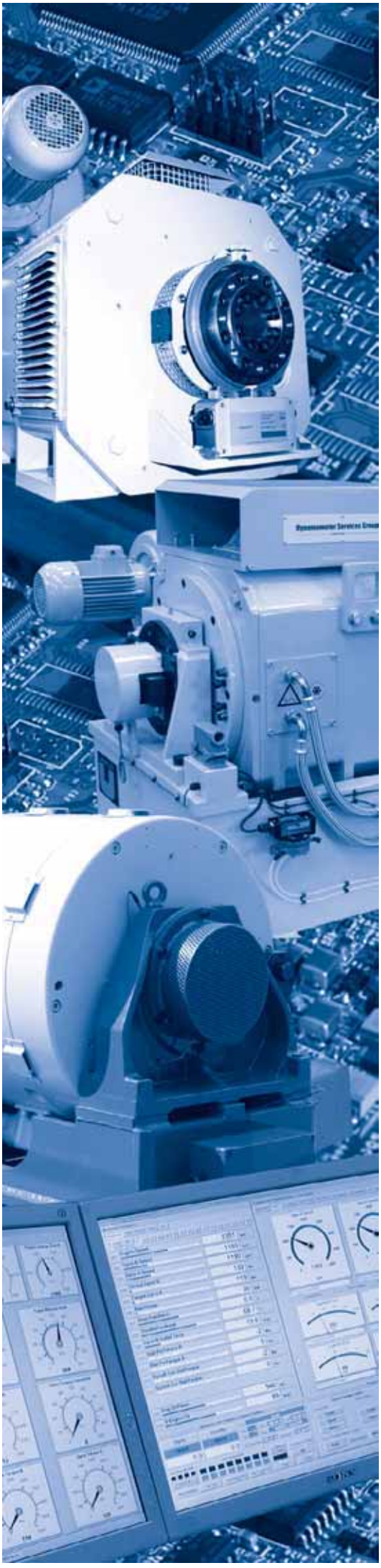

Product Information

Advanced Digital Control &
Data Acquisition Systems

New and Factory
Remanufactured Dynamometers

Dynamometer Services Group Limited

A unique combination of experience in all aspects of engine, transmission, vehicle and component testing.

A one stop solution for your automotive testing requirements.

Worcester, UK
www.dsgroup.uk.com
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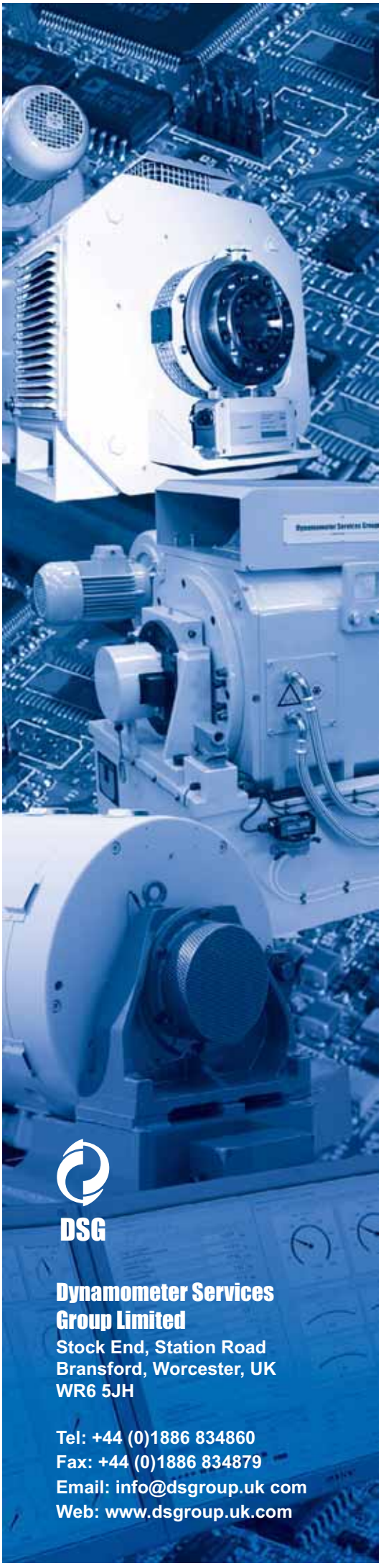

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Company Profile

Dynamometer Services Group Limited is an ISO9001 accredited company formed in 2000 from the joining together of two long standing companies:

- Dynamometer Services Limited (originally formed in the 1970's) and
- Engine & Dynamometer Services Limited (formed in the 1980's).

DSG is now a leading manufacturer of engine, transmission and vehicle test systems in the UK.

New Facilities in Worcester

Based at our new purpose built facilities on the outskirts of Worcester, DSG can provide a full range of services including design, engineering, service support and dynamometer repair and remanufacture.

The facility also includes storage for an extensive range of reconditioned dynamometers and associated equipment.

Engineering Services offered by DSG include:

- Consultancy & Project Management
- Design & Manufacture
- Data Acquisition & Control
- Turnkey Test Cells
- Chassis Dynamometer Upgrades

Mechanical Services offered by DSG include:

- Support Systems
- Installation & Commissioning
- Calibration
- Maintenance
- Spares
- Dynamometer Refurbishment

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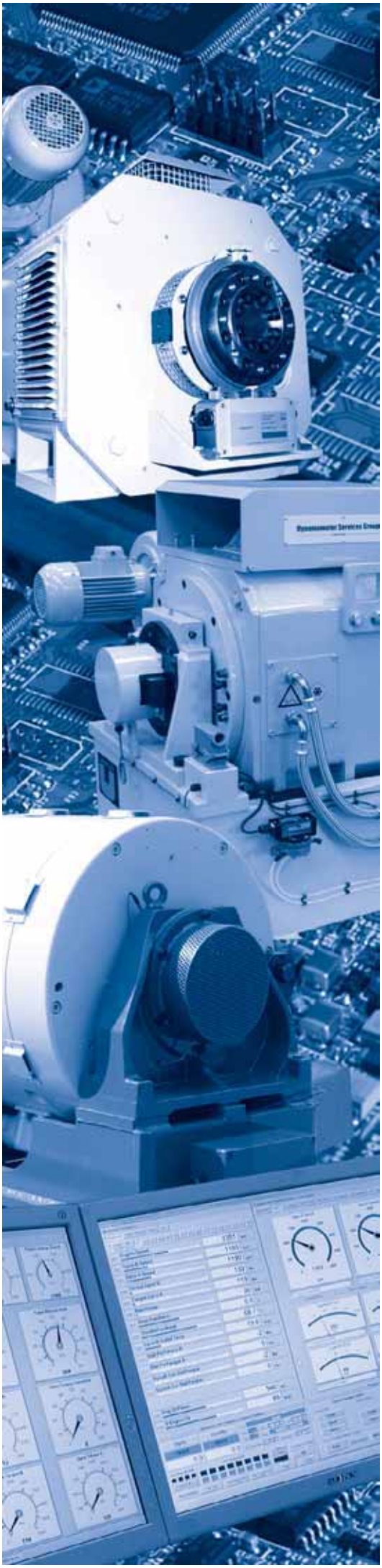


Dynamometer Strip, Report and Overhaul Service

DSG specialise in aftermarket overhaul for most brands of Eddy Current and Hydraulic dynamometers.

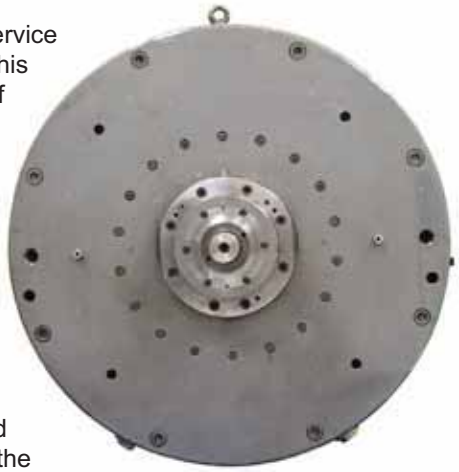
Our purpose built facility includes all the specialist lifting, Pre & Post overhaul testing and re-finishing equipment necessary to provide reconditioned machines of the highest standard.

All of our reconditioned machines carry a 6 month warranty covering malfunction due to defective workmanship and/or defects of supplied components.

A standard service for an eddy current dynamometer (as shown) would include the following:

- Strip of machine.
- De-scaling of the loss plates and sand blasting of the loss plate tracks.
- Checking of the coil continuity.
- Cleaning of the shafts and grinding of the front and rear flange surface.
- Checking of the speed pick up.
- Checking of the temperature sensors for the water inlet/outlet (where fitted).
- Checking of the pressure switch operation (where fitted).
- Checking of the dynamometer terminal wiring.
- Cleaning of the trunnion bearing seat.
- Checking of the gap between rotor and stator.

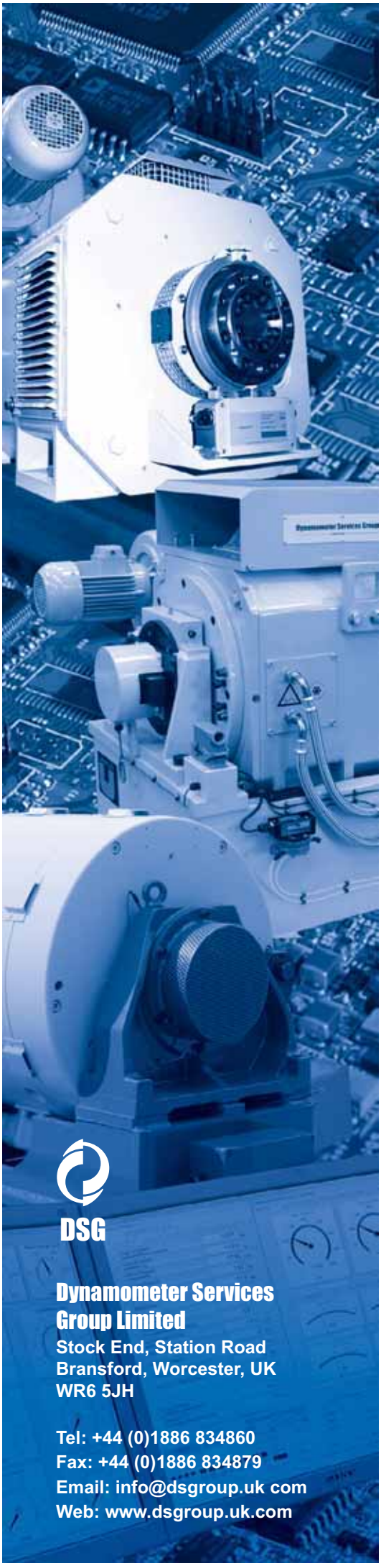
At this stage a strip report and service quotation will be provided. This report details the findings of the initial strip of the machine including any modifications that may be recommended. The quotation details our estimates for the final cost of repair.



Once you have received the report and agreed the details of the service an order number will be required to complete the build of the machine, including the following:

- Works completed as per strip report/quotation (Non Standard services).
- Rebuild of machine including replacement of shaft bearings and seals.
- Pressure test.
- Spin test.
- Re-spray of the machine.

continued...



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A typical turn-a-round time for a standard service as detailed above would be 7 – 10 working days; this is strictly subject to the findings of the initial strip and report.

A full range of both Mechanical and Electrical overhaul and installation services are available; please contact DSG for further details.

Typical Service & Support Work for Overhauling Dynamometers

For a speedy service during breakdown/emergency support, Dynamometer Services Group can operate special arrangements for service and support work for overhauling Customers dynamometers.

Typical arrangements are as follows:

- Dynamometer Services Group submits a quotation for the overhaul of a number of dynamometers including parts, for example between £20,000 - £30,000 in net order value. This value is agreed between Dynamometer Services Group and the Customer.
- The Customer places an order for the agreed amount.
- The Customer then calls off against this order all items required including dynamometer overhauls, service support and parts. This work can only be authorised by selected personnel and DSG invoices against the 'blanket' order.

The obvious benefit of this is response time as we do not have to wait for the order to be processed in an emergency. When the order value reduces to an agreed point, typically £5,000, Dynamometer Services Group will notify the Customer and re-submit a new quotation to the Purchasing Department.

This hopefully provides a seamless service for the customer.

