0</i> v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 2014/53/EU.</p>
<p><i>Dynamic Load Monitoring (UK) Ltd</i> týmto vyhlasuje, že <i>TL-3.0</i> spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 2014/53/EÚ.</p>
<p><i>Dynamic Load Monitoring (UK) Ltd</i> vakuuttaa täten että <i>TL-3.0</i> tyyppinen laite on direktiivin 2014/53/EU oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.</p>
<p>Härmed intygar <i>Dynamic Load Monitoring (UK) Ltd</i> att denna <i>TL-3.0</i> står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 2014/53/EU.</p>
<p>Hér með lýsir <i>Dynamic Load Monitoring (UK) Ltd</i> yfir því að <i>TL-3.0</i> er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 2014/53/EU.</p>
<p><i>Dynamic Load Monitoring (UK) Ltd</i> erklærer herved at utstyret <i>TL-3.0</i> er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 2014/53/EU.</p>
<p>Noi, <i>Dynamic Load Monitoring (UK) Ltd</i>, declarăm pe propria noastră răspundere că produsul <i>TL-3.0</i> este în conformitate cu cerințele esențiale și celelalte prevederi aplicabile ale Directivei 2014/53/UE.</p>

A copy of the signed Declaration of Conformity can be found here:

www.dIm-uk.com/downloads/certificates



Dynamic Load Monitoring (UK) Ltd

DLM House, Bridgers Farm, Nursling Street, Nursling, Southampton, SO16 0YA

T: +44 (0)2380 741 700 E: sales@d1m-uk.com W: d1m-uk.com

7.2 FCC

This device complies with Part 15.247 of the FCC rules. Operation is subject to the following two conditions:

- 1) This device must accept any interference and
- 2) This device must accept any interference received including interference that may cause undesired operation

Changes or modifications not expressly approved by Dynamic Load Monitoring Ltd. could void the user's authority to operate the equipment.

Additional FCC requirements and testing when installing in another host:

Manufacturers integrating the Link Module into other devices should note the following:

- The device is compliant with part 15.247 of Title 47 of the FCC rules. If the Link Module is integrated into a new host product, the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.
- If the link module is integrated into a new host product, the should follow FCC KDB 996369 D04 Module Integration Guide. The link unit may be placed into continuous transmit or hopping modes using test firmware, a unit containing this firmware can be supplied from Dynamic Load Monitoring (UK) Ltd via the above contact details.



REGISTERED IN ENGLAND NO. 2924110.

REGISTERED OFFICE 14 BAKERS DROVE, ROWNHAMS, SOUTHAMPTON, SO16 8AD