microDAQ3-32-HP

32 Channel High Pressure Scanner

- **Unparalleled data quality: up to 0.02% of full scale**
- **Ranges up to 11 bar.**
- **High speed : 400 kHz per channel**
- **Absolute and differential measurements**
- **Optional electrically driven valve for purge and re-zero**
- **Complete with IEEE 1588 PTPv2 time stamping**
- **Thermally compensated from -20 to 90ºC**
- **24 bit ADC per channel**
- **Output over Ethernet (100Mbit TCP / UDP) and CAN**
- **Available with quick-disconnect top plate**
- **Fully configurable over Ethernet with embedded web server**

The Chell microDAQ3-32-HP builds in the successful microDAQ3 range of pressure scanners. This scanner uses high pressure and high accuracy digital transducers to provide unparalleled accuracy in pressure scanning technology. The sensors used in the microDAQ3-32-HP are all absolute. This gives the user the option of outputting absolute data or differential data. For differential data, the absolute references are subtracted from the channel data. The user can decide whether to use either reference or an average of the two.

The microDAQ3-32-HP is capable of measuring differential pressures at line pressures given the large measurement range of the scanner (0 to 1140 kPa absolute).

The microDAQ3-32-HP will output differential or absolute compensated engineering unit pressure data over Ethernet, CAN, IENA, and EtherCAT (see microCAT3) at speeds up to 400Hz per channel.

The microDAQ3-32-HP offers the option of an electrically driven valve that gives the scanner a purge and re-zero facility. The valve has been years in development and features precise positional measurement and current monitoring to ensure reliability.

For applications where the valve isn't required, both the cost and size of the scanner are reduced.

The microDAQ3-32-HP makes use of high accuracy transducers which are combined with two 24-bit ADC's per port - one for pressure and one for temperature. This precise temperature measurement allows the MicroDAQ3-32-HP to almost entirely compensate for thermal effects over its wide operating range.

