# PicoScope®

Engine and hydraulics testing

pico® Technology

## with the WPS600C hydraulic pressure transducer

Pico's Engine and Hydraulics Kit is designed to make you able to diagnose problems on your equipment relating to both engine and hydraulics.

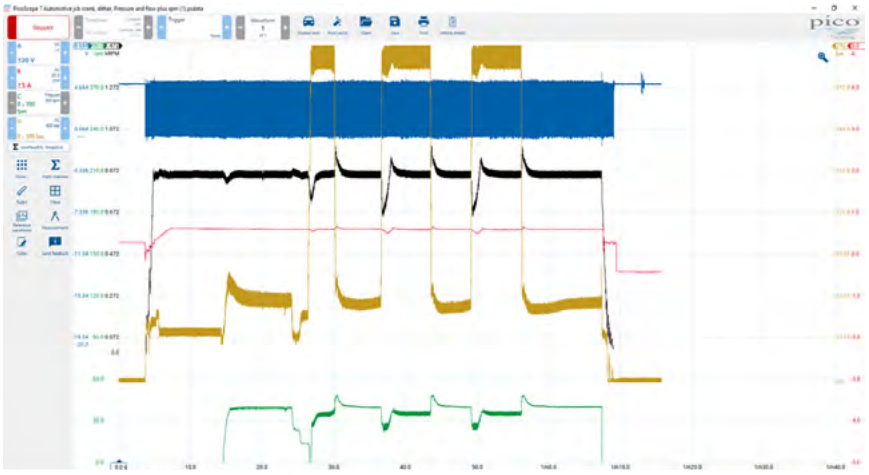
When our PicoScope software is combined with our WPS600C Hydraulic Pressure Transducer, you are given an unparalleled window into your hydraulic system, showing true system performance in real-time.

Mobile Construction and Agricultural machinery is getting ever more complex and we see more and more machines moving from mechanical diesel engines to modern high-tech common rail diesel injection systems. With the introduction of stricter emission standards and CAN communicated PVGs, the challenges the field support technicians are facing are changing, requiring both new skills and new tools.

By creating our Engine and Hydraulics Kit, we can now offer mobile repair technicians one single kit they can use to diagnose the majority of systems on expensive mobile plant such as tractors, back-hoe loaders, combine harvesters, telehandlers and all other mobile hydraulic machinery. With this kit, the technician is able to see the problems across the engine / hydraulic system boundary by directly relating engine characteristics to the performance of the hydraulic system and vice-versa. For example, you can now monitor the engine speed via signals such as the crank sensor, while also monitoring hydraulic system pressures in real-time.

With the clarity of the waveforms and PicoScope's powerful zoom functions, measurements and math channels, you can truly see what is happening and to a detail that has yet to be seen elsewhere. You can now view the pulsations from a hydraulic pump, record and calculate pump efficiency and physically see interactions between the various systems. With this type of analysis, you can start to build a picture of health for the machine, recording how the system works. You can also save any capture for further analysis or for future maintenance, such as PQ test results.

You can now explore the operation of the whole system with one capture. In the waveform shown below you can see the performance of the hydraulic system on a telehandler using the optional 300 litre/min Webtec flowmeter.



There is a huge amount of diagnostic information in this capture, showing both the basic operation of the system, as well as some of the feedback controls built into this vehicle. Engine speed can be inferred directly from the crank speed sensor by using a measurement, or as shown above, using a math channel.

Our Engine and Hydraulics kit can be used both for simple tests of purely electric signals, such as extending and retracting a hydraulic ram, to full system tests where you can investigate the state of the complete system.

It is important to understand that a simple-sounding fault such as "the engine stalls when a heavy hydraulic load is applied" can be down to problems with either the engine or the hydraulic system. Having the ability to directly relate the hydraulic system's performance to engine signals such as injectors, exhaust pressure and engine speed, can show the technician what is happening as well as what the ECU expects to be happening, thus highlighting possible issues.