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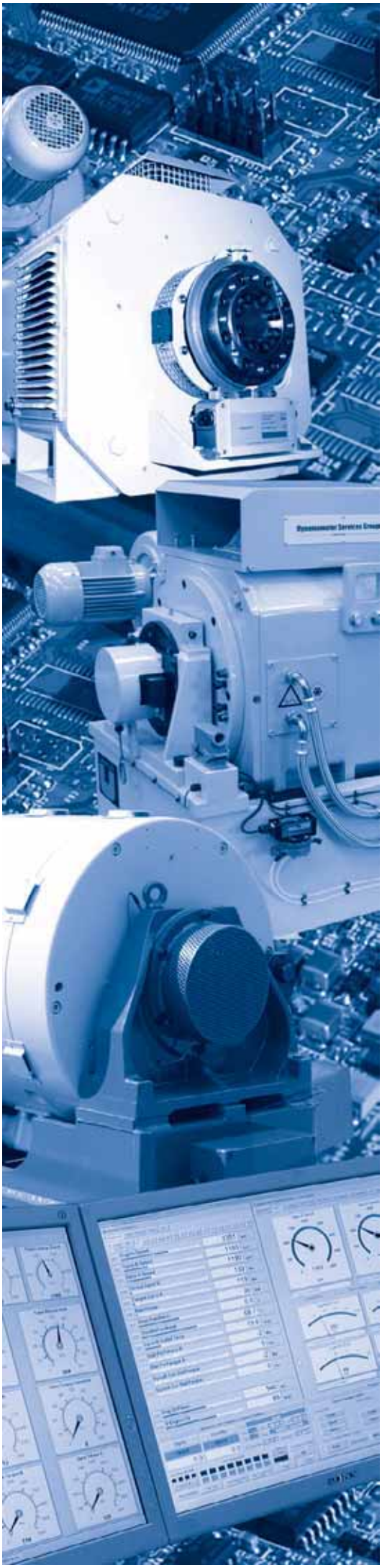
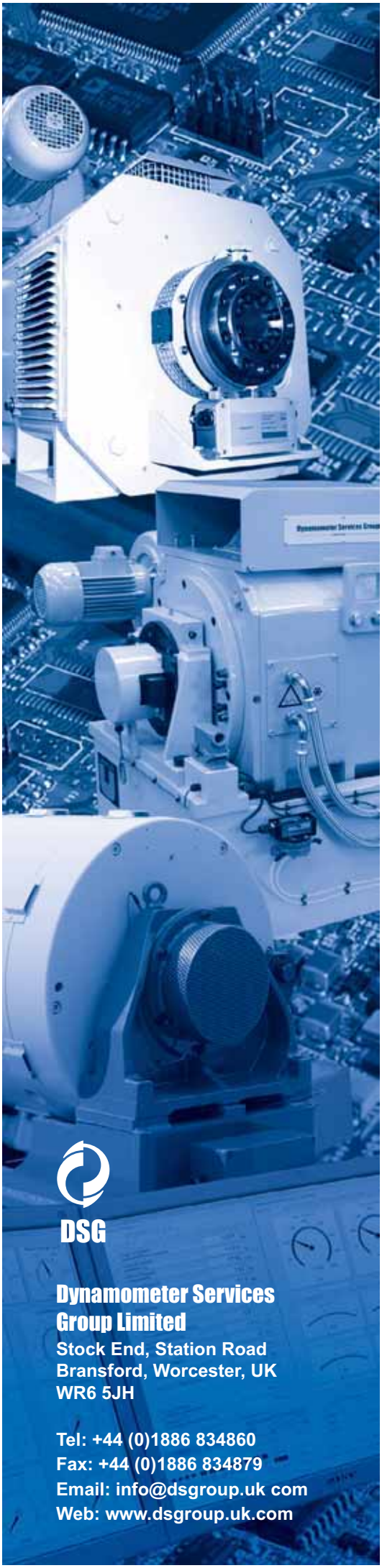


Reconditioned Hydraulic and Eddy-Current Dynamometers

Froude Dynamometers

Size	Max BHP	Speed Range
DPX0	60	6,000 – 10,000
DPX045	80	8,000 – 14,000
DPX1	100	5,000 – 9,000
DPX145	135	6,750 – 10,500
DPX2	150	4,000 – 7,500
DPX245	200	5,300 – 10,500
DPX3	225	2,800 – 6,000
DPX345	300	3,750 – 8,250
DPX4	350	2,000 – 5,000
DPY5	1000	2,000 – 3,500
DPY6	1500	1,500 – 2,750
DPY7	2000	1,200 – 2,500
DPY7D	4000	1,200 – 2,500
G3	300	3,750 – 7,500
GB3	500	6,250 – 10,000
G4	600	3,400 – 6,000
GB4	600	3,400 – 9,000
G5	1200	2,750 – 4,000
G490EH	1000	6,000 – 15,000
G490EH	1000	6,000 – 19,000
F24M	800	2,100 – 6,000
F0151	350	5,400 – 12,000
F0201	800	4,600 – 10,000
F0201EH	400	2,300 – 10,000
F020145	800	4,500 – 10,000
F0271	1300	2,800 – 8,000
F0351	2200	2,200 – 6,000
EC26	100	4,700 – 9,000
EC38	212	3,300 – 8,000
EC50	400	2,600 – 6,000
AG80	100	4,700 – 14,000
AG150	200	2,600 – 12,000
AG250	325	2,500 – 8,000
AG400	500	2,000 – 8,000
MK.I	300	4,500 – 10,000
MK.II	250	2,000 – 6,000
MK.III	500	1,400 – 3,500
MK.IV	1000	1,400 – 3,500



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Borghi & Saveri Dynamometers:

Size	Max BHP	Speed Range
FA60	60	3,000 – 12,000
FA100	100	3,250 – 8,000
FE60-S	60	3,250 – 13,000
FE100-S	100	3,250 – 13,000
FE150-S	150	4,500 – 13,000
FE260-S	260	2,750 – 12,000
FE350-S	350	1,750 – 8,000
FE600-S	600	1,500 – 5,500
FE900-S	900	1,500 – 4,000

Schenck Dynamometers:

Size	Max BHP	Speed Range
W40	50	5,000 – 15,500
W70	90	4,500 – 12,000
W130	170	3,000 – 10,000
W230	300	3,000 – 10,000
W400	520	2,000 – 5,500
D400	520	4,000 – 10,000
D700	900	3,500 – 7,500
D900	1175	3,000 – 5,500
D1200	1565	2,500 – 5,500
D2100	2740	2,200 – 4,000

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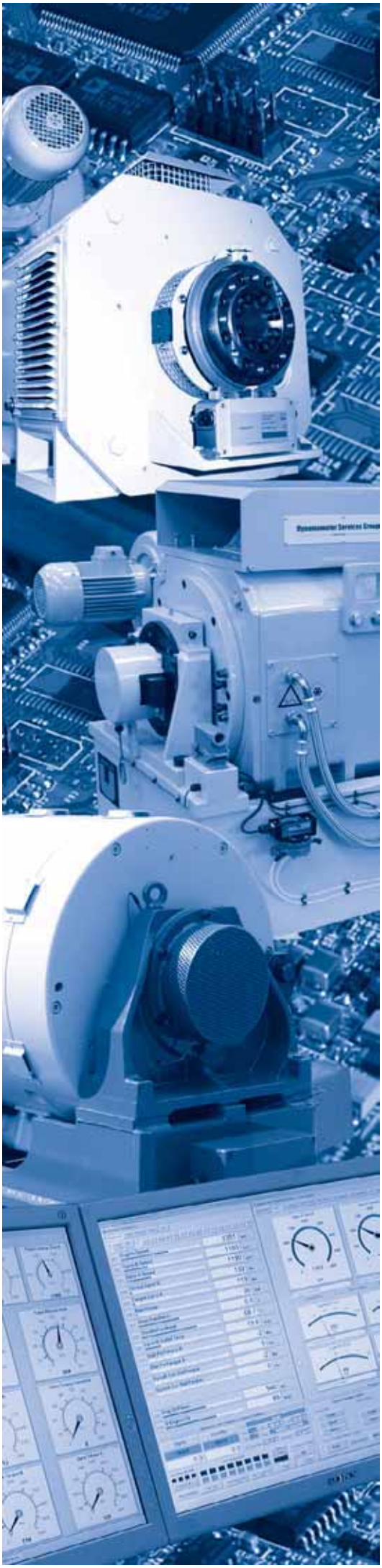

Dynamometer Motoring Drives

DSG has developed a range of motoring conversions for new or existing eddy-current or hydraulic dynamometers. The motoring conversion enables engine testing in new areas such as overrun, downhill simulation, noise, vibration, manifold cracking and variable speed starting. With the inclusion of extra equipment, testing can be extended to include drive cycles, route/lap simulation and engine-friction-torque measurements.

The conversion provides a cost effective facility without the need for a total A.C. dynamometer installation.

The system comprises an A.C. motor coupled to the dynamometer by a flexible coupling, lay shaft and belt drive. An option for inline shaft connection is also available. The motor is controlled by a flux vector drive.

If motoring is not required the motor can simply track the speed of the dymamometer in a zero torque mode, thus inducing no extra load or drag on the engine.

The motor can be mounted in various positions, depending on the application and space available i.e behind, on top, underneath or at the side of the dynamometer. See overleaf.

Typical maximum motoring speed is 7500 rpm, with powers up to 100 kW.

Advantages:
- extended test capabilities
- cost effective
- compact size
- higher utilisation
- low inertia

Dynamometer Services Group Limited

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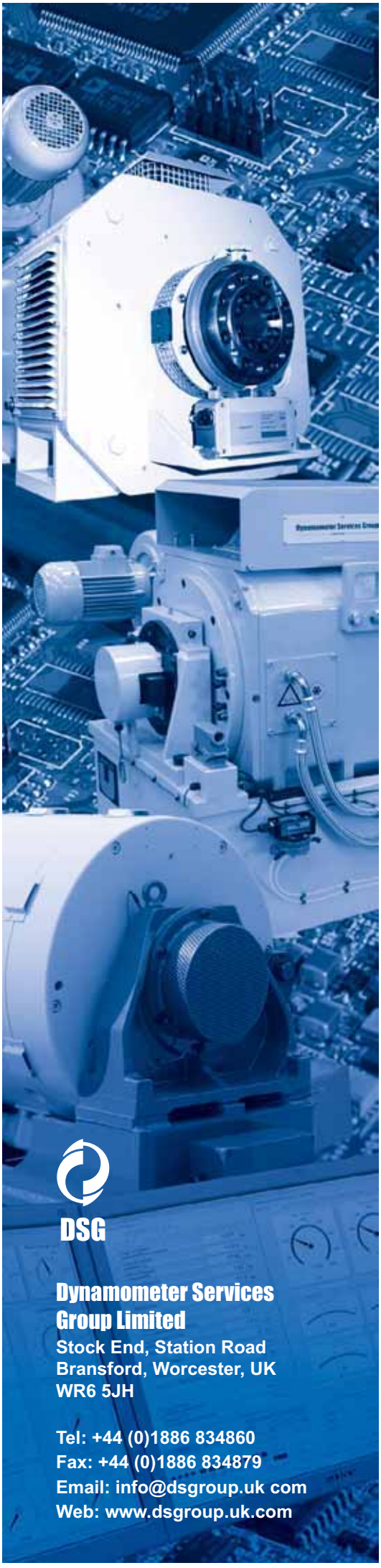

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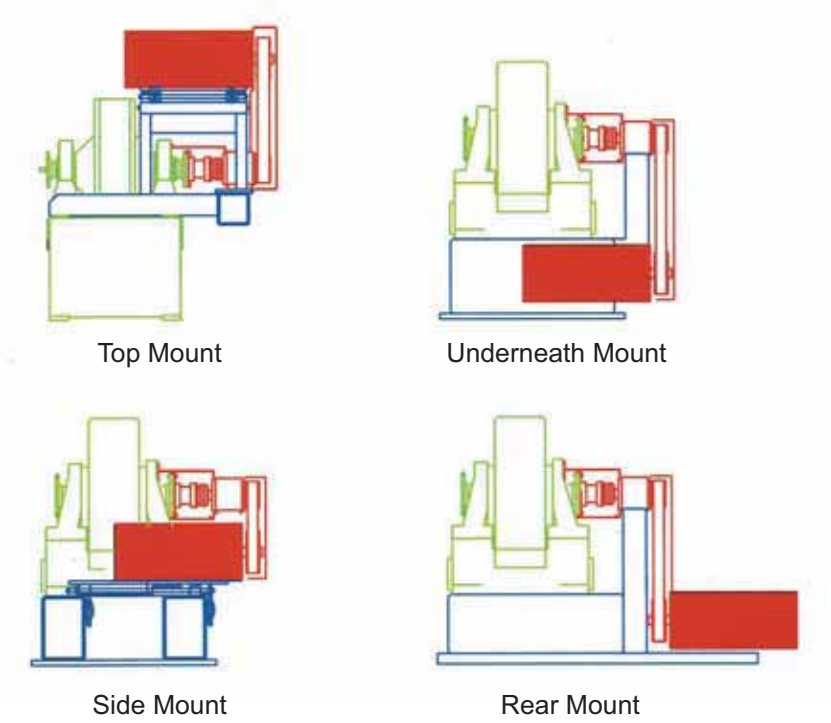
Motoring Drive Configurations including inline mount shown below



