datum electronics

425 SERIES

PTO Torque & Power Monitoring System

PRODUCT OVERVIEW

Made in the UK

PRECISION. DATA. INNOVATION.

425 SERIES

PTO Torque & Power Monitoring System

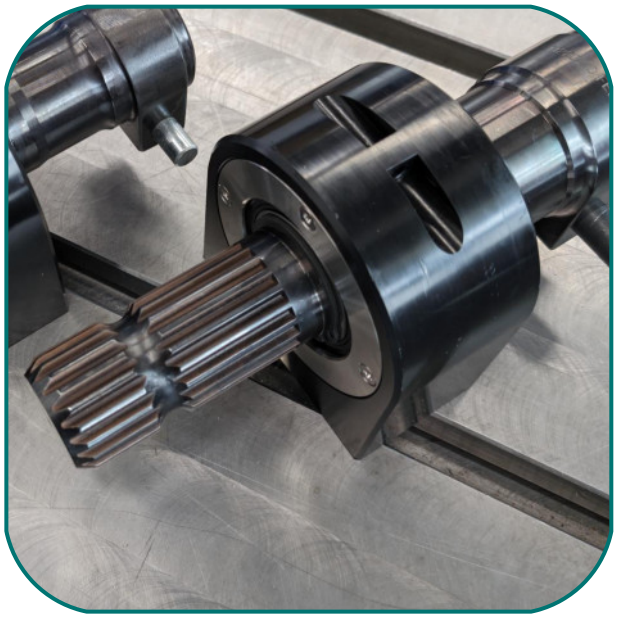
The Datum Electronics PTO Torque and Power Monitoring System measures and logs the torque, RPM, and shaft power transmitted from the tractor to the PTO (power take-off) or stub shaft-driven machinery.

The Datum PTO425 combines strain-gauge technology, robust build quality, and wireless telemetry, to deliver highly accurate performance data to the user via **Datum Link**, our monitoring app for iOS, Android, and Windows devices.

Compatible with all standard PTO shafts and offering a range of digital and analogue inputs, the Datum PTO425 is ideal for those seeking validate performance, optimise efficiency, and ensure safe operation in heavy duty agricultural and industrial applications.

Features and Benefits

- Accuracy Class: 0.1
- Compatible with all standard PTO shafts
- IP65 Rating for harsh field applications
- Simple to setup and install on your equipment
- Selectable analogue outputs of torque, speed & power
- Digital data outputs via RS-485 and Wi-Fi
- Compatible with Datum Link app for iOS, Android, & Windows
- PC test software also included



System Overview

The Datum PTO425 is a non-contact rotary torque transducer built to accurately measure bidirectional torque, rotational speed, and calculated shaft power. Its advanced strain-gauge technology and on-shaft microprocessors capture data and transmit wirelessly to the stationary stator assembly.

Data Transmission & Interface

Torque, RPM, and calculated power data is transmitted digitally to the **Datum Link** app over Wi-Fi, with with RS-485 also available for Windows devices via a USB-Serial connection from the included Datum Connect Interface (DCI). Analogue outputs are also available from the DCI.

Mechanical Design

The Datum PTO425 functions as an in-line extension between the power source and driven equipment. It features a female coupling on one end and a male coupling on the other, mirroring the connection style of standard PTO setups.

Components & Connections

Datum PTO425 Transducer

Datum Connect Interface (DCI)