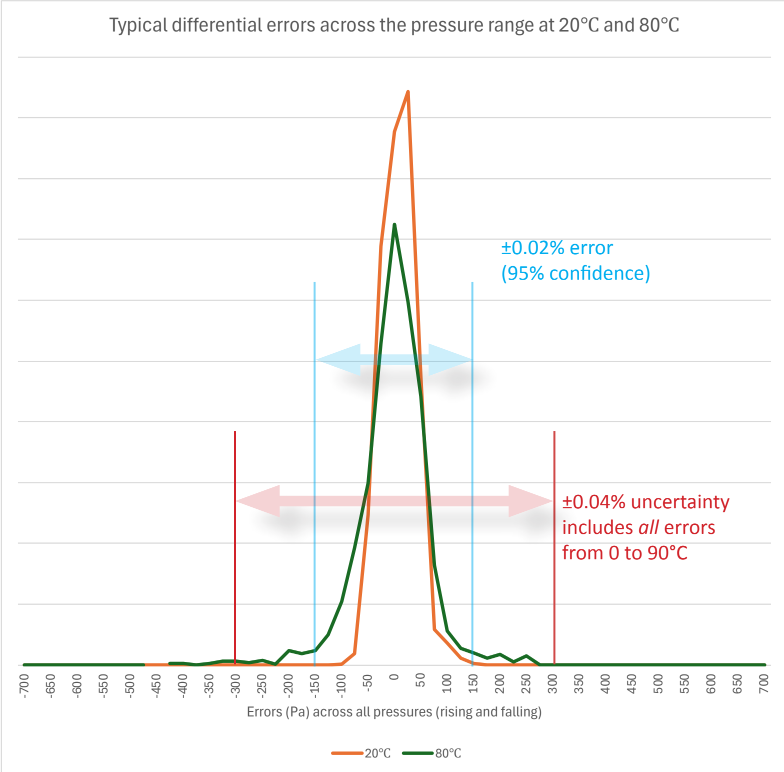
General	
Differential ranges available	689 and 1034 kPa (100 and 150 psid)
Number of channels	32
Maximum Acquisition Speed (measurements / channel / second)	400Hz
Data Output	
Output types	CAN and Ethernet (TCP/IP & UDP), IENA
Ethernet Specification	100Mbit TCP/IP or UDP (user configurable)
CAN Specification	2.0B
Performance	
System Accuracy	See table below
Absolute Ranges	13 kPa to 1140 kPa (1.89 psia to 165 psia)
Line pressure limitation	None - as long as all measured pressures are within above pressures
Proof Pressure (all ranges)	1380 kPa (200 psig)
Ouput Resolution	16 bit or ±range / 65536
System Resolution	24 bit
Mechanical	
Valved version Dimensions width x depth x height in mm)	80 x 37 x 34 excluding tubulations
Non-valved version Dimensions (width x depth x height in mm)	80 x 37 x 27 excluding tubulations
Weight (Valved / non-valved)	205g / 157g
Enclosure Sealing	IP54
Measurement ports	1.0 mm (0.04”) or 1.6mm (0.063”) bulged tubulations
Purge ports (valved version only)	2.3 mm (0.09”) bulged tubulation
Maximum purge pressure	15 bar gauge
Purge Flow	22 SLPM at 1 bar purge, 46 SLPM at 2 bar purge and 66 SLPM at 3 bar
Power Supply	
Input supply (DC Powered)	8-30 VDC
Power consumption (DC Powered)	1W (non-valved), 4W (valved)
Electrical Connector (DC Powered)	Female 9-way micro-miniature ‘D’ type (suggested mate : Glenair MWDM2L-9PS - solder cup version)
Environment	
Operating Temperature Range	-40 to +90°C
Compensated Temperature Range	0 to +90°C (optional -20 to +90°C)
Storage Temperature Range	-40 to +90°C
Ambient Pressure	5 mbar abs to 2.5 bar abs
Vibration	Engine standard vibration test to DO160E category S, curve W with duration of 1 hr/axis. Fan blade (20 g 2 kHz)
Shock	Fan blade out to DO160F section 7 (40g 11 m/s)
Maximum relative humidity	95% at 50°C (non-condensing)
Timing / Data Synchronisation	
Time Stamping	IEEE 1588 PTPv2
Time Stamping Resolution	1µs
Hardware Trigger	5 V TTL pulse, maximum 1000 Hz, minimum 0.5 Hz

microDAQ3 Accuracy - A Metrology Approach

The performance and flexibility of the microDAQ3 calls for a different approach to specifying its accuracy. The table below details the resolution, standard deviation and errors with 95% confidence (2 x sigma). This is comparible with data from other manufacturers.

In addition to this, we have detailed the measurement uncertainty which takes into account the following sources of error:

- Uncertainty of the Chell calibration standards used in production
- Thermal errors from 0 to 90°C (-20 to 90°C with optional calibration)
- Drift errors over 12 months



Differential Range (+/-)[1]		Output Resolution (Pa)	Standard Deviation (Pa)[3]	Error (95% Confidence) ±Pa	%FS[2]	Uncertainty %FS[2]
-83 kPa to 689 kPa	-12 to 100 psi	21	16	150	**0.02%**	0.04%
-83 kPa to 1034 kPa	-12 to 150 psi	30	18	200	**0.02%**	0.04%

1) Differential range assumes a reference of 1 bar. Reference pressure can vary as long as all measurements are within the absolute range of the transducers.
2) %FS values refer to the percentage of the differential range as listed.
3) Data collected at 100Hz with an average of 16.

