



Chell - 2416

16 Channel Advanced Pressure Scanner

- **Unparalleled Data Quality: up to 0.02% of full scale**
- **24 bit synchronous acquisition across all channels**
- **Multi-range and in field transducer replacement**
- **Electric 3 position shuttle valve (run-cal-purge)**
- **Purge gas pressure measurement**
- **High speed : 1kHz per channel**
- **Absolute and differential measurements**
- **Power-over-Ethernet**
- **Complete with IEEE 1588 PTPv2 time stamping**
- **2 x 24 bit ADC per channel (pressure and temperature)**
- **Output over Ethernet (100Mbit TCP/IP / UDP), Chell native protocol, Netscanner protocol, iDDS and IENA**
- **Quick-disconnect measurement couplings**
- **Fully configurable over Ethernet with embedded web server**

The Chell 2416 is a 16 channel industrial pressure scanner. Like the microDAQ products and the 2432, the 2416 makes use of high accuracy digital absolute transducers to give unparalleled performance - even in the most demanding environments.

The 2416 has been designed to give the user all the desirable features of a modern pressure scanner. These include a 3 position electric shuttle valve (no 7 bar air requirement), digital transducers with pressure and temperature measurement per port and an unrivalled set of output interfaces to suit most installations.

The Chell 2416 will output differential or absolute temperature compensated engineering unit pressure data over Ethernet with the Chell native protocol, IENA, and iDDS at speeds up to 1kHz per channel.

For integration into existing facilities, it also features a Netscanner emulation mode where a significant subset of the Netscanner commands are supported.

The Chell 2416 incorporates an electrically driven shuttle valve for purge and re-zero - therefore removing the need for high pressure supply lines associated with other scanners. The 2416 will also measure and control the purge gas flow removing the need for external valving. The shuttle valve features positional feedback, current sensing on the motor and a count of the number of shuttles to help with planning maintenance requirements. The valve life is tested to 10,000 cycles.

External measurement connectors are made via the 5/16-24 SAE 'O' ring bosses. This gives the user the flexibility to specify 1/8" double ferrule compression fittings or AS205 quick disconnects. In addition, these fitting can be added to two 8-channel quick disconnect plates.

The 2416 has a smart power supply which is compatible with a DC supply and PoE. The 2416 will always use a DC supply if it senses one - otherwise it will negotiate with a PoE enabled switch for power.

With the addition of an iDDS run time license, the 2416 is fully compatible with iDDS installations.

| | |
|---|---|
| General | |
| Differential ranges available | 1, 2.5, 5, 7, 10,17, 35, 55, 103, 207 and 310, 689, 1034, 2757, 5171, 6890 kPa |
| Number of channels | 16 |
| Maximum acquisition speed (measurements / channel / second) | 1kHz per channel (200 for iDDS output) |
| Data Output | |
| Output types | Ethernet (TCP/IP & UDP), Chell and Netscanner protocols, IENA and iDDS (optional) |
| Ethernet Specification | 1000Mbit TCP/IP or UDP (user configurable) |
| Performance | |
| System Accuracy | See table below |
| Absolute Ranges | See table below |
| Line pressure effect | Negligible |
| Proof Pressure | Ranges ≤ 55 kPa : 35 kPa (50 psig) Ranges between 83 kPa and 300 kPa: 1380 kPa (200 psig) Ranges between 689 kPa and 1034 kPa : 2068 kPa (300 psig) Ranges ≥ 2758 kPa : 10 Mpa (1450 psig) |
| Output Resolution | 16 bit or ± range / 65536 |
| System Resolution | 24 bit |
| Mechanical | |
| Dimensions (width x depth x height in mm) | 241 x 89 x 115 |
| Weight (Valved / non-valved) | 3.5 kg |
| Enclosure Sealing | IP67 with one way safety valve fitted |
| Measurement ports | 5/16"-24 SAE O ring boss with 1/8" double ferrule compression fitting or Chell AS205 QDC. 1.0 and 1.6mm tubulations via mating SQDC |
| Cal and reference ports | 5/16"-24 SAE O ring boss with 1/8" double ferrule compression fitting or AS205 |
| Purge port | 5/16"-24 SAE O ring boss with 1/4" double ferrule compression fitting |
| Maximum purge pressure | 7 bar gauge |
| Purge Flow | 40 SLPM at 1 bar purge, 60 SLPM at 2 bar purge and 120 SLPM at 3 bar |
| Power Supply | |
| DC Power | 18 to 32 VDC with smart sensing power supply 25W max current = 1.0A at 28VDC |
| PoE Specification | IEEE 802.3at (Type 1 and 2) 25W |
| Electrical Connector | 09-49-15KPT06FS or TV06ZN-11-35PN-UWBSB2 |
| Environment | |
| Operating Temperature Range | 0 to +90°C |
| Compensated Temperature Range | 0 to +90°C with option for -20 to 90°C |
| Storage Temperature Range | -55 to +90°C |
| Ambient Pressure | 100 mbar abs (52,000 ft) 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) |
| Radiated emissions | MIL standard 461-E: RE102 |
| Conducted emissions | MIL standard 461-E/MIL standard 461-C |
| Timing / Data Synchronisation | |
| Time Stamping | IEEE 1588 PTPv2 |
| Time Stamping Resolution | 1µs |
| Hardware Trigger | 5 V TTL pulse, maximum 1 kHz, minimum 2 Hz |