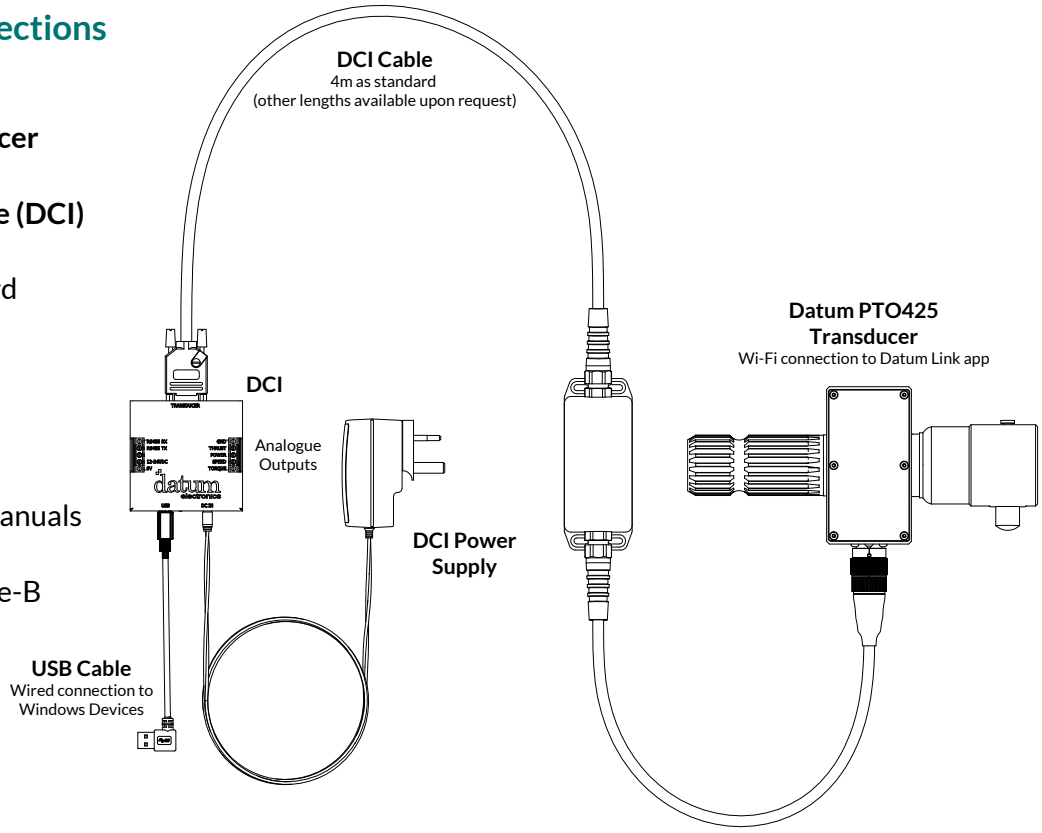
DCI Cable: 4m as standard

DCI Power Supply

Calibration Certificate

USB Drive: Software & manuals

USB Cable: type-A to type-B



For applications other than the one shown above please contact Datum Electronics for power supply requirements (including DC supply options).

Familiarisation

Before installing your Datum 425PTO into the rig or vehicle we would advise you to familiarise yourself with its connections and operation by performing a bench test. By connecting the transducer to the DCI you will be able to rotate the shaft to generate measurable output signals - see Datum Link below:

Datum Link

Install, Connect, Monitor

Now available for iOS, Android, and Windows devices, Datum Link provides seamless access to data from the Datum PTO425.

Want to learn more?

Visit **datum-electronics.com/datum-link**

Download on the App Store

GET IT ON Google Play

Get it from Microsoft

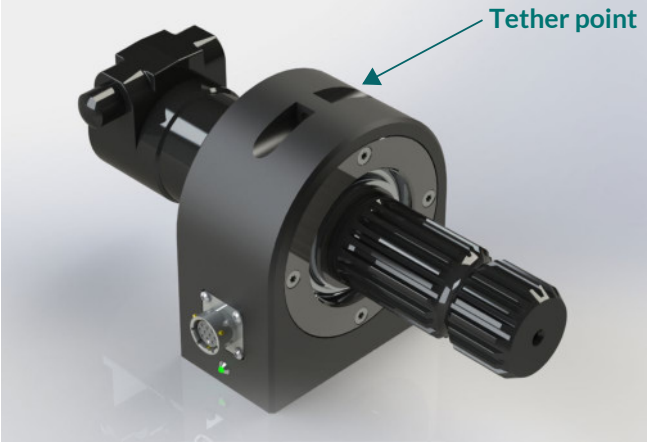
Image Credit – Coolamon

Mechanical Installation

Anti-Rotation Point

The body of the transducer is suspended on bearings on the rotating shaft. An anti-rotation tether point is provided on the transducer to prevent the transducer body from rotating with the shaft. A chain, cable tie or similar are examples of acceptable tethers. **Under no circumstances should the DCI cable be relied upon as an anti-rotation tether.**

The bearing in the transducer is intended for supporting the body of the transducer only and should not be used to support the shaft or assembly to which the transducer is mounted.



Installation

The transducer should be attached to the PTO shaft output of the vehicle and a suitable tether arranged to a stationary part of the vehicle to prevent the outer body from rotating when the PTO shaft rotates.

The DCI cable connects the transducer to the DCI, which should be mounted in a convenient place, protected from rotating parts, dirt, and moisture.

The RS-485 output is connected to the DCI. Torque, RPM, and calculated power can be monitored from a connected device. Analogue outputs are available to be locally monitored via the DCI.

