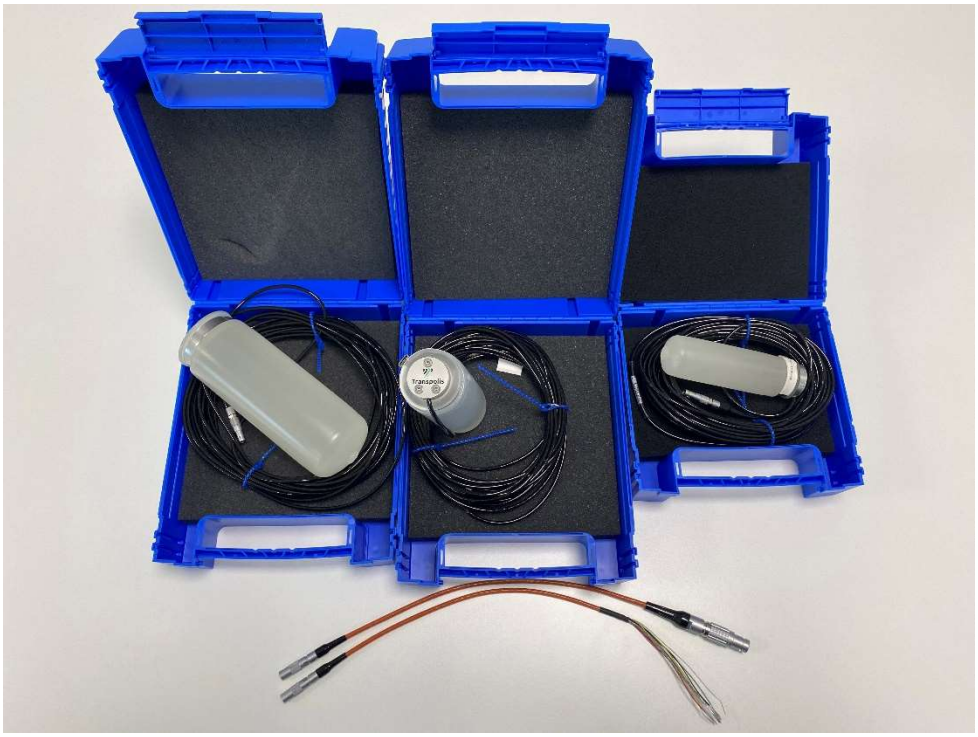
APTS USER MANUAL



IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions
2. Keep these instructions safe
3. Take notice of all warnings
4. Follow all instructions
5. Do not store or use this product near a heat source such as radiators, heaters, ovens, or other apparatus that produces heat
6. Do not dismantle the plug wiring
7. Do not remove the Lemo plug from the cable
8. Protect the cable and the plug from being walked on or pinched
9. Only use plugs or accessories provided by the manufacturer
10. Never open the sensor head containing the electronics and wiring

RoHS compliance

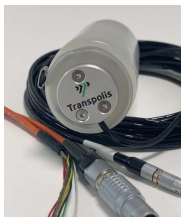
This product is compliant to RoHS 3 directive (2015/863/CE) by the EU and Advisory Council concerning the restriction of the use of certain hazardous substances in electric and electronic equipment.

GENERAL DESCRIPTION AND SPECIFICATIONS

The APT sensors have been designed to measure the abdomen pressure inside the dummy to certify child restraint systems during crash tests.

Each sensor is made of a soft and robust cylindrical elastomer bladder, filled with a specific liquid, and sealed with a mechanical cover. The sensor head includes a miniature pressure cell and signal conditioning electronics. The key design of the fluid-elastomer assembly enables a very high biofidelity with the real stiffness of abdominal tissues. The ability of the restraint system to meet injury regulatory criteria is assessed by recording the pressure inside the abdomen during the crash impact.

For impact testing, the sensors are inserted vertically by pair in the abdomen.