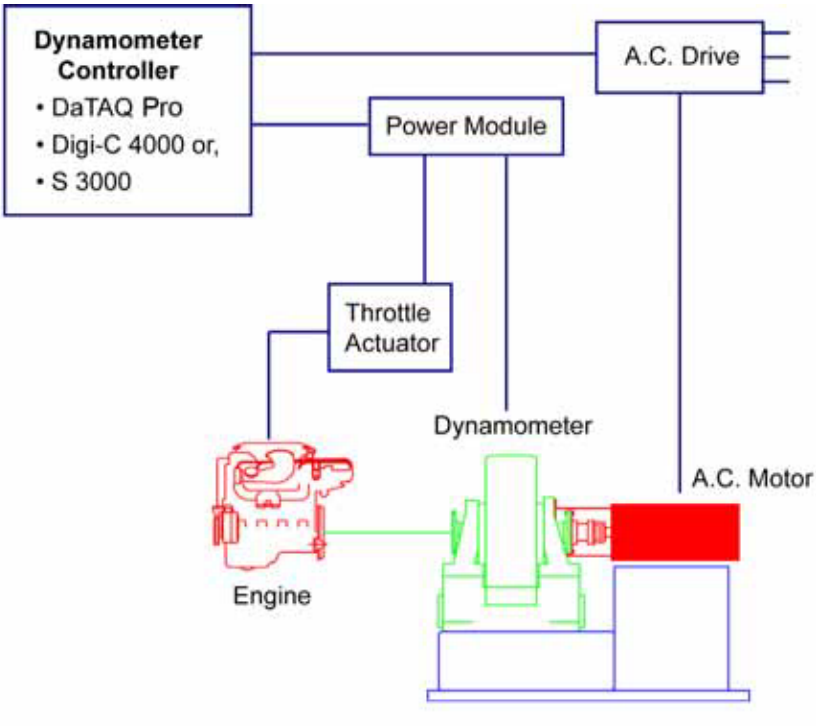
Top Mount

Underneath Mount

Side Mount

Rear Mount

Schematic Diagram



Inline Mount

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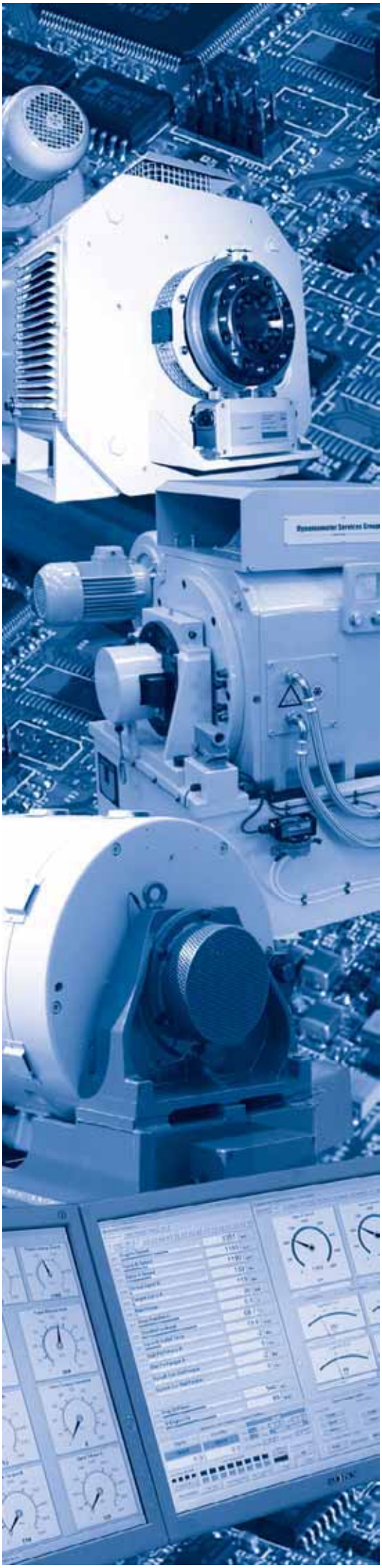
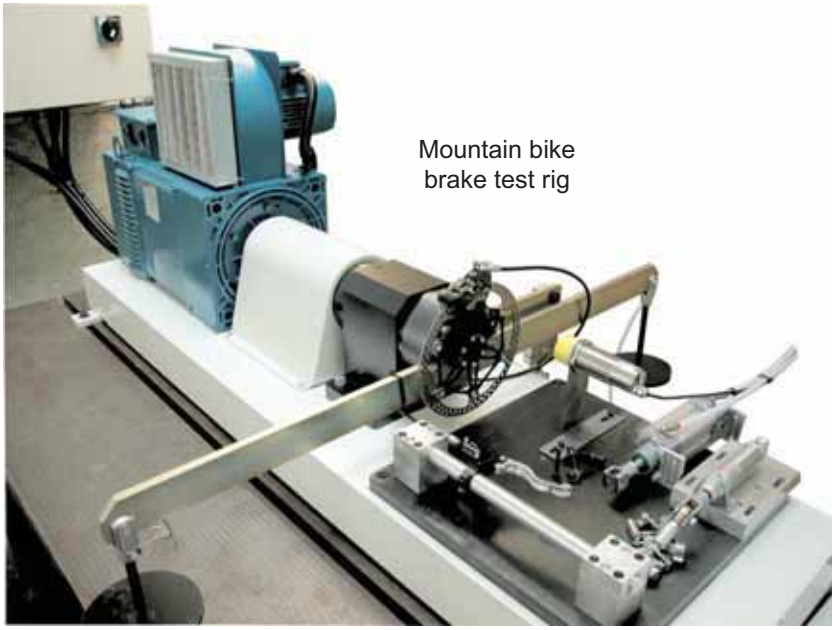


Component Test Rig

The need for manufacturers to test their products at component level has become increasingly more important. New legislation, the environment and performance, life and cost requirements have driven this need forward.

Data from testing can yield many benefits including performance, life and reliability enhancements and savings in cost, noise, size and weight.

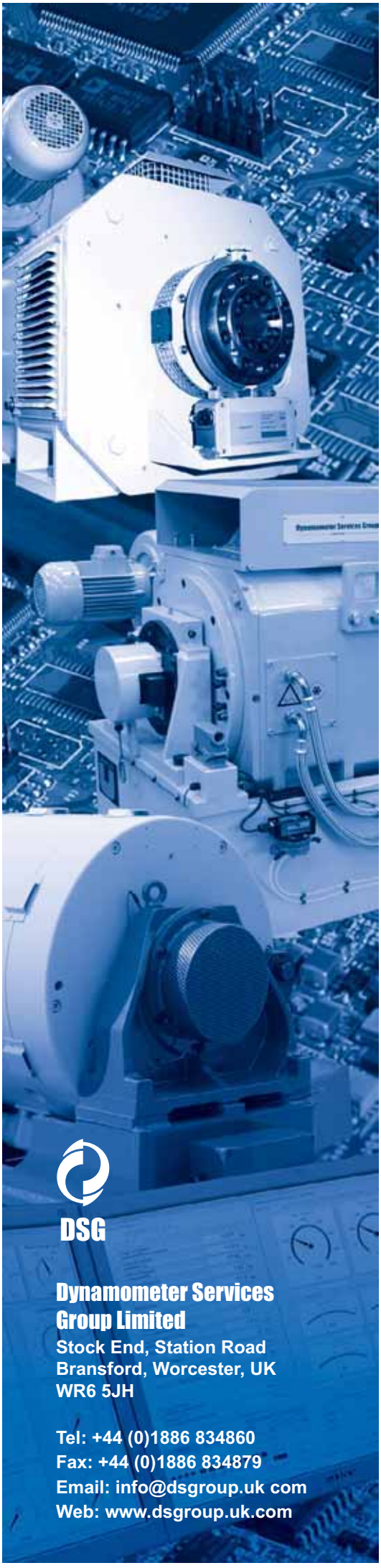


Mountain bike brake test rig

DSG has many years experience in providing component test rigs. These range from simple rigs with manual controls to multi axis rigs with fully automated controls (drive cycle simulation) and comprehensive data logging.

Typically rigs have been supplied for testing brakes, transmissions, axles, drive shafts, pumps, compressors, alternators, motors etc.

PTO test rig



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Cooling Module

DSG has designed and supplied compact cooling modules for engines up to 500kW. The module provides precise variable temperature control for both coolant and oil under steady state and dynamic conditions. Three way mixing valves and heat exchangers are incorporated in both the coolant and oil circuits. The valves are controlled by pneumatic actuators and electro-pneumatic converters.

Modules can be extended to include transmission and charge air-cooling. Preheating features can also be provided.

Modules can be free-standing, wall mounted, moveable on castors or built into the engine test bed.

• An example of a 190kW compact cooling module with coolant and oil purge pumps.

• Cooling module built into the underside of a high performance test bed

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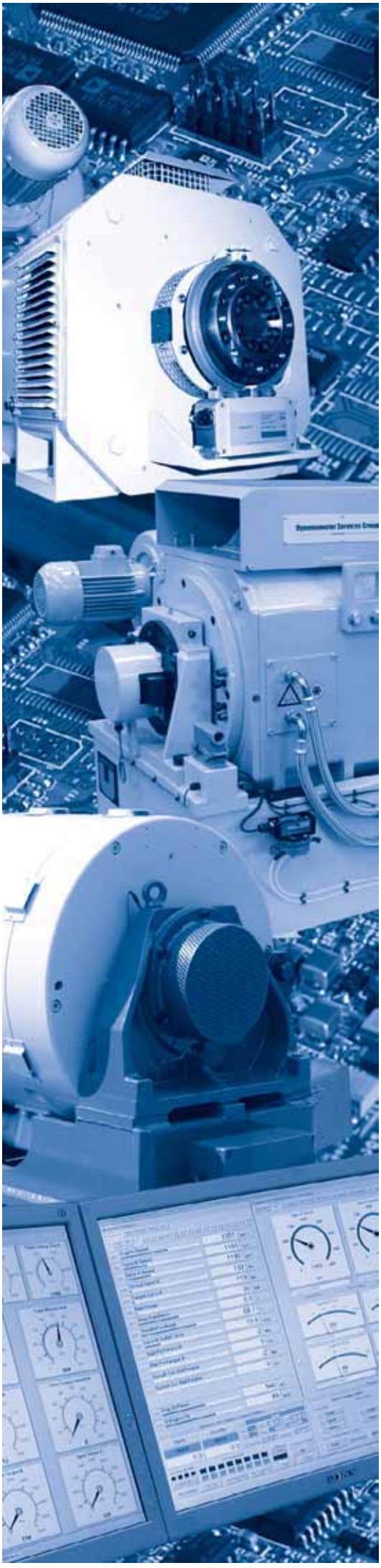

Fuel Panel

DSG provide a range of petrol and diesel fuel panels to suit new test standards and customer requirements. The panel can include fuel filter, pump, day tank, vapour eliminator, pressure regulation, fuel measurement and fuel temperature conditioning.

The panels are manufactured in stainless steel and are suitable for wall mounting in the engine cell.

Specification:

Diesel engine fuel panel suitable for use with engines rated for 400kw and specifically designed to accommodate engines with high “Spill Back” characteristics.

The system includes:

- Fuel Meter
- Vapour Eliminator
- Level control
- Cooler
- Filter
- Variable speed pump

Small engine fuel panel with fuel meter, day tank and filter

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Fuel Balance

For gravimetric measurement of petrol and diesel engine fuel comsumption on engine test beds and chassis dynamometers in research, development and production for maximum measurement volumes of 2000g.

The fuel comsumption is determined using an appropriate weighing vessel linked to an extremely accurate pressure transducer.

The mass of fuel consumed is therefore determined gravimetricaly, which means that the density does not have to be determined in addition.

The fuel consumption can thus be determined extremely accurately.