Ensure The PTO Shaft is Guarded

A tractor power take-off and the power take-off drive shaft of a machine are very dangerous if not correctly guarded. Every year people are killed or seriously injured in accidents involving PTOs and PTO drive shafts. Most of these accidents are preventable if the PTO and PTO drive shaft are fitted with guards of good design which are properly used and maintained.

NB: Broken, damaged, or badly-fitting guards can be just as dangerous as no guard at all.

Protect the tractor PTO with a shield covering the top and both sides of the PTO so that it stops anyone making contact with it, either with parts of their body or their clothes. Make sure this shield is well made and capable of supporting a downward load of at least 120 kg. When the PTO is not in use, it may be covered by a fixed cap. Guard PTO drive shafts by enclosing them along their full length, from the tractor to the first bearing on the machine.

Take care to route all the PTO Transducer cables safely away from the rotating PTO shaft

and any moving mechanical components. Secure them with cable ties to ensure there is no possibility of fouling on the rotating shaft.

Further advice on guarding the PTO shaft is available from the Health and Safety Executive website at the following link:

hse.gov.uk/pubns/ais40.pdf

Calibration

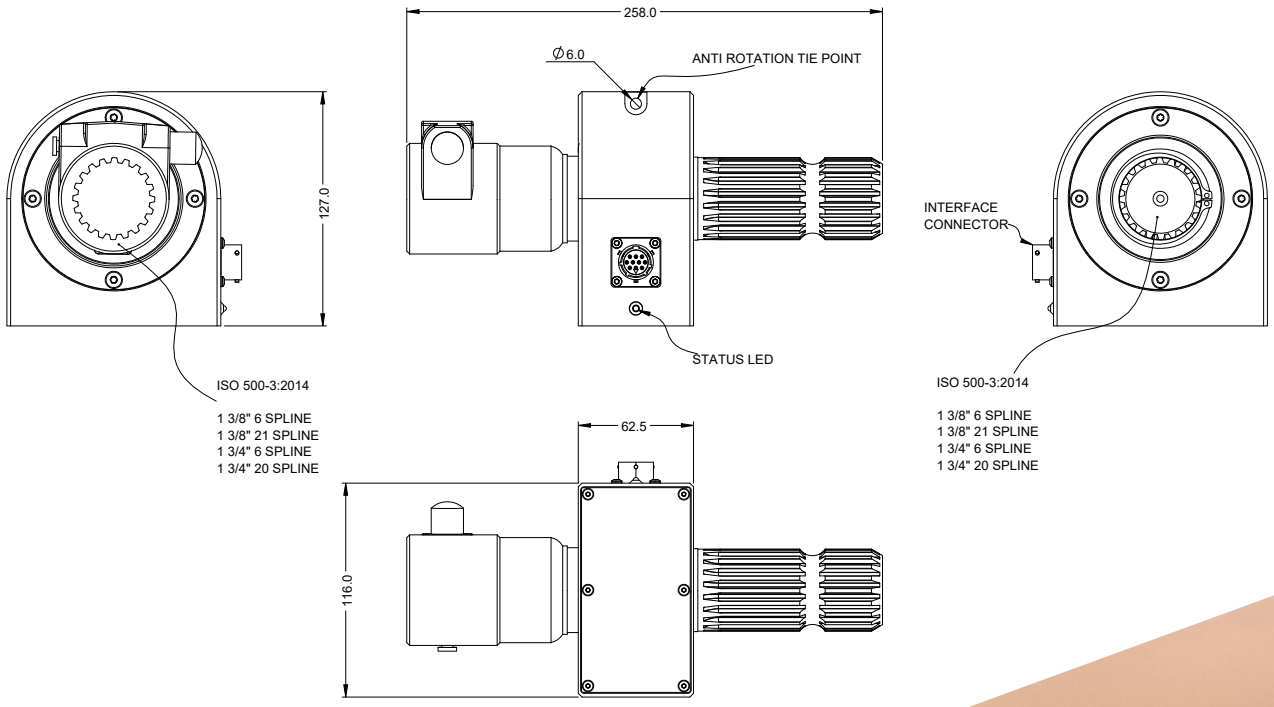
The transducer is supplied with a calibration certificate for reference purposes. The output from the transducer is described in mV/V and related to data transmitted via the RS-485 output from the transducer.

The DCI is supplied pre-set to the transducer's calibration values and should not need to be adjusted other than a possible re-setting of the transducer's zero offset through Datum Link.

Operation

Datum Link will show the torque, RPM, and calculated power, as measured by the transducer. Datum Link also provides log file management and export capabilities along with the ability to configure DCI analogue outputs.