The V3 current version of the APTS described in this document is available in three dimensions. The nominal diameter of the sensor corresponds to the main dimension accordingly to the abdomen Q dummy size; key specifications are provided in Table 2.

- Nominal diameter of 30mm for the Q1 and Q1.5 dummy,
- Nominal diameter of 40mm for the Q3 and Q6 dummies,
- Nominal diameter of 50mm for the Q10 dummy.

The APTS are mounted inside special Q dummy abdomen. These abdomen assemblies are designed by Humanetics Innovation Solutions or Cell Bond featuring two blind holes parallel to the lumbar spine.

The APTS must be inserted in the abdomen with the aluminum cap downwards and the sensor cables coming out of the abdomen through small holes. To reduce the friction with the skin inside the hole, each APTS sensor shall be inserted in a thin Lycra sock. To prevent unwanted slippage during testing, the sock should be attached to the bottom of the hole.

Performance, environmental and electrical characteristics

Range (bar / psi / kPa)	5 / 73 / 500	Safe temperature (°C)	-20 to 70
Safe overload	150%	Compensated temperature (°C)	0 to 50
Rated output (mV/bar) (1)	0.42 ±20%	Temperature effect on zero (%RO/°C) and output (%/°C)	±1% and ±0.3%
Non linearity (%RO)	±1.5 % max.	Nominal excitation (VDC)	5 to 15
Hysteresis (%RO)	±1% max.	Bridge resistance (Ω)	350 ±10%
Cable	Length 9m, black polyurethane coated, 32AWG copper wire, outer diameter 2.6 mm	Compliance	RoHS 3 directive (2015/863/CE)
Plug	Lemo FGG.00.306.CLAD35Z	TEDS (IEEE P1451.4)	DS2431 1024-bit EEPROM chip

Mechanical characteristics

Sensor type	APTS-D30	APTS-D40	APTS-D50
Dimensions L × D (mm)	105 × 30	125 × 40	141 × 50
Weight (g)	81±2%	160±2%	272±2%
Special abdomen P/N	Q1/1.5 : 036-5005	Q3 : 020-5005 Q6 : 033-5005	Q10 : 010-4309
Biofidelity static response (bar/mm) (2)	1.01/10.81 ±10%	0.67/16.51 ±10%	0.60/15.81 ±10%

(1) With an excitation voltage from 5VDC to 15VDC. (Excitation voltage is safe from 2.4 to 18 VDC.)
(2) Data obtained after static compression test with a belt: measurement of the pressure (bar) and the deflection (mm) with 250 N load.

GENERAL RECOMMENDATIONS

Listed below are the general requirements to operate the APTS sensor with maximum safety and quality of measurement results.

- The APTS should be stored in a temperature-controlled room (around 20 °C/68°F) and away from water.
- Before a test, the APTS should be kept in the test environment for at least 4 hours.
- After each test, verify that the APTS' are still in place: check the upper bladder position with respect to the abdomen. If the APTS' have moved upwards (typically 2 cm or more) then the test results may not be valid and the APTS must be checked for damage (cable, etc.).
- For data processing, pressure signals should be filtered using a CFC 180 filter. Before the test, the signal pressure offset should be cancelled or the pressure value just prior to the test shall be recorded (with the dummy in position). The maximum pressure criterion is the maximum of the left and right pressure (low passed filtered and offset removed).
- A time interval of at least 30 minutes should be observed between two tests on the same APTS.
- To guarantee high quality standard of the measurements, it is highly recommended to perform an official calibration of the APTS at least once a year. The calibration must be done in the Transpolis laboratory or in a laboratory accredited by Transpolis (please ask Transpolis for technical support). During the calibration, the APTS biofidelity conformance is also verified.

SAFETY PRECAUTIONS

Be sure to observe the safety precautions given in the instruction manual to ensure correct and safe operation.

Contact Transpolis technical support @ apts@transpolis.fr in case of doubt.

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