Digital Transducers - A revolution in data quality

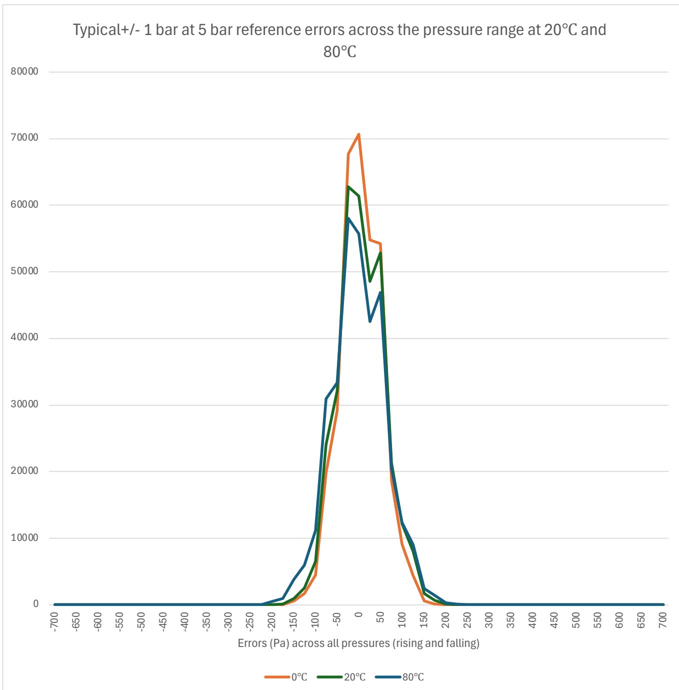
The digital transducers used in the microDAQ3 provide unparalleled data quality. When the pressure and temperature output for each transducer are processed with our proprietary thermal compensation routine, the results set a new standard for pressure scanners and a considerable improvement over previous scanner technology.

Line Pressure Measurements

The use of absolute transducers means that all pressures must be within the range of these transducers. While this may limit some line pressure applications, the step change in performance from didgital transducers gives us good results - even at significant line pressure.

The graph to the right shows a ±1 bar measurement at a line pressure of 5 bar using the 100 psi scanner range. Even at these conditions, the results are better than ±0.1% of the reduced ±1 bar range- and the absolute data is available too!

This graph also demonstrates how the thermal compensation removes all thermal errors.



Absolute Performance

Absolute Range		Output Resolution (Pa)	Standard Deviation (Pa)[1]	Error (95% Confidence) ±Pa	Error (95% Confidence) %FS[2]	Uncertainty %FS[2]
Absolute range for differential range of 689 and 1034 kPa (100 and 150 psi)						
0[6] to 1140 kPa	0 psia to 165 psia	17	20	300	**0.03%**	0.05%

1) Data collected at 100Hz with an average of 16
2) %FS values refer to the percentage of the maximum absolute values as listed.
3) Lowest absolute calibrated pressure is 14 kPa as standard (please contact us for lower pressures)
4) Lowest measurable absolute pressure for 1140kPa range is 11kPa.

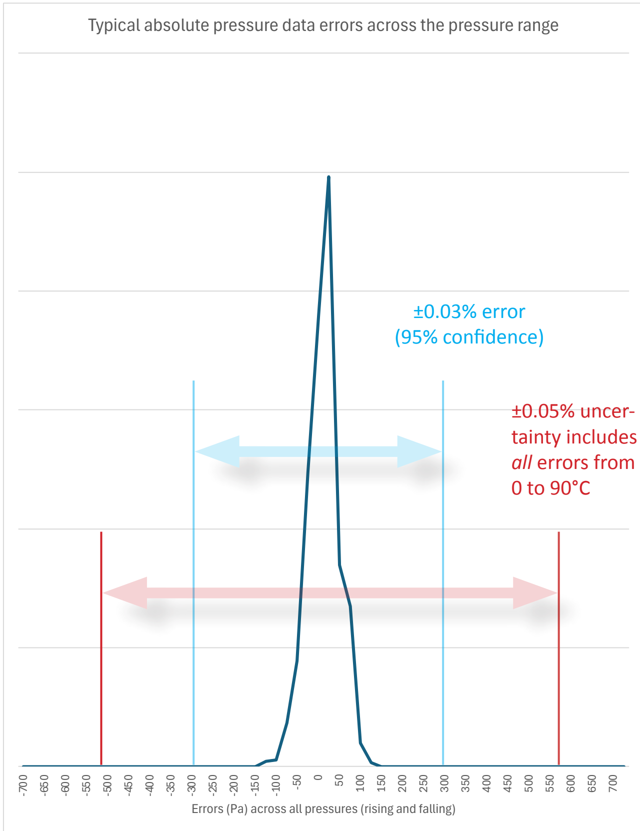
Absolute Transducers - More information and better performance