Specifications

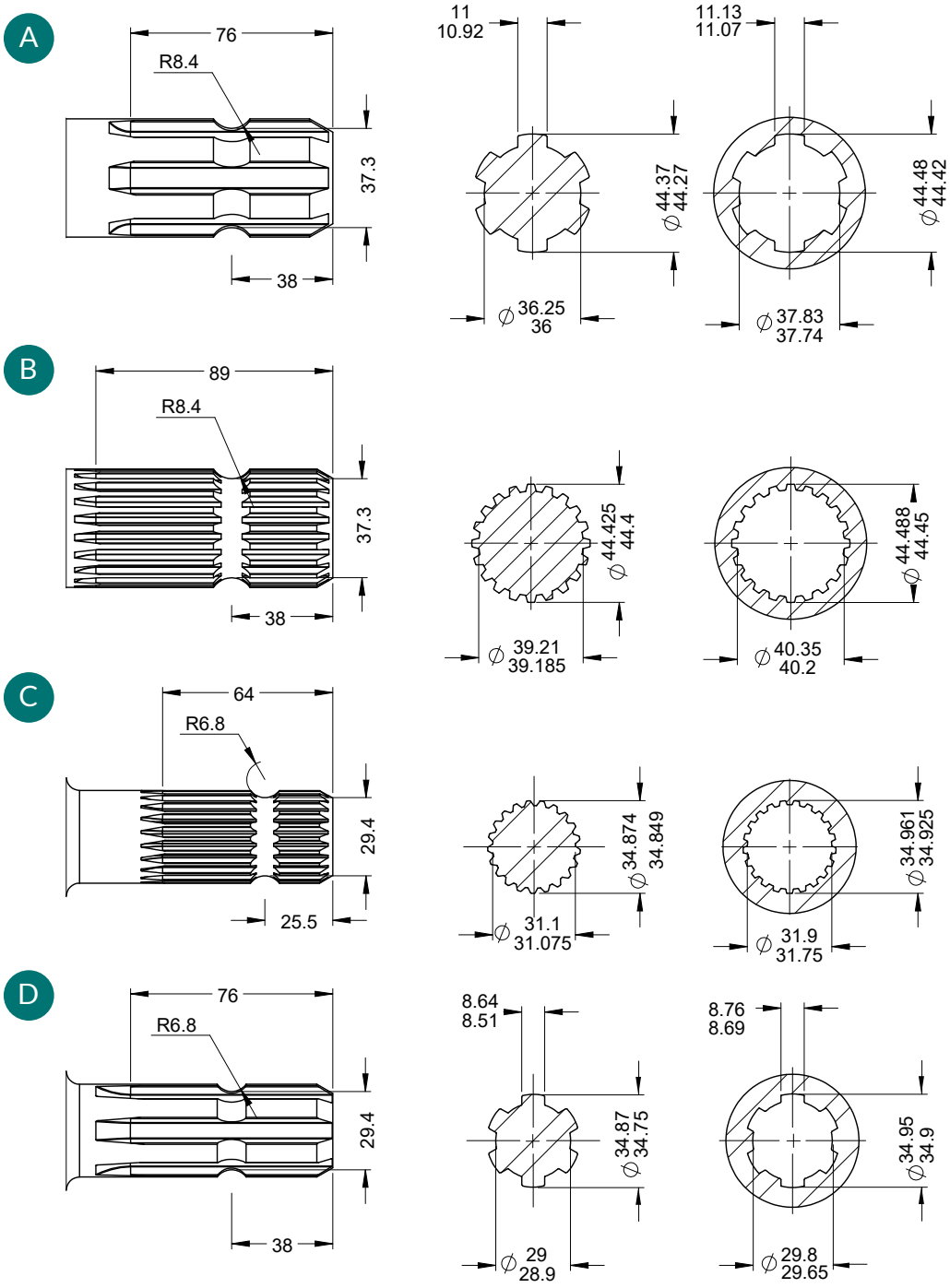


Mechanical Interface Specifications

Datum PTO425 Transducer compatible spline configurations.

Splined Power Take Off Shaft Profiles:

- A Male / Female 1 ¾" x 6 spline
- B Male / Female 1 ¾" x 20 spline
- C Male / Female 1 ⅜" x 21 spline
- D Male / Female 1 ⅜" x 6 spline



3D models and STEP files are available from Datum Electronics to assist project planning.

Please contact Datum Electronics for more information.

Pre-Calibrated and Tested

Test Certificate

The PTO Torque and Power Monitoring System is calibrated on test rigs traceable to UK National Standards.