Technical Data:

- Vessel capacity: 1000/2000g
- Measurement renge: 0 - 160Kg/h
- Fuels: petrol and diesel fuels up to a maximum content of 20 vol% methanol or ethanol (M20, E20)
- Computer interface: included for DaTAQ Pro
- Power supply: 24V ± 0, 5V DC, 1.6A

Option I

- Fuel cut-off solenoid pneumatic or electrically operated

Option II

- Pressure regulator for operation on a fully pumped system

Option III

- Fuel cooler for including control valve for engine spill back

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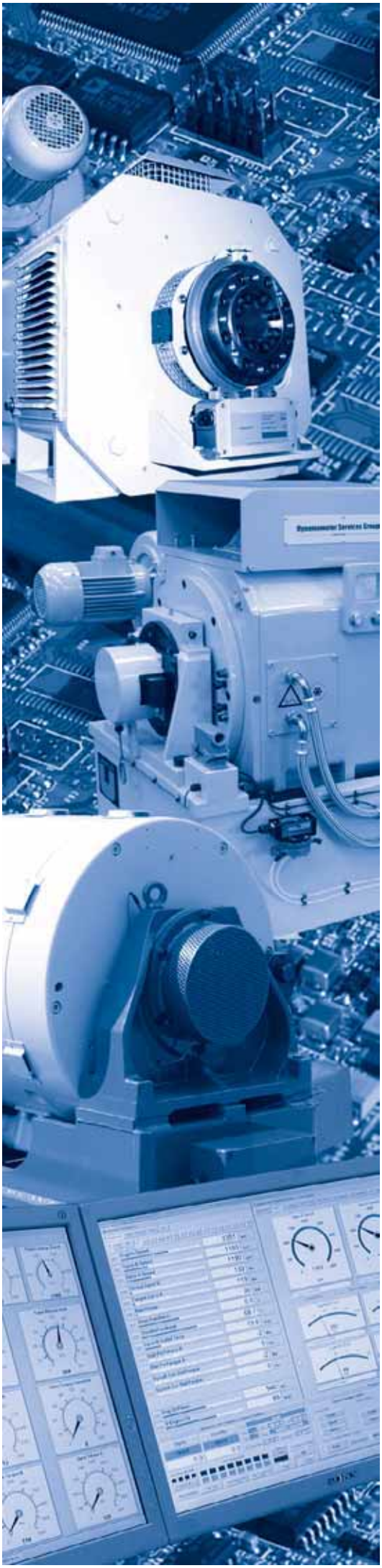


Engine Pallets

DSG provides a range of pallets which will accept engines from 100 Kg to 10 tonnes. Most pallets have tee slots which allow adjustable mounts to be fitted, thus enabling a range of engines to be accommodated. Alternatively pallets can be dedicated to suit specific engines (for production testing).

The use of a pallet based system enables engines to be mounted, aligned and rigged away from the test cell resulting in much higher test cell utilisation and engine throughput.

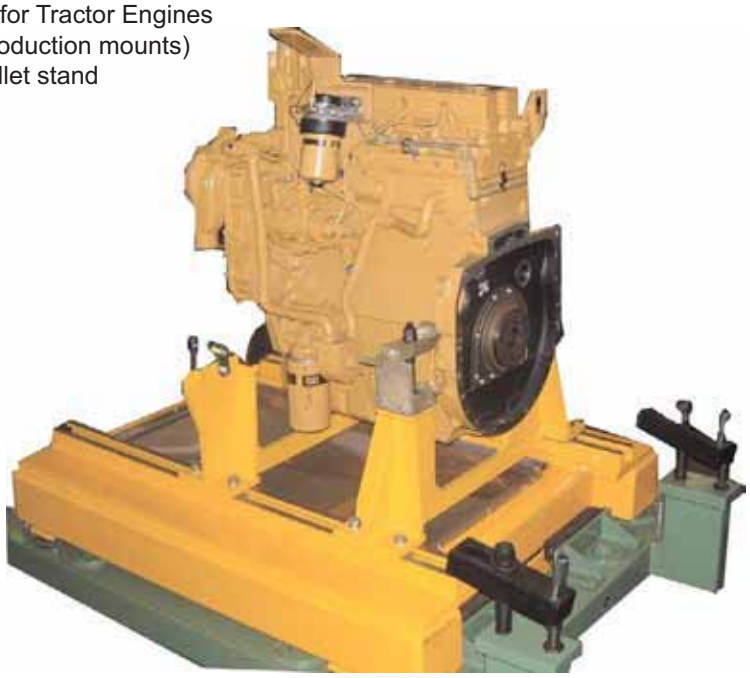
With three pallets, one engine could be on test, anothercould be being rigged for test and another be being de-rigged after a test.

for pallets with engines up to 1000Kg a manual pallet truck is used to lift/lower and move the pallet. For heavier engines a powered pallet is necessary.

The engine/pallet are lowered on to a pallet stand in the test area. The stand provides an accurate and secure mounting for the pallet whilst the engine is being tested.

• Pallet and alignment jig with jacks for universal mounting (shown in rigging shop).

• Pallet for Tractor Engines (with production mounts) on a pallet stand



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Universal Engine Pallets and Stands

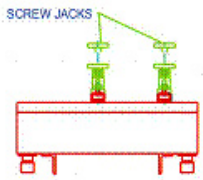
Each pallet includes:

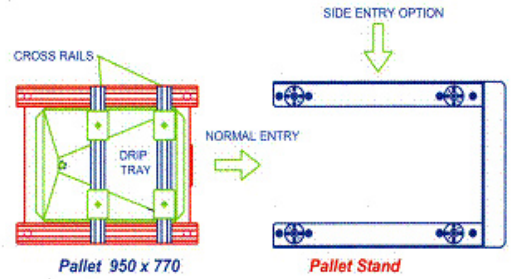
- drip tray
- cross rails (2)
- screw jacks (4)

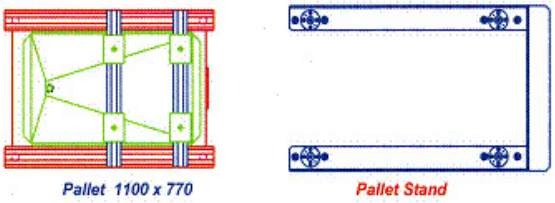
Optional items:

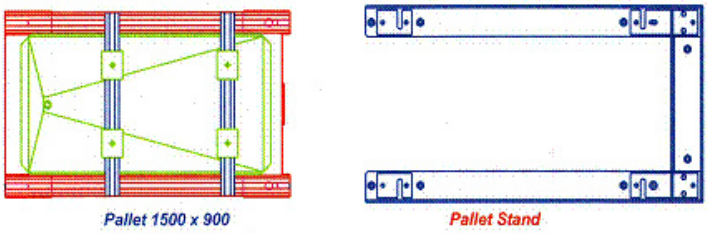
- alignment jig
- pallet truck

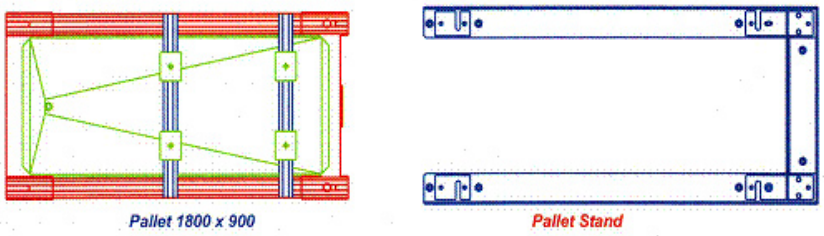
Note - Anti-vibration mounts must be fitted between engine and screw jacks.











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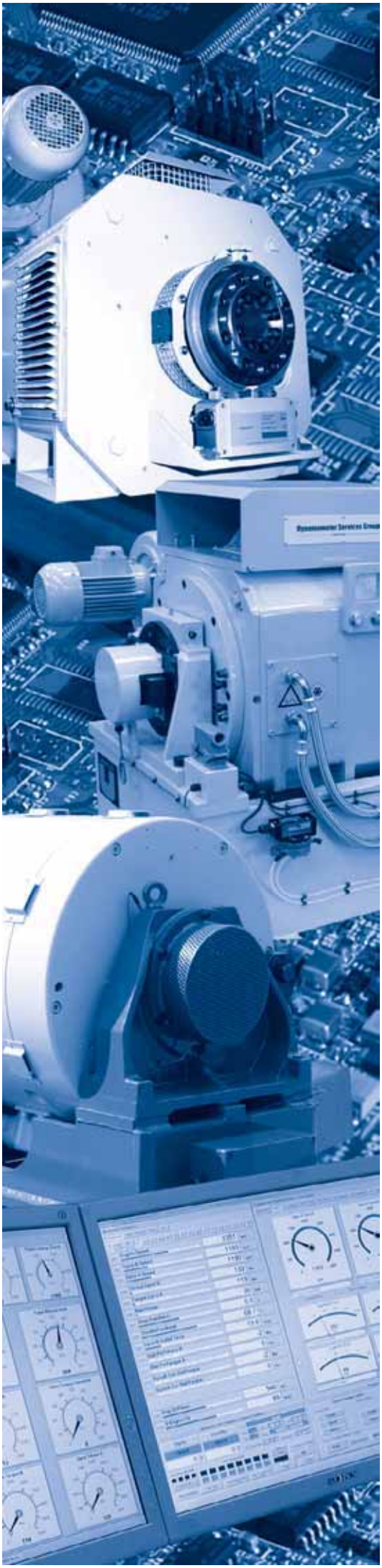


Dynamometer Display Module

The Dynamometer Display Module is a rack-mounting unit which contains an accurate load cell amplifier and tacho-meter pick-up amplifier which feeds a micro-processor based digital display system. In conjunction with Dynamometer Services specified load cell it offers a very accurate and stable readout of torque, rpm and power.

Although each display is based on a common design, aspects such as imperial / metric units, analogue meter scales and load cell amplifier gain are custom-built for every display in order to offer the best possible resolution, accuracy and stability.

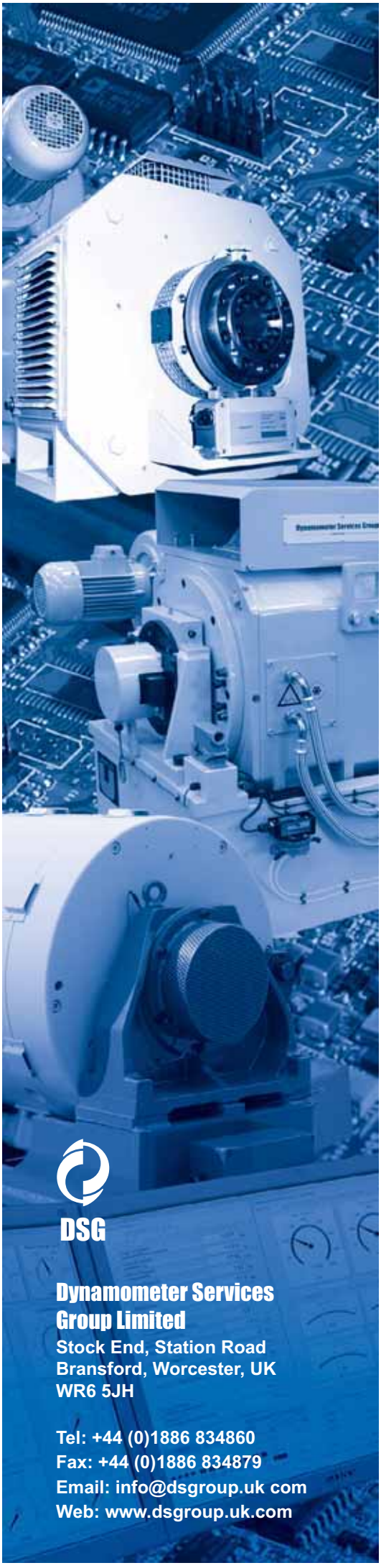
Key Design Features:

- Large clear analogue panel meters for fast estimated readings.
- 4-digit high-brightness LED displays for torque, speed and power.
- Digital auto-zero button to compensate for cooling hose torque.
- 10-range selectable digital filter for smoothed torque display.
- Hold button freezes digital display, continuous data/analogue output.
- 0-5V analogue outputs for torque and speed fitted as standard.
- 4-20mA output and RS232 data output available as low-cost options.
- Crystal controlled tachometer, display accuracy ± 2 rpm.
- Load cell voltage measurement accuracy ± 0.03% of span.
- Straightforward automated torque calibration routine.
- Rugged 19 inch (3U high) rack-mounting case.
- A complete display solution for all dynamometers.
- Customised versions available for special requirements.

Notes on Instrument Functions:

- Filter button toggles between filter ‘OFF’ (actually filter level 2, the normal measurement period of 1 second), and ‘ON’, the user’s selected filter number. This button illuminates in amber when ‘ON’. When first switched on, the filter level is displayed for one measurement period.

  If, when switched on, the button is held for more than 2 seconds, the filtering level shown in the display will cycle round ‘1” (two readings per second) to 10” (one reading every 5 seconds). When the desired level is reached, the button is released and that level is stored in memory as the ‘user’s filter level’. This can therefore be recalled and/or adjusted at any time.