2416 Accuracy - A Metrology Approach

The performance and flexibility of the Chell 2416 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 comparable 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
- Drift errors over 12 months

| | Differential Range (+/-) ¹ | | Standard Deviation (Pa) ³ | Error (95% Confidence) | | Uncertainty |
|----------------------------------|---------------------------------------|-----------------|--------------------------------------|------------------------|------------------|------------------|
| | | | | ±Pa | %FS ² | %FS ² |
| 1 kPa | 10mb | 4" water | 0.91 | 1.82 | 0.2% | 0.4% |
| 2.5 kPa | 25mb | 10" water | 0.91 | 1.82 | 0.07% | 0.15% |
| 5 kPa | 50mb | 20" water | 0.91 | 1.82 | 0.04% | 0.08% |
| 7 kPa | 70mb | 1 psi | 1.1 | 2.26 | 0.03% | 0.06% |
| 10 kPa | 100mb | 1.5 psi | 1.25 | 2.5 | 0.03% | 0.04% |
| 17 kPa | 170mb | 2.5 psi | 1.5 | 3.0 | 0.02% | 0.03% |
| 35 kPa | 350mb | 5 psi | 2.01 | 7.0 | 0.02% | 0.03% |
| 55 kPa | 550mb | 8 psi | 1.71 | 11 | 0.02% | 0.03% |
| -83 kPa to 103 kPa | -830mb to 103mb | -12 to 15 psi | 3.0 | 20 | 0.02% | 0.03% |
| -83 kPa to 207 kPa | -830mb to 2.07 bar | -12 to 30 psi | 5 | 40 | 0.02% | 0.03% |
| -83 kPa to 300k Pa | -830mb to 3.0 bar | -12 to 43.5 psi | 9.0 | 60 | 0.02% | 0.03% |
| -83 kPa to 689 kPa | -830mb to 6.89 bar | -12 to 100 psi | 20 | 300 | 0.04% | 0.05% |
| -83 kPa to 1034 kPa | -830mb to 10 bar | -12 to 150 psi | 30 | 400 | 0.04% | 0.05% |
| -83 kPa to 2758 kPa ⁴ | -830mb to 27.5 bar | -12 to 400 psi | 60 | 1100 | 0.04% | 0.05% |
| -83 kPa to 5171 kPa ⁴ | -830mb to 51.7bar | -12 to 750 psi | 150 | 2000 | 0.04% | 0.05% |
| -83 kPa to 6890 kPa ⁴ | -830mb to 68.9bar | -12 to 1000 psi | 200 | 2750 | 0.04% | 0.05% |

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.