The PTO transducers are subjected to a series of test cycles starting with a proof load cycle(s) and then followed by a series of calibration cycles.

Loads are applied from zero torque to the maximum working torque of the transducer.

The data shown on the test certificate:

- The test equipment used
- Calibration date
- A table of the actual loads applied against the output
- The output is described in either:
    - mV/V - this is the raw strain signal from the torque shaft
    - Nm/lb-ft - this is the calibrated output of the transducer
- PTO transducers have an output that is processed and displayed in the instrumentation or user software.
- RPM

PTO Model	Rated load (N·m)	Power	Speed (RPM)	Accuracy	Protection	System weight (kg)
Male / Female 1 ¾" x 6 spline	2500	190 HP or 141 kW at 540 RPM 350 HP or 261 kW at 1000 RPM	540/1000	0.1%	IP65	5.4
Male / Female 1 ¾" x 20 spline	2500	190 HP or 141 kW at 540 RPM 350 HP or 261 kW at 1000 RPM	540/1000	0.1%	IP65	5.4
Male / Female 1 ⅜" x 6 spline	1800	135 HP or 101 kW at 540 RPM 253 HP or 188 kW at 1000 RPM	540/1000	0.1%	IP65	4.4
Male / Female 1 ⅜" x 21 spline	1800	135 HP or 101 kW at 540 RPM 253 HP or 188 kW at 1000 RPM	540/1000	0.1%	IP65	4.4

For more information, or to discuss how we can tailor a solution to your exact requirements, speak with our team.

Maintenance

Serviceable Items: Bearings

The bearings are the only component on the PTO Torque & Power Monitoring System that may require servicing depending on operating conditions. The following provides information on the bearing life under load conditions.

The body of the transducer is supported by a bearing. The life of the bearings at normal running RPM of half the rated RPM is 10 years continuous use.

If you have requirements for high duty sensors where bearing life may be a concern due to other external loads, ask our team about the **Datum RS425** and **Datum FF425**. These bearing-free sensors provide a high degree of flexibility with regard to mounting tolerances and maintenance free operation.

If the transducer shaft is bent, its balance will be disturbed and the bearing life will be reduced. Excessive load or mounting misalignment will also affect the life of the bearings. Bearings can be serviced by a return to Datum Electronics.
See our Calibration & Repair service at:

datum-electronics.com/services/torque-calibration

Glossary of Terms

Engineering Units

The transducers/sensors are calibrated in engineering units of either N·m or lbf·ft.

Full Scale Output

The mV/V is the output from the transducer when the rated load in applied.

mV/V

To measure torque we use a bridge network of resistive strain gauges. These change resistance with the applied stain. The output the y give is a ratio of the voltage applied and the mV change in signal from the bridge.

This mV/V ratio is normally quoted in the form 1.55mV/V = 1000Nm. The mV/V value is established at calibration by applying a known torque to the shaft. This ratio will remain constant for the life of the transducer/sensor unless damaged.

Noise

Irregular fluctuations that accompany a transmitted electrical signal but are not part of the data generated from the sensor.

Proof Load

The proof load is the load to which the transducer/sensor has been tested - occasional loading to this level should not damage the transducer. Repeated loading to this level will reduce the fatigue life of the transducer and may cause small zero offset over time (usually measured in either N·m or lbf·ft).

Rated Load

The Rated Load is the designed full load of the transducer/sensor (measured in either Nm or lb-ft).

Raw Data

Raw data is the raw strain level from the torque shaft. It will include any zero offset.

The scaling of the raw data will require:

Torque [Nm] = (raw data [mV/V] - zero offset [mV/V]) x (rated torque [Nm]) ÷ (full scale output [mV/V]).

Sensor

A sensor measures a physical quantity and converts this into a signal. The physical quantity is torque or torsional strain, this is converted into serial data.

Note: The words transducer and sensor are often used in this context to mean the same thing.

Span

This is the value of output at the rated load. Either given in terms of mV/V signal or Nm or lb-ft when in engineering units.

STEP files

A STEP file is a widely adopted CAD file format used to share 3D models between users with different CAD systems.

Torque

The twisting force on the shaft created by the driving force (motor) and the resisting force (brake or gear).

Transducer

A transducer is defined as a device that converts one form of energy to another. In terms of the PTO Power Monitoring System the transducer converts torque into serial data.

Note: The words transducer and sensor are often used in this context to mean the same thing.

Zero

This is the value of the signal when the shaft is completely unloaded. Normally quoted in mV/V.

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