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• Hold button by-passes the micro-processor's display update routine to that although readings continue to be made and sent up the RS232 link, the displayed values do not change. Display freezing is clearly shown by the button illuminating in red. Pressing again resumes updates. The analogue functions (0-5V, 4-20mA, analogue meters) are independent of the micro-processor and so continue unaffected.

• Zero (tare) makes the present reading becomes zero. This is useful for zeroing the display in case of a small torque offset induced by pressure in the cooling water hoses etc. The activation of a temporary zero is shown by the button illuminated in green. Pressing again re-loads the factory-calibrated zero.

• Digital Displays are 0.56" high brightness types with circular polarised red filters and are therefore clearly readable in daylight. The power display (kW or BHP according to requirements) is calculated exactly by the micro-processor and needs no calibration.

• Analogue Meters are 96mm square DIN panel meters with 90° movements. To make the best of their resolution, custom scales (e.g. 0-3600 rpm) are fitted to each meter. They offer fast and intuitive but, of course, approximate (± 1.5% accuracy) readings.

• Back Panel Connectors are standard square multi-pin types. Three connectors are used, one for mains (9-pin), one for the load cell (12-pin) and one for the tachometer (6-pin); all are keyed and non-reversible. A 9-pin 'D' connector is included for the retro-fittable RS232 option.

• Calibration is activated by means of a keyswitch for security. Calibration coefficients are held in non-volatile memory with a retention time of 200 years and cannot drift. If the load cell zero drifts due to mechanical preload, the digital zero button restores exact calibration.

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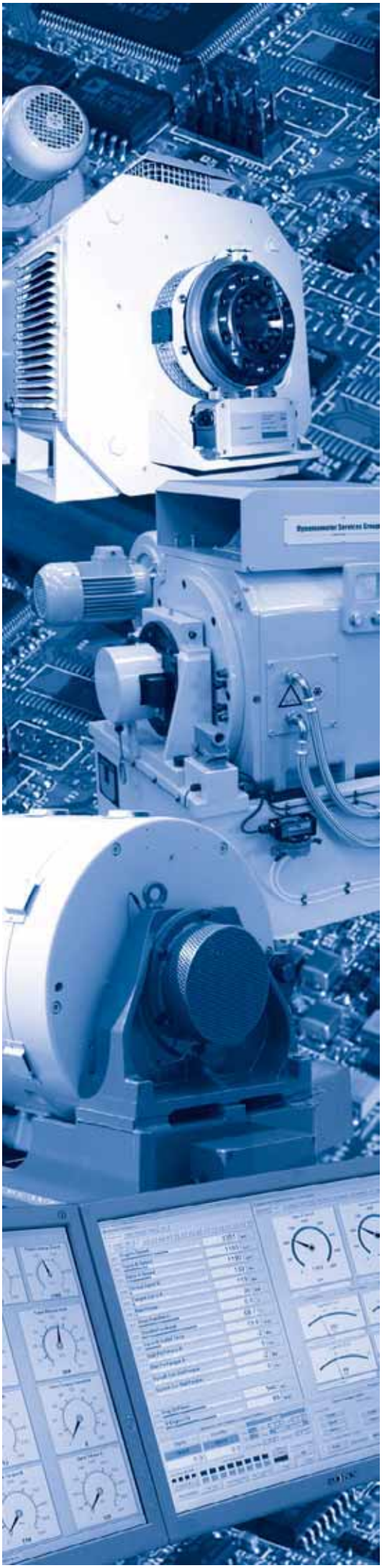
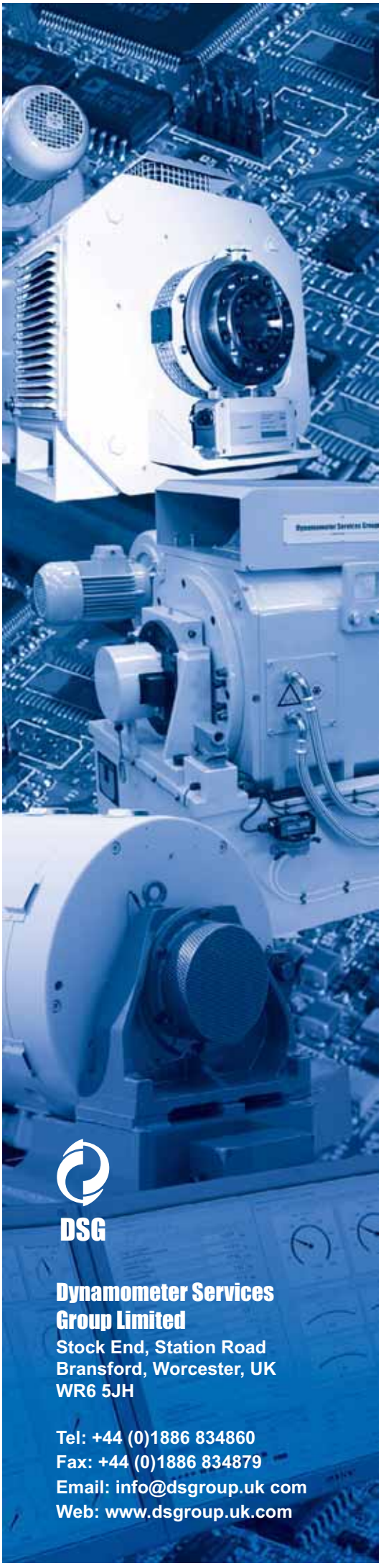


Digi-C 2000 - Advanced Digital Dynamometer Controller

The Digi-C 2000 controller is designed to perform speed control of the DPY / DPX range of sluice gate dynamometers. The system uses fully digital closed loop speed control with on screen real time PID tuning and multiple save options.

Features

- AC Vector Drive provides smooth gate control and near instant braking.
- Choose between manual or full auto sluice gate control modes.
- All controls are via a 4¨ touch screen and encoder wheel fitted to the front panel.
- Repeated outputs of actual and setpoint demand for dynamometer speed.
- Calibration free digital frequency speed feedback.
- Configurable over-speed alarm and shutdown.
- Uses either an existing AC geared motor fitted to the dynamometer or a new supply unit.
- Safety limit switches and analogue position feedback of sluice gate.



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DIGI-C 4000

- Advanced Digital Dynamometer & Engine Controller

DIGI-C 4000 builds on the technologies developed for DaTAQ Pro V2 to provide an advanced high-speed digital controller for all engine and dynamometer applications.

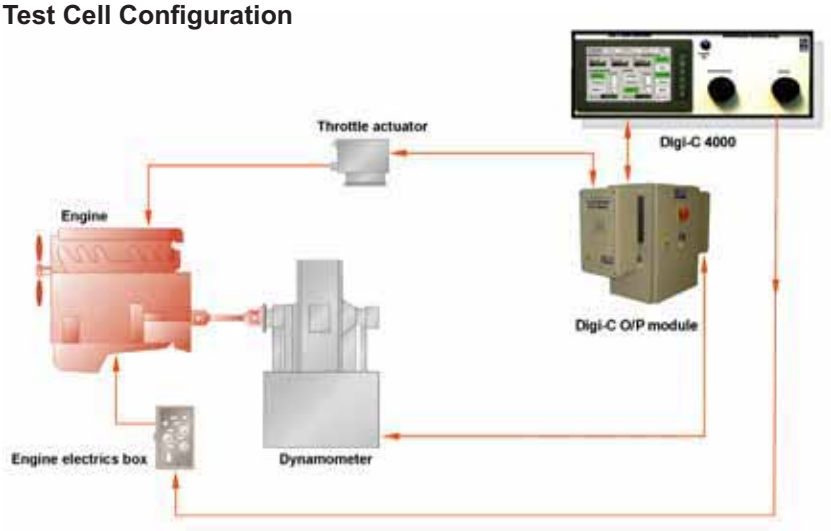
• Colour Touch Screen control provides an easy to use interface allowing all parameters to be easily monitored and configured. The on-screen display updates in real-time and provides torque and power in both SI and English units.

• Multiple Digital PID Storage allows DIGI-C 4000 users to store and retrieve PID terms for different engine/dynamometer configurations. The advanced On-Screen PID Tuning facility allows rapid tuning whilst the engine is running.

• Remote Computer Interface allows easy interfacing to external computer control systems for setpoint control and mode selection.

• Advanced I/O Architecture ensures accuracy and reliability into the future. In common with DaTAQ Pro, DIGI-C 4000 uses off-the-shelf hardware and I/O wherever possible.

Test Cell Configuration



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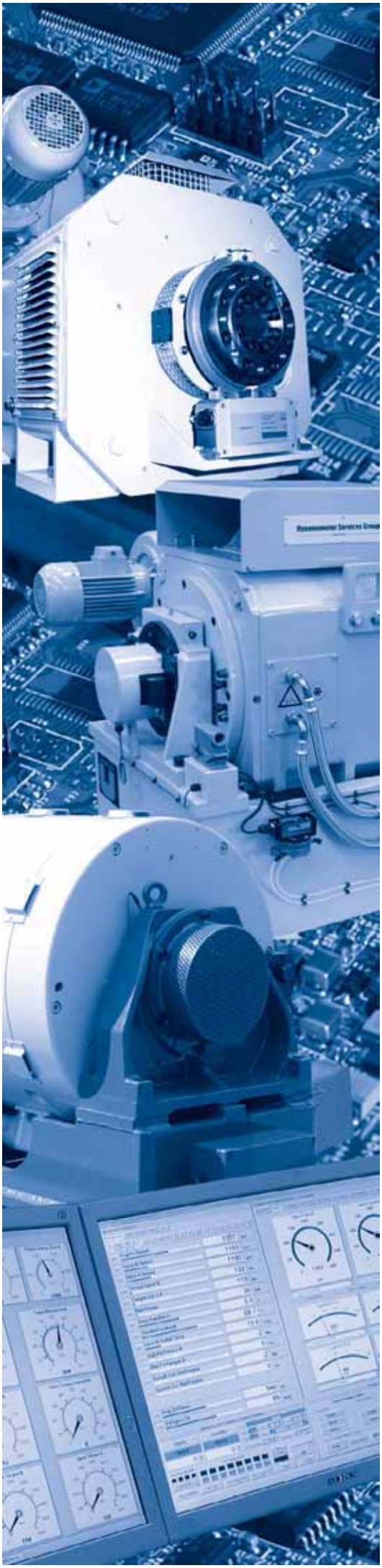
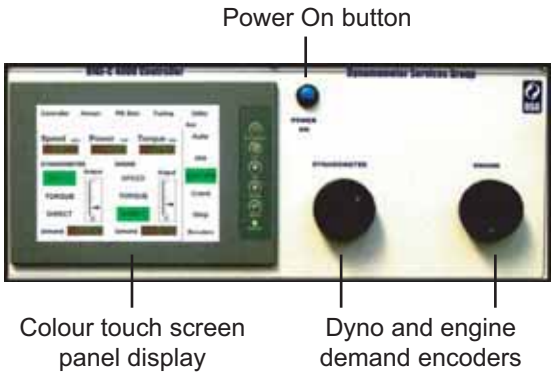
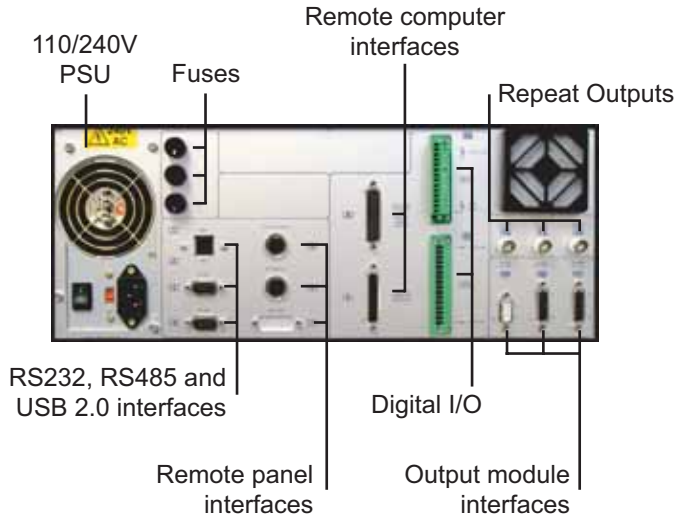