The microDAQ3-32-HP uses advanced digital transducers where each channel has a 24-bit ADC for both temperature and pressure. All the transducers (including the references) are calibrated over the absolute range of 0 to 1140 kPa. If absolute pressures are required the user can configure the output to be any range within the limits of 0 and 1140 kPa. This ensures that all the resolution of the 16-bi pit is utilised over the range of interest.

For differential outputs, the two reference ports (they can be used individually or averaged together) are subtracted from the measurement ports to provide a differential output. The microDAQ3's are purchased pre-configured for a particular differential range to maximise the resolution of the 16-bit output. Line pressures can be accommodated as long as the range of pressures measured falls within the absolute range of the sensors. For example, a 150 psi 32MD3-HP could measure +/-50 psi with a line pressure of 100 psi.

The use of absolute transducers in the microDAQ3 leads to several advantages:

- The ability for the user to switch between differential and absolute measurements.
- Unparalleled differential and absolute measurement performance.
- The ability to output differential measurements ***and*** the absolute value of the reference removing the need for external barometric transducers.
- The option to output absolute values for all channels and thereby removing the need for a reference all together.
- The lack of an internal reference cavity (and therefore volume) means the scanner responds much faster to changes in reference pressure (for example, changes in altitude) improving data quality.

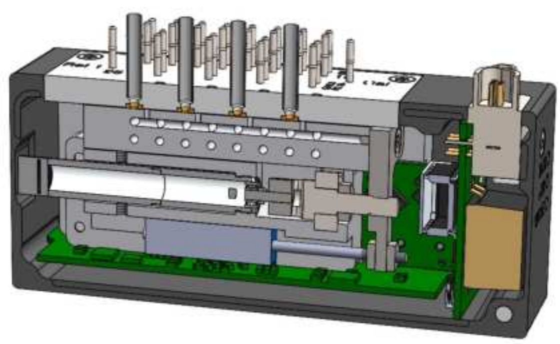


The Purge Valve

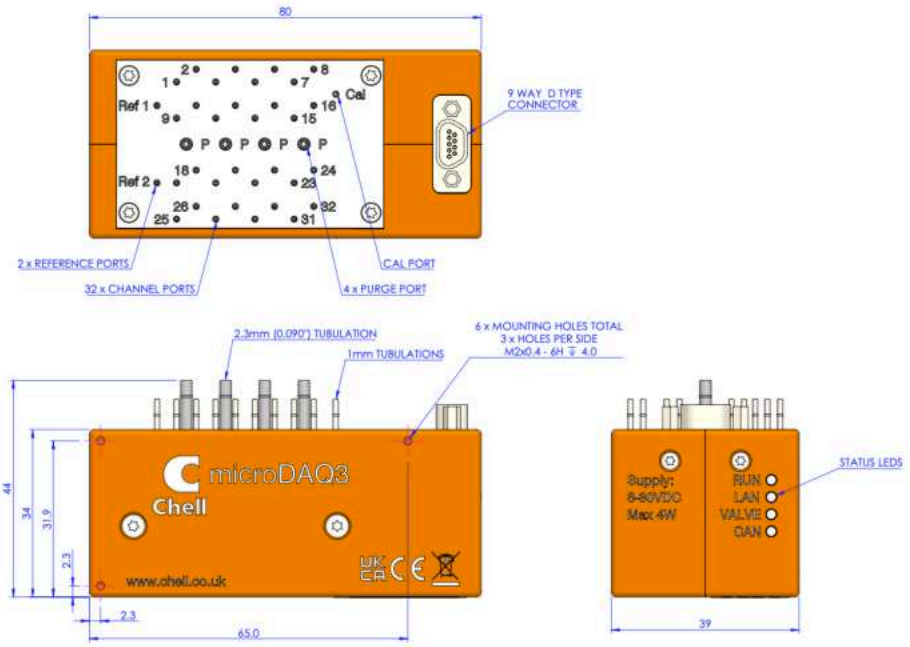
We have been developing the new purge valve for the last few years. To remove the need to supply pneumatic pressures to the scanner, the new valve is electrically driven by a precision high-torque motor and gearbox. The valve is controlled to a position (measured to 5 μm) and the current consumed by the motor to ensure reliable, repeatable performance.