**Dual WPS600C add-on Hydraulic kit: PQ108**

## The WPS600C:

- can accurately measure up to 600 bar (8700 psi)
- is ultra-fast; 100 microsecond response time (0% to 90% of full scale)
- has an internal rechargeable LiPo battery
- has an industry-standard M16 x 2 test point connector
- uses auto zeroing
- has high noise immunity
- is temperature compensated


The WPS600C pressure transducer gives the ability to test the hydraulics associated within a wide range of commercial vehicles and plant machinery. Once the WPS600C is connected to the relevant hydraulic test port, the Technician is able to view activity and transitions in hydraulic pressures of up to 600 bar in real-time.

These are all measurements and tests that can be performed and recorded with the WPS600C and PicoScope:

- Hydraulic pump performance
- Hydraulic valve switching activity
- Hydraulic pressure control valve performance
- Hydraulic pressure decay
- Residual hydraulic pressure

## Flow Meters

To go with the Engine and Hydraulics Kit, Pico can supply a range of flow meters designed to work with your PicoScope. The Pico flow meter range has been developed with industry-leading flow meter supplier Webtec and is based on their very popular range of turbine flow meters.

Pico offers three different sizes of flow meters: 25 lpm, 300 lpm and 600 lpm. All flow meters come with a BNC output for direct connection to the PicoScope (the 8-channel scope, PicoScope 4823, requires a frequency voltage converter, not supplied) and an embedded thermistor for measuring oil temperature. They also have an M16x2 Minimess pressure test port for connecting to your WPS600C. The two larger sizes also have a built-in loading valve allowing you to load the hydraulic system. With PicoScope connected you can record and capture the system performance in real time whilst under load.

For ease of connection, the flow meters are supplied with either SAE or BSP inlet and outlet ports depending on your requirements.

**Flow meter 300 Lpm BSP: TA377**


## Flow meters:

- 25Lpm BSP (TA376)
- 300Lpm BSP (TA377)
- 600Lpm BSP (TA378)

# Kit contents

**Engine and Hydraulics Kit with 4-channel BNC+ scope: PQ195**


- 1 x User Guide WPS600C Pressure Transducer
- 1 x PicoScope 4425A Safety Guide
- 1 x PicoScope oscilloscope 4425A
- 1 x Cable: USB2 4.5m
- 2 x S Hook
- 2 x Telescopic pack: 45x45 length 80-120mm
- 1 x Carry case: Standard PS4x25 kits
- 1 x Carry Case: Dual WPS600 small case M2000
- 2 x Multimeter style test probe (black)
- 2 x Multimeter style test probe (red)
- 2 x Small crocodile clip (black)
- 2 x Small crocodile clip (red)
- 1 x Electronics Acupuncture Probes
- 1 x 2 pin breakout lead
- 4 x 4mm shrouded to unshrouded adaptor red
- 1 x Breakout lead for ATC style fuses
- 1 x Extension lead for mini style fuses
- 2 x Cable: USB A male to mini 5 pin 2m
- 2 x Cable: BNC to BNC 2m
- 2 x WPS600C pressure transducer 60/600 Bar
- 2 x Cable: insulated BNC to insulated BNC 5m
- 1 x Cable: USB 3.0 blue 1.8m
- 2 x Battery clip 4mm socket (red)
- 2 x Battery clip 4mm socket (black)
- 4 x Flexible back pinning probe black
- 4 x Flexible back pinning probe red
- 1 x Extension lead for JCASE fuse
- 1 x Breakout Lead 2 pin ACS
- 1 x Breakout Lead 3 pin Kostal
- 1 x Extension lead for maxi style fuses
- 1 x Ultrasonic Parking Sensor Detector
- 1 x Keyless Entry Detector
- 1 x PicoBNC+ current clamp: 200A/2000A AC/DC 150V
- 1 x PicoBNC+ wide-range linear temperature probe
- 2 x PicoBNC+ automotive 10:1 scope probe
- 2 x Automotive probe 4mm adaptor
- 1 x PicoBNC+ 60A Clamp
- 4 x PicoBNC+ premium test leads (4 colours)

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