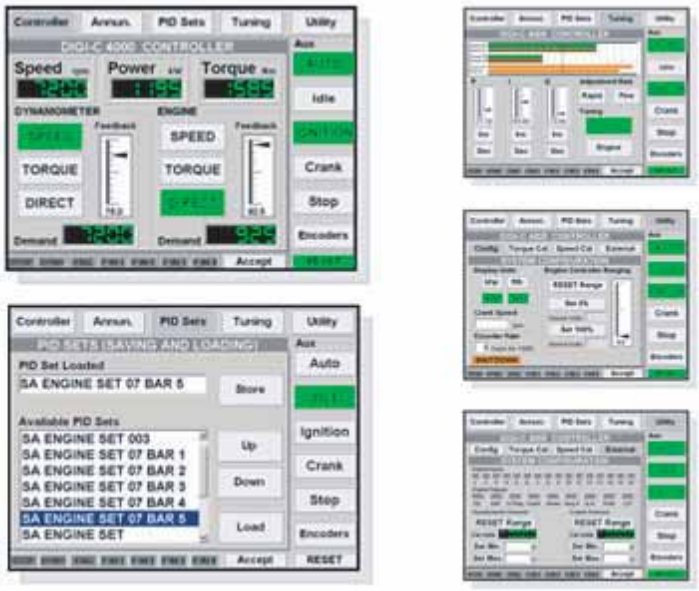
Controller - front panel

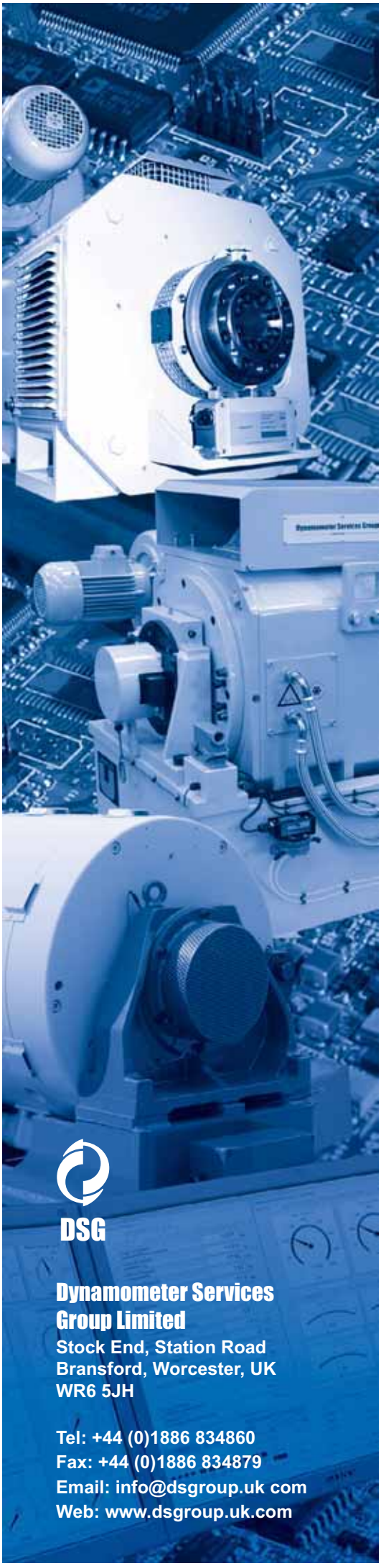


Controller - back panel



Digi-C 4000 sample screen shots:





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Digi-C 4000 Specification

Dynamometers Supported

- Eddy current dynamometers
- Water brakes
- AC and DC machines.

Digital Control

- Two high speed digitally controlled outputs providing full digital PID control of both the dynamometer and throttle/pedal. Speed control, torque control, direct control, with independent control modes for both dynamometer and throttle/pedal.
- Bumpless control mode changing from both automatic and manual control conditions.

System Hardware

- Controller (240/110V)
- Fully industrial 19” (482.6 mm) 4U rack mounting control system with handles. Front user interface panel is removable and can be desk mounted if required.
- 6.4” high brightness TFT flat screen with precision analogue resistive touch display for manual control.
- Precision optical encoders for manual control of dynamometer and throttle/pedal.
- Output Modules
- Integrated dynamometer and throttle/pedal output modules that support a wide variety of dynamometers and throttle/pedal control systems.
- Output modules have built in protection inputs/outputs for both the dynamometer and throttle/pedal systems.

I/O Interfaces

- Speed inputs, either
- Precision frequency to voltage converter, or
- High speed direct sampling frequency input.
- Dual speed inputs supported to provide monitoring of engine speed and dynamometer speed to allow automatic detection of drive-shaft breakage.
- Repeat outputs (0 - 10V) for torque and speed to allow interfacing to data acquisition systems or chart recorders.
- Repeat frequency (TTL level) output of dynamometer speed signal.
- Full remote control interface for integration with test cell control computer.
- Digital interface providing individual mode selection inputs for dynamometer and throttle/pedal control modes.
- Individual demand inputs for dynamometer and throttle/pedal.
- Ignition, cranking and remote control mode digital interface.
- Eight digital inputs for alarm annunciation.
- Alarm/shutdown outputs.
- Ignition and crank digital outputs.
- Glowplug on/off output for diesel engine starter interface.

continued...

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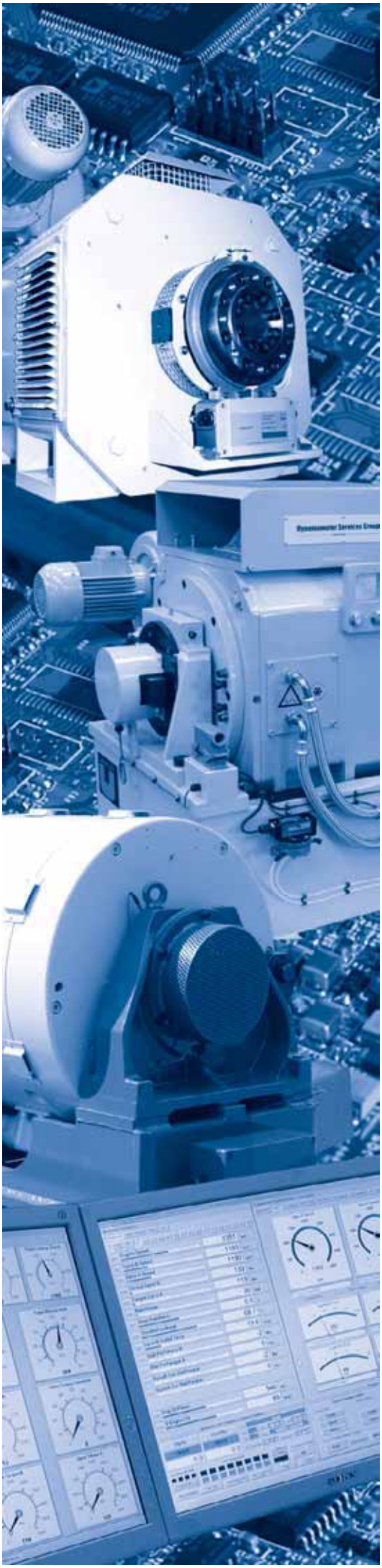


Other Interfaces

- RS232 / RS485. RS485 port can be used to expand I/O capabilities through remote I/O modules when upgrading the system to full DaTAQ Pro.
- 2 off USB2.0 ports (also used to install software updates via memory sticks).

System Software

- Easy to use and configure.
- Simple on-screen calibration facilities for dynamometer torque and speed signals.
- Full alarm protection with configurable eight channel system annunciator and over-speed detection.
- Programmable digital PID values with touch-screen manual adjustment and display.
- Saving and loading of different PID sets for different engine/dynamometer configurations providing improved control.
- On-screen display of speed, torque and power in English or SI units.

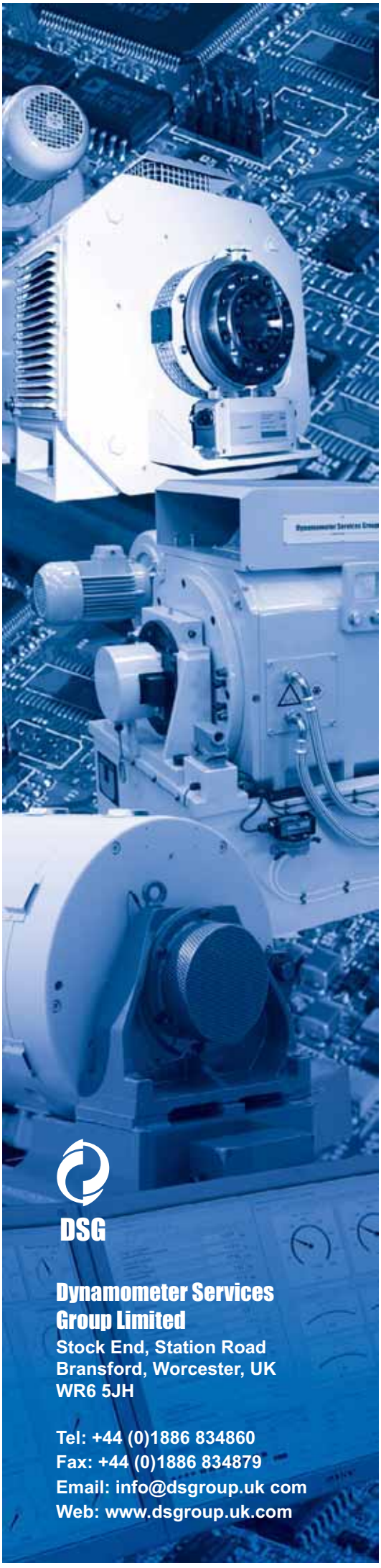
Supply Options:

DIGI-C 4000 - 1 Digital PID Dynamometer & Engine Controller (240/100 VAC)

DIGI-C 4000 - System Options

- Controller
  - Remote Signal Conditioning Module
  - Dynamometer Setpoint Encoder
  - Engine Setpoint Encoder
  - Interface for Remote Mounting of Control Panel

- Output Modules
  - Eddy Current Dynamometer Output Module
  - Hydraulic Dynamometer (Water Brake) Output Module
  - Throttle/Pedal Output Module



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DTP Throttle Actuator

The DTP actuator is a totally enclosed DC motor driven Throttle Actuator that forms part of the DSG Dynamometer and Throttle control system and can also be used with other control systems. The actuator provides performance suitable for applications ranging from small two stroke engines up to heavy diesels and racing engines.

Position feedback is provided by an internally mounted servo-potentiometer. The direct coupling of the potentiometer to the output shaft ensures accuracy. A thermal overload cut out is included to protect the motor from damage if any faults should occur. The unit is simple to install with one electrical connector, and simple attachment of the throttle cable. Throttle cables are available separately.