The valve has been rigorously tested to 10,000 cycles and features a cycle count so that any necessary maintenace can be planned.

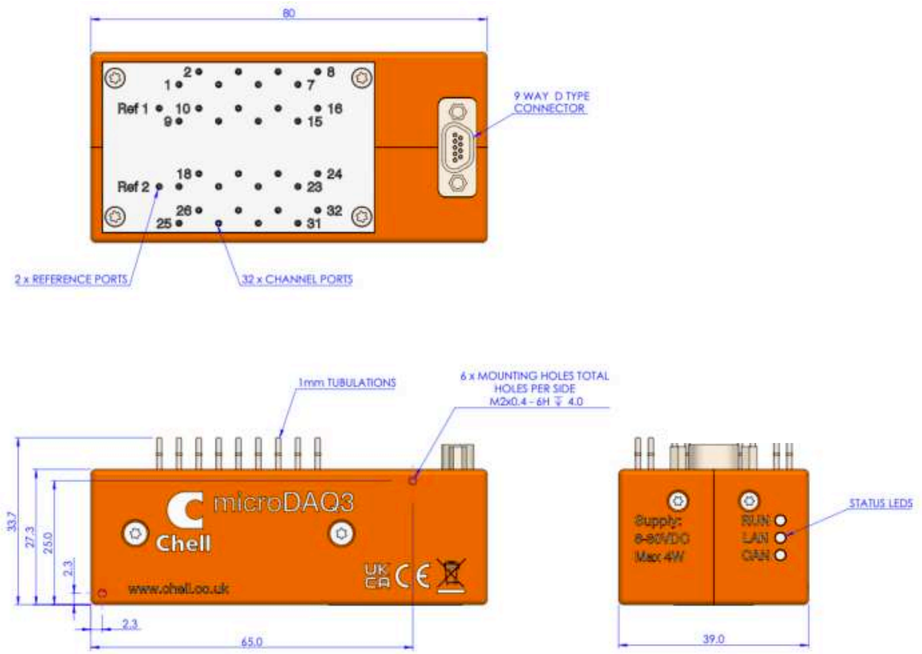
The purge flow through the valve has been characterised over a pressure range (see table above) and provides a greater flow than scanners offered elsewhere.



Dimensions - Valved Version (BB=01)



Dimensions - Non-Valved Version (BB=02)



Part Number:

32MD3 -AABBCCDD

AA = Range
12 = 689 kPa (100 psi)
13 = 1034 kPa (150 psi)
81 = Mixed range (range 12 and 13)

BB = Valve
01 = With valve and 1 mm tubulations (2.3 mm for purge tubulations)
02 = Without valve and with 1 mm tubulations
03 = With valve and quick disconnect top plate (1 mm tubulations)
04 = Without valve and with quick disconnect top plate (1 mm tubulations)
05 = With valve and quick disconnect intermediate plate and protector only
06 = Without valve and with quick disconnect intermediate plate and protector only
13 = With valve and 1.6 mm tubulations (2.3 mm for purge tubulations)
14 = Without valve and with 1.6 mm tubulations
15 = With valve and quick disconnect top plate (1.6 mm tubulations)
16 = Without valve and with quick disconnect top plate (1.6 mm tubulations)

CC = Interface / Supply
02 = DC supply with CAN and hardware trigger

DD = Calibrated Temperature Range
01 = 0 to 90°C
02 = -20 to 90°C