4) Provisional

| Absolute Range | Output Resolution (Pa) | Standard Deviation (Pa) ¹ | Error (95% Confidence) | | Uncertainty | |
|--|-------------------------|--------------------------------------|------------------------|------------------|------------------|--------|
| | | | ±Pa | %FS ² | %FS ² | |
| Absolute range for differential ranges up to 35 kPa (5 psi) | | | | | | |
| 15 ³ to 115 kPa | 2.2 psia to 16.8 psia | 1.5 | 1.13 | 20 | 0.02% | 0.025% |
| Absolute range for differential range of 55 kPa (8 psi) | | | | | | |
| 13.0 ³ to 160 kPa | 1.885 psia to 23.2 psia | 2.24 | 1.6 | 30 | 0.02% | 0.025% |
| Absolute range for differential range of 103 kPa (15 psi) | | | | | | |
| 15.0 ⁴ to 206 kPa | 2.2 psia to 29.9 psia | 2.9 | 3.5 | 40 | 0.02% | 0.025% |
| Absolute range for differential range of 207 and 300 kPa (30 and 43.5 psi) | | | | | | |
| 0 ⁴ to 400 kPa | 0 psia to 58.01 psia | 6.1 | 6 | 60 | 0.02% | 0.025% |
| 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 | 50 | 300 | 0.03% | 0.04% |
| Absolute range for differential range of 2758 kPa (400 psi) | | | | | | |
| 0 ⁶ to 3000 kPa ⁷ | 0 psia to 435 psia | 46 | 400 | 1000 | 0.03% | 0.04% |
| Absolute range for differential range of 6890 kPa (1000 psi) | | | | | | |
| 0 ⁶ to 7000 kPa ⁷ | 0 psia to 1015 psia | 107 | 600 | 2000 | 0.03% | 0.04% |

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 measurable absolute pressure for ranges up to 160kPa is 11kPa.

4) Lowest measurable absolute pressure for 206 and 400 kPa range ranges is 0.5kPa.

5) Lowest absolute calibrated pressure is 14 kPa as standard (please contact us for lower pressures)

6) Lowest measurable absolute pressure for 1140kPa range is 11kPa.

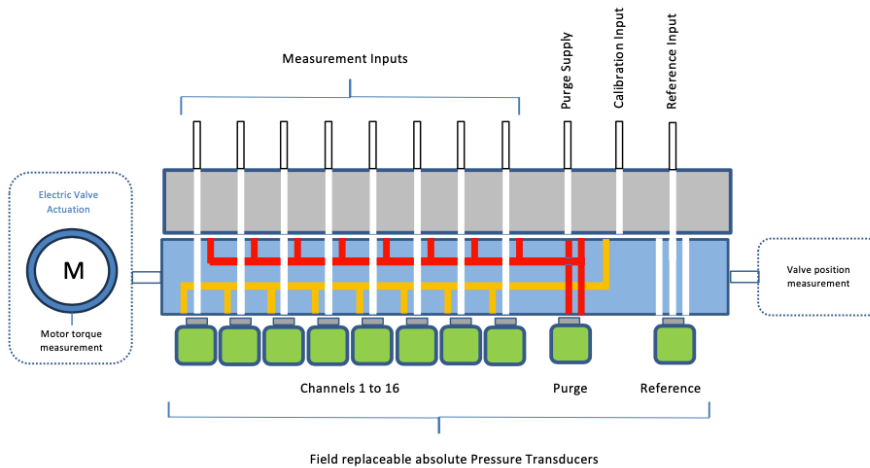
7) Provisional

Digital Transducers - A revolution in data quality

The digital transducers used in the 2416 provide unparalleled data quality. Each channel has two 24 bits ADCs - one for pressure and one for temperature. When the pressure and temperature output for each transducer are processed with our proprietary thermal compensation algorithm, the results set a new standard for pressure scanners and a considerable improvement over the earlier scanner products.