For features, see next page

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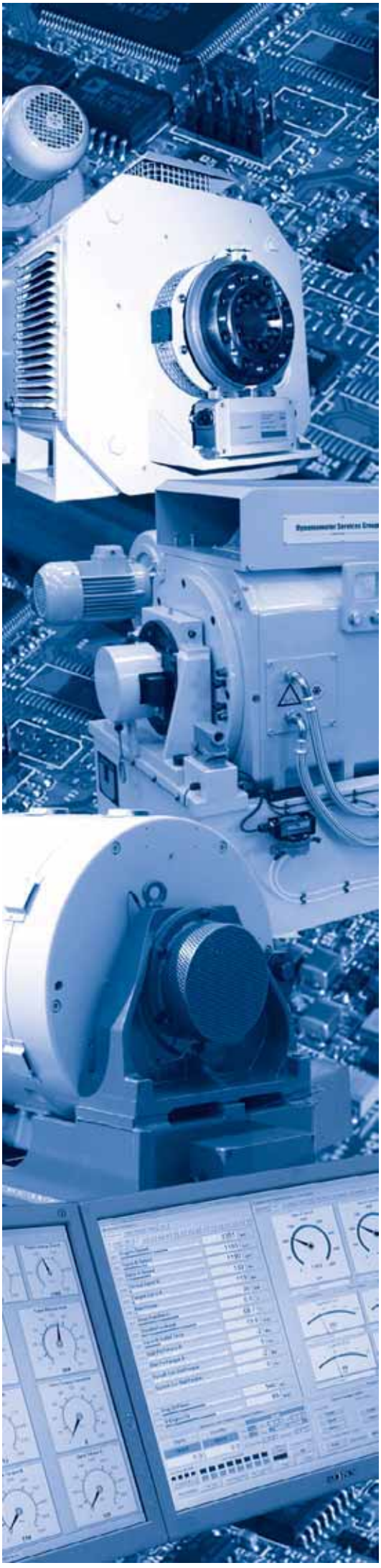
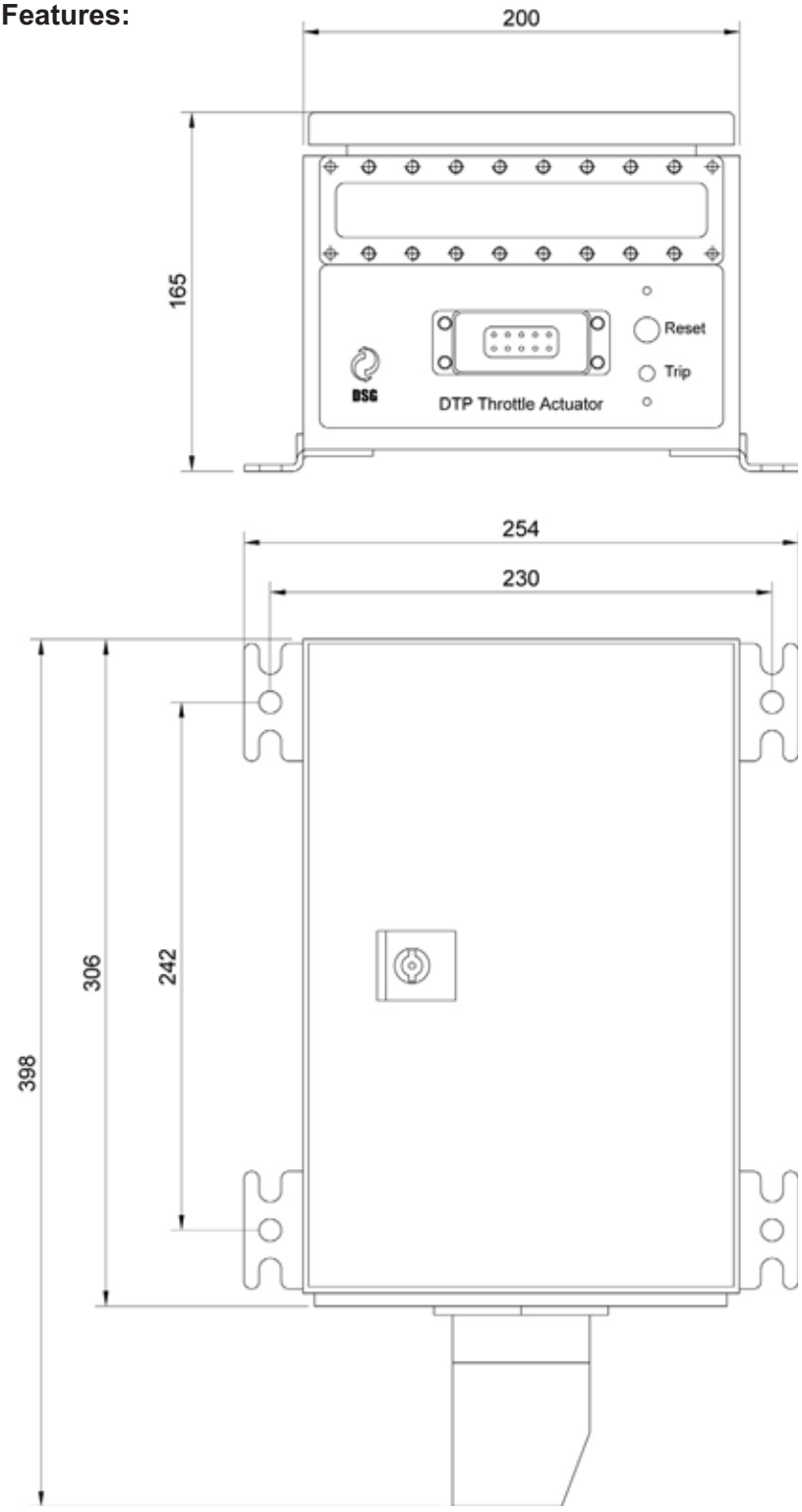
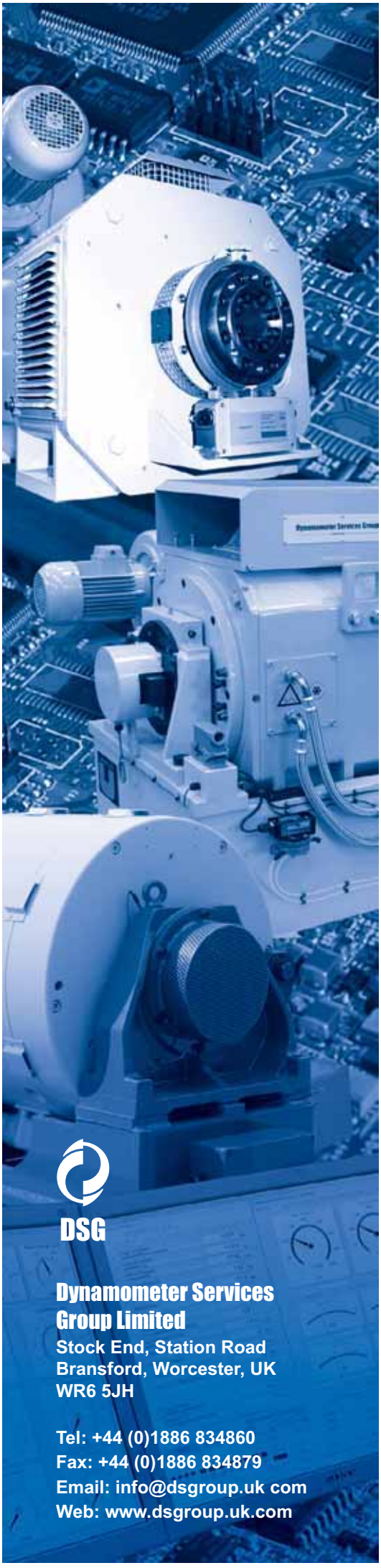


Features:



- Permanent Magnet DC Motor
- Worm Reduction Gearbox
- Servo Potentiometer
- Splash-proof 10-pin connector
- 15kgF Pull Capability
- 0-180 Deg in 250 milliseconds
- Total Weight 6.5kg
- Colour RAL7035
- Thermal Overload Protection



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DaTAQ Plus

Data Acquisition and Control System

*

Key Design Features:

- DaTAQ Plus is a Microsoft Windows XP® based application designed for ease-of-use by test bed operators. Based on our flagship test bed control system (DaTAQ Pro), and retaining many of the advanced digital test features, the system sets new standards for entry level testing.

- DaTAQ Plus is a cost-effective solution incorporating features normally associated with more advanced systems: for example, the standard features include automated power curve testing, fully functional sequence editor, high speed data logging and full PID control of several parameters.

- Packaged with a predefined set of I/O hardware, DaTAQ Plus is supplied as a complete system intended for installation by the customer. This is supported by a full set of instructions and a comprehensive user manual.

Further literature detailing the full capability of DaTAQ Plus is available on the website. For a hard copy please contact the DSG office.

*(Picture is for illustration purposes only and may differ from the final extent of supply)

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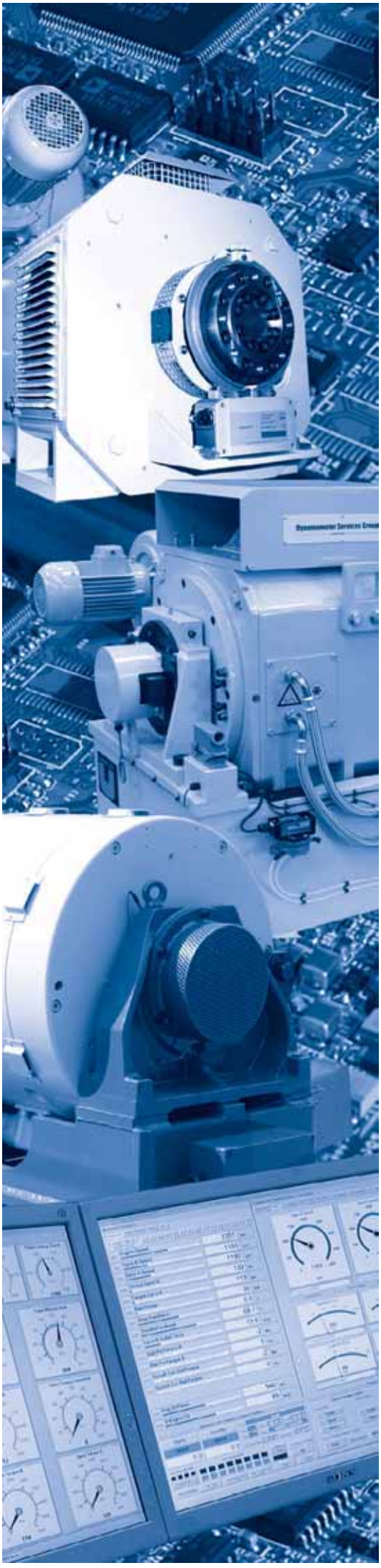


DaTAQ Pro

Advanced Data Acquisition and Control System

DaTAQ Pro is an advanced real-time data acquisition and digital control system running on *Microsoft Windows*® platforms. Utilising commercial, off-the-shelf (COTS) hardware, DaTAQ Pro provides users with guaranteed supply and support for the future.

By using novel and modern design techniques DaTAQ Pro provides an advanced test systems solution that is both easy to use yet flexible enough to meet the most demanding of test requirements.

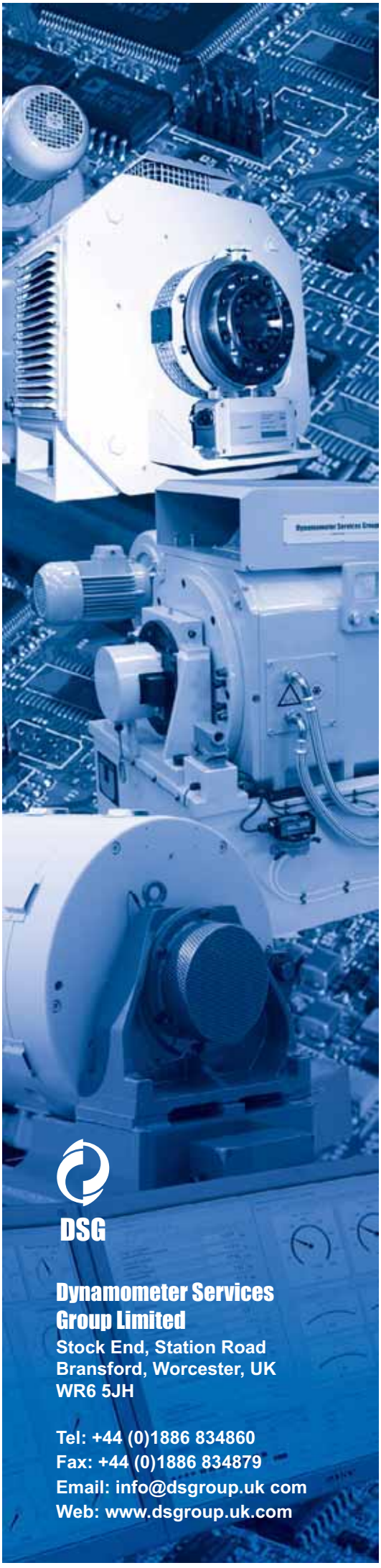
DaTAQ Pro is more than just a software package – it is a completely new and advanced hardware and software design philosophy that provides a modern and robust approach to testing.

To cope with modern testing needs DaTAQ Pro utilises some of the most advanced high speed I/O Systems for PCs that are available on the market today. The open architecture easily allows new I/O to be added.

High user configurability, flexibility and friendliness.

DaTAQ Pro has been designed from the bottom up with a very open hardware and software architecture. New hardware and device interfaces can easily be incorporated into the system with very little effort.

DaTAQ Pro is supplied as a complete system that includes all existing device drivers as part of the base system. Therefore if you acquire an additional supported third party instrument in the future, the software for it will be available at no extra cost. The range of supported instruments is comprehensive, covering a long list of engine and vehicle test bed instrumentation devices.



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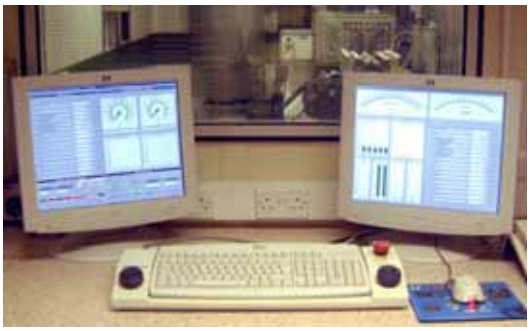
DaTAQ Pro - General Description

DaTAQ Pro, together with DSG's state-of-the-art integrated DigiC Real-Time Digital Control System, provides an excellent solution for data acquisition and control in the engine, dynamometer and other testing environments.

DaTAQ Pro is a *Microsoft Windows*® based application designed for ease-of-use by test system operators. The heart of the design philosophy for DaTAQ Pro has always been to produce a test system that can be learned quickly yet provides the user with a flexible and open system.

The intelligent distributed I/O System utilised by DaTAQ Pro, provides for easy installation and support. The I/O Modules feature on-board thermocouple linearization and cold-junction compensation.



Some of the features provided by the DigiC Real-Time Control System:

- Manual and automatic control of dynamometer and throttle in such modes as:
  - Speed control
  - Torque control
  - Position control

- Fully digital PID control system with bumpless switching from any mode to any mode, including from Automatic Control to Manual Control.
- PIDs typically run within the DigiC System at 100Hz, though higher rates of up to 1kHz are supported.
- Multiple PIDs are stored so that each Engine-Dynamometer mix can have its own set of PID terms.
- Any monitored channel can be used as feedback for the PIDs. For example, the throttle can be used to control exhaust temperature.

Further literature detailing the full capability of DaTAQ Pro is available on the website. For a hard copy please contact the DSG office.

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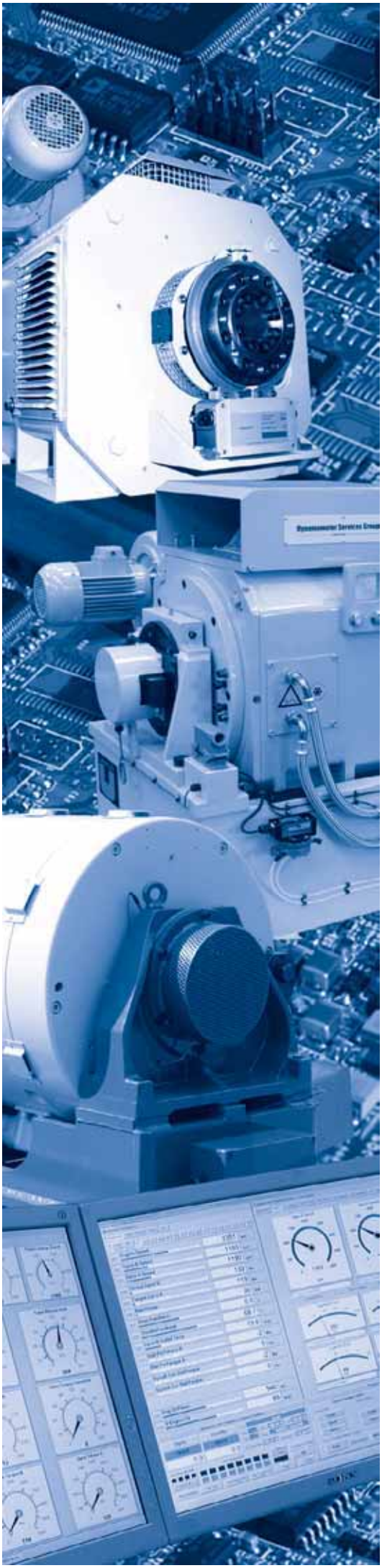

Customers

DSG's customer base covers the full spectrum of today's manufacture, development and research fields.

The following highlights a cross section of the customers who have chosen DSG to meet their control & data acquisition and service demands:

AICT (Korea)
Birmingham University
CAT (Formally Perkins Engines)
Cats & Pipes
Clutch Auto
Cummins
Deadong (Korea)
Defence Solution Group (Formally ABRO)
Denso
Diesel Recon (Part of the Cummins group)
Engine Developments
Ford
Ilmor
Imperial College London
Johnson Matthey
Kamtec (Korea)
Kukje (Korea)
Leeds University
Mahle
Millbrook
MIRA
Nicholson Mclaren
Neil Brown Engineering
Nissan
NIAE (Korea)
Petronas (Malaysia)
Ricardo
Tilotson
UITM (Malaysia)
University of Central London
University of Central Lancashire (UCLAN)

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Employees

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Alex Macfadzean - Director
James Derrett - General Manager

Gregg Atkins - Business Development Manager

Hardy Siegmann - Product Support & Development Manager
Dave Long - Product Support & Development Engineer

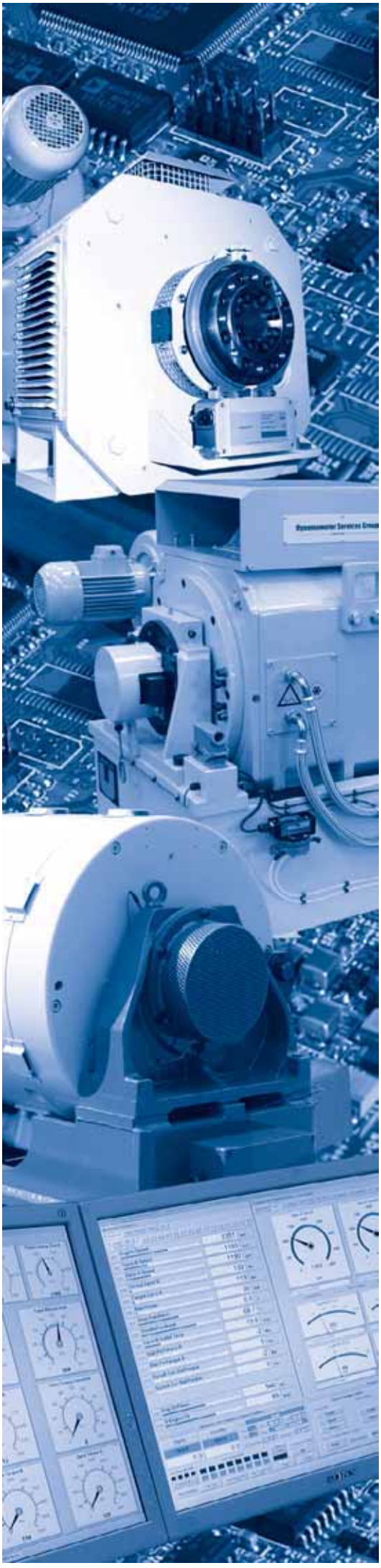
Mike Mullins - Mechanical Design Engineer

Roger Morgan - Engineering & Sales Support
Ian Collett - Site Manager
Nigel Webley - Production Manager

Trish Powell - Admin Assistant

Dynamometer Services Group Limited
Purleigh, Essex

Alex Macfadzean - Director



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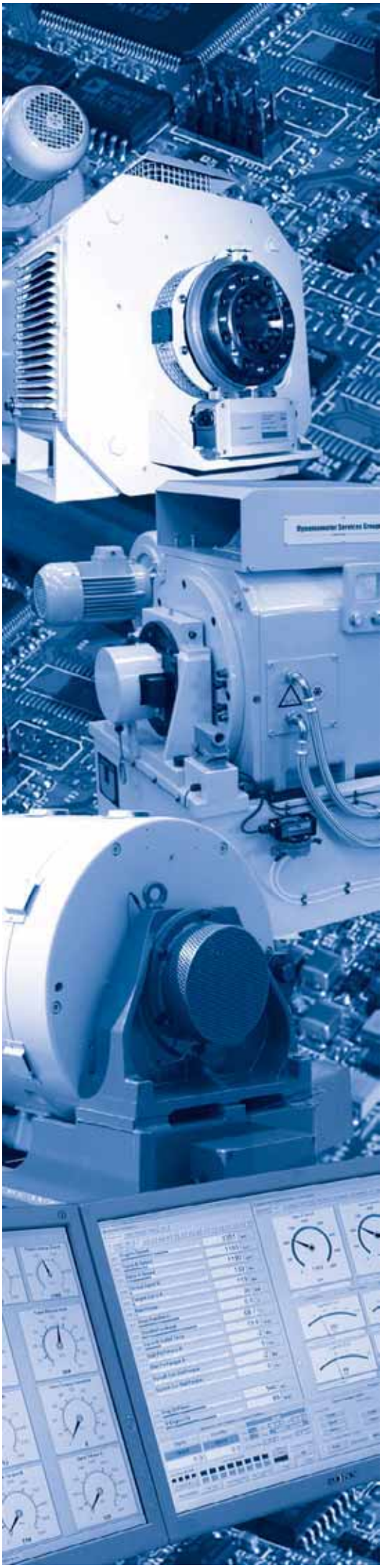
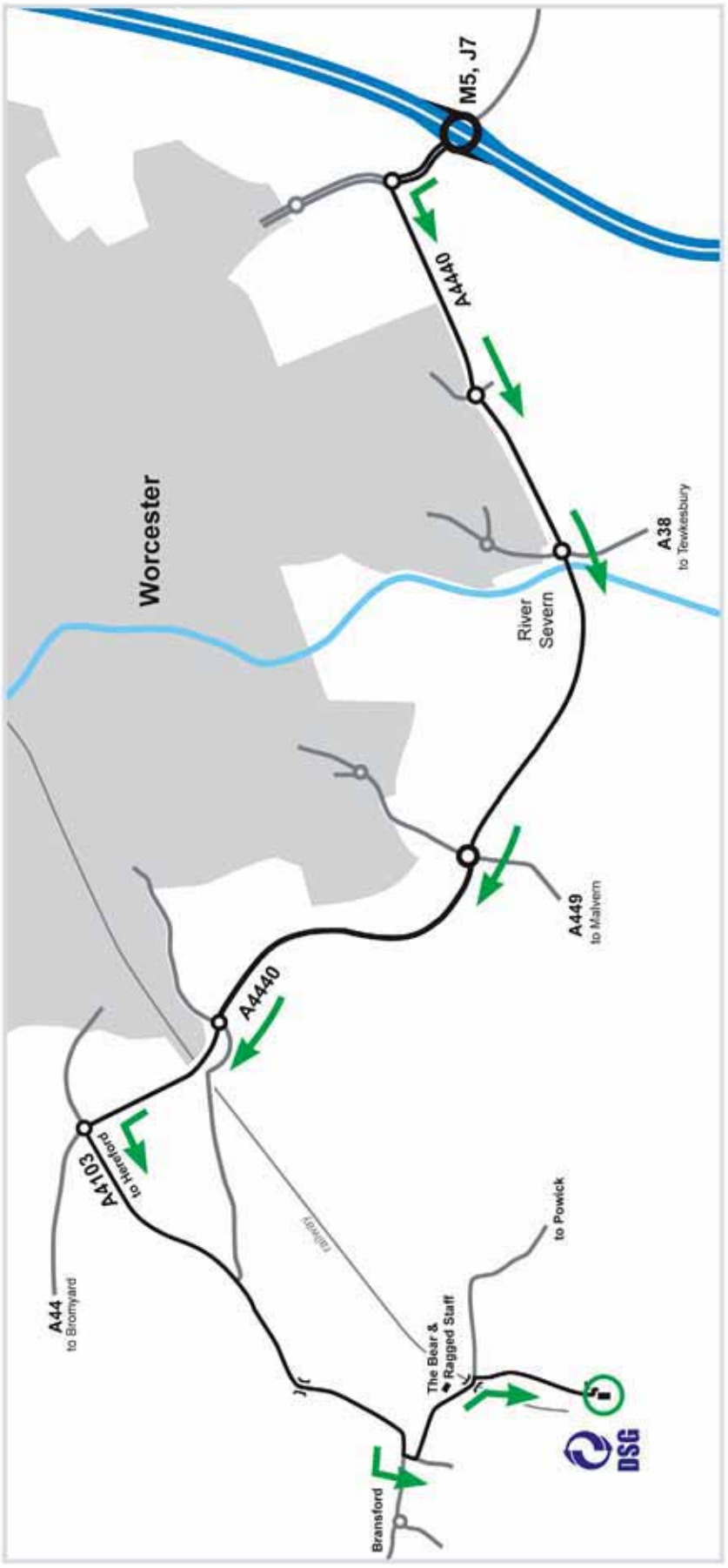
How to Find Us (also shown on Map)

- From M5, Junction 7 - take the turn towards Worcester.
- Keep in left hand lane, turn left at the roundabout onto the A4440 (Malvern, Hereford).
- Follow signs for Hereford around the ring road going straight on at the next 4 roundabouts.
- At the 5th roundabout turn left towards Hereford. Follow the road for a few miles.
- There will be a left hand bend, then after the next right hand bend take the left turn to Powick (see signs for The Bear & Ragged Staff).
- Follow this road for about 1 mile (passing The Bear), then turn right immediately after the bridge, into Stock End Farm. Follow the drive up to the top of the hill.



Map



Dynamometer Services Group Limited

DSG

Although this document accurately describes our products at the time of going to print, details may be subject to change from time to time.

If you are refurbishing, upgrading or considering a new engine test facility DSG can provide a turn-key solution, including dynamometers, engine pallet systems, cooling modules and a complete range of control systems.

Please call our sales team for more information on our full range of products and services.

DSG

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