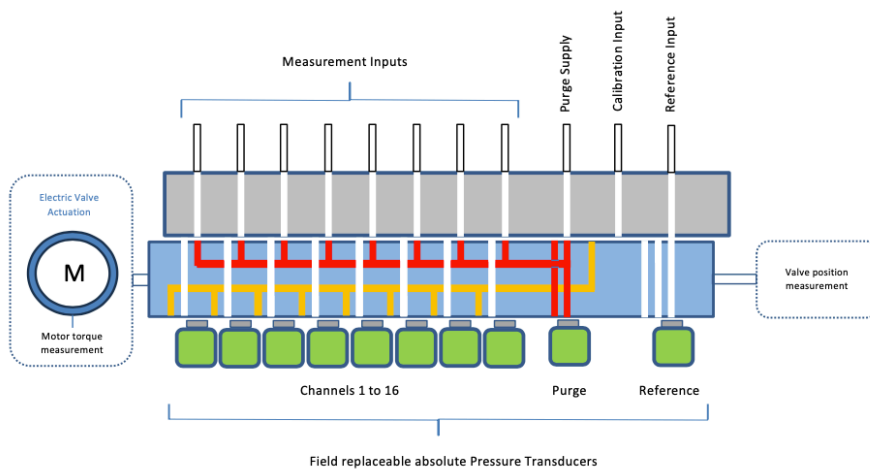
2416 Electric Shuttle Valve

Run Mode



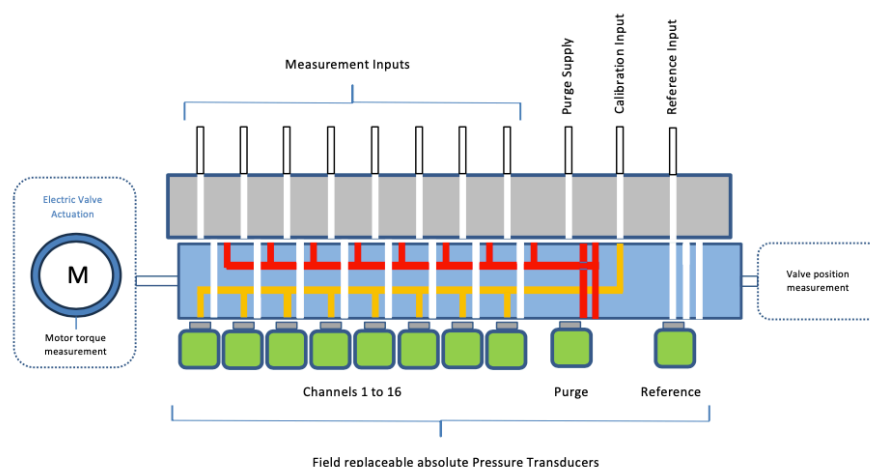
Here each measurement input is connected to its transducer. The purge supply and calibration input are positively shut-off. The purge supply pressure can be monitored.

Purge Mode



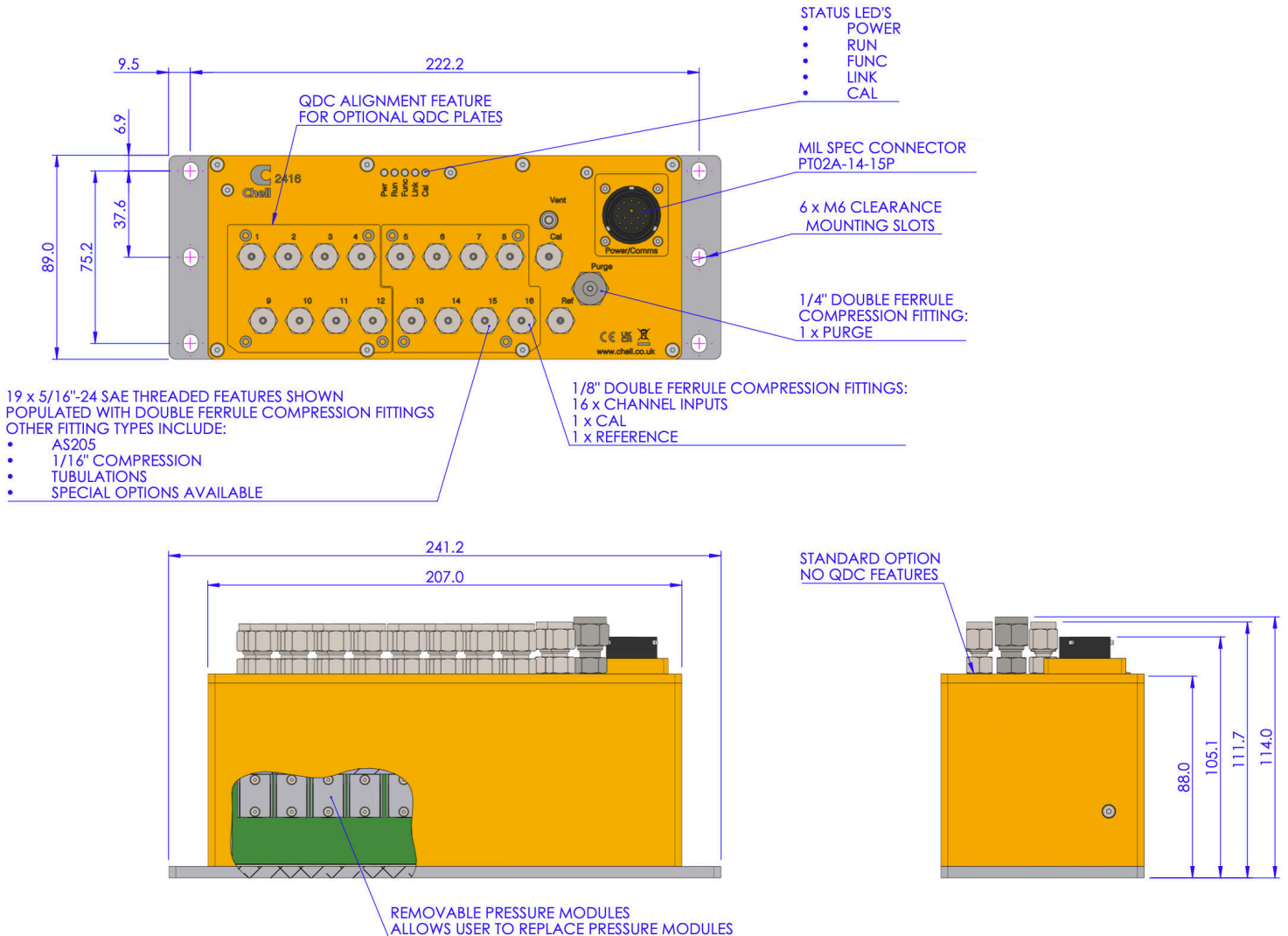
In purge mode, all the measurement lines are connected to the purge supply. The purge pressure can also be measured by the purge transducer. The transducers are isolated and the calibration input is shut-off.

Cal Mode



In cal mode, all the transducers are connected to the calibration input. The measurement lines are isolated and the purge supply is positively shut-off.

2416 Dimensions



Part Number:

2416 -AABBCCDDEE

AA = Range

- 01 = 1 kPa (4" water)
- 02 = 2.5 kPa (10" water)
- 03 = 5 kPa (20" water)
- 04 = 7 kPa (1 psi)
- 05 = 10 kPa (1.5 psi)
- 06 = 17 kPa (2.5 psi)
- 07 = 35 kPa (5 psi)
- 08 = 55 kPa (8 psi)
- 09 = 103 kPa (15 psi)
- 10 = 207 kPa (30 psi)
- 11 = 310 kPa (43. psi)
- 12 = 689 kPa (100 psi)
- 13 = 1034 kPa (150 psi)
- 14 = 2758 kPa (400 psi)
- 15 = 5171 kPa (750 psi)
- 16 = 6890 kPa (1000 psi)

BB = Measurement Ports

- 00 = No mating Connectors
- 01 = 1/8 Swagelok
- 02 = AS205
- 03 = 1/8 Swagelok on 2 x quick disconnect plates
- 04 = AS205 on 2 x quick disconnect plates
- 05 = 1.0mm (0.040") bulged tubulations on 2 x quick disconnect plates
- 06 = 1.6mm (0.063") bulged tubulations on 2 x quick disconnect plates

EE = Interface Types

- 01 = Chell Interface, IENA and NetScanner emulation
- 02 = Chell Interface, IENA, NetScanner emulation and DDS
- 03 = Chell Interface, IENA, NetScanner emulation and DDS (including iDDS run time license).

DD = Service ports

- 01 = 5/16" - SAE O-ring boss
- 02 = 1/8" double ferrule compression fittings
- 03 = AS205 quick disconnect

CC = Interface / Supply

- 01 = 09-49-15KPT06FS (MIL-DTL-26482 14-15P)
- 02 = TV06ZN-11-35PN-UWBSB2 (MIL-DTL-38999 11-35P)