鑫源宇通
A bridge to perceive the world

微型电子压力扫描阀
ESP-32HD/64HD

ESP 压力扫描器为微型电子差压测量单元，内置阵列式硅压阻式压力传感器，每个压力接口对应一枚传感器。该类传感器通过专利工艺封装于通用混合陶瓷基板，可最大化保障设备长期稳定性。传感器输出信号经板载单路仪表放大器，以二进制寻址方式实现电子多路复用，复用速率最高可达 70000 赫兹。经放大的多路复用模拟输出信号可驱动长距离电缆，直接传输至远端模数转换器。

ESP 压力扫描器集成双位校准歧管，由控制压力的瞬时脉冲信号驱动切换。当校准歧管处于校准档位时，所有传感器均与通用校准压力接口相连。可通过该接口输入一系列精准标定的压力值，在传感器实际工作工况下对其进行原位特性标定。定期规范的在线校准，可将静态误差控制在满量程（FS）压力范围的 ±0.03% 以内，甚至达到更高精度。校准歧管可自动切换两路通用参考压力，确保校准过程中参考压力的稳定性；同时配备可视位置指示器，采用动态 O 型圈密封设计，既提升设备可靠性，又便于现场维护。

设备可选配与压力传感器相隔离的吹扫功能，可清除测量管路中的水汽与污染物，同时避免在涂覆压敏漆过程中，模型测压孔发生堵塞。其他可选配置包括：镍箔热电阻温度输出接口，用于监测扫描器内部温度；融合 PSI 第二代放大器技术的数字温度补偿（DTC）技术。

数字温度补偿（DTC）选配件融合了 PSI 公司在 ESP 技术领域的最新创新成果，核心功能包括：每枚硅压阻式压力传感器均配备温度信号输出端；内置电可擦除可编程只读存储器，可存储包含温度特性在内的出厂校准信息；带可选双量程校准功能的可编程双增益放大器；校准歧管位置检测功能；以及带检测输出的传感器内部激励调节功能。DTC 系列 ESP 压力扫描器可搭配 PSI 公司的擎天柱系统处理器、DTC Initium 系统及 FDS Initium 系统使用，大幅减少设备校准频次。

此外，ESP 压力扫描器还兼容各类第三方配套系统。

产品特点

- 卓越长期稳定性
- 数字温度补偿（DTC）
- 独立偏移量与热零点补偿
- 自动切换参考压力
- 可选隔离吹扫功能
- 可选温度检测输出

场景应用

- 风洞测试
- 飞行测试
- 汽车测试

400-780-9688
www.senstechxyz.com

规格

除非另有说明，所有参数均为25℃环境、大气压为参考压力、预热 1 小时后测得。

PARAMETER	DTC		CONVENTIONAL		UNITS	COMMENTS
	32HD	64HD	32HD	64HD		
PNEUMATICS						
通道数	32	64	32	64	ports	
压力范围[1]	±4 (1.0) to ±20 (5.0) ±1 (7) to +150 (1034)				in WC (kPa) psid (kPa) psid (kPa)	
耐压范围 [2]	400 150				% FS % FS	ranges ≤ 30 psid ranges > 30 psid
最大参考压力	50 (345) 15 (103)				psid (kPa) psid (kPa)	ranges ≥ 2.5 psid ranges < 2.5 psid
校准歧管控制压力	100 (689) 125 (862)				psig (kPa) psig (kPa)	min max
可选的吹扫压力	greater than max input pressure 150 (1050)				psig (kPa) psig (kPa)	min max
测量介质: 测量端口 参考端口	相对湿度达 100% 的非冷凝型无腐蚀性气体、干燥无腐蚀性气体					
气动连接	0.040 or 0.063	0.040	0.040 or 0.063	0.040	inches OD	SS bulged tubulation
PERFORMANCE						
静态精度[3] @100% range [4]	±0.03 ±0.06 ±0.15		N/A N/A N/A		% FS % FS % FS	range ≥ 10 psid range ≥ 10 in WC to < 10 psid range < 10 in WC
@33% range [7]	±0.05		N/A		% FS	range ≥ 10 psid
2nd order correction [5]	N/A N/A		±0.15 ±0.20		% FS % FS	range > 2.5 psid range ≤ 2.5 psid
4th order correction [6]	N/A N/A		±0.05 ±0.10		% FS % FS	range > 2.5 psid range ≤ 2.5 psid
热零点误差	N/A		±0.06 ±0.20		% FS/°C % FS/°C	range > 2.5 psid range ≤ 2.5 psid
热满量程误差	N/A		±0.02 ±0.03		% FS/°C % FS/°C	range > 2.5 psid range ≤ 2.5 psid
热稳定性 @100% range	±0.002 ±0.004 ±0.01		N/A N/A N/A		% FS/°C % FS/°C %FS/°C	range ≥ 5 psid range ≥ 10 in WC to < 5 psid range < 10 in WC
@33% range [7]	±0.003		N/A		% FS/°C	range ≥ 5 psid

NOTES:

① 未列压力量程请咨询原厂。50 psi以上压力量程，此类配置与 Initium 系列产品不兼容，可适配 8400、Optimus等其他系统。

② 传感器性能无衰减的最大适用压力。

③ 静态精度包含非线性、迟滞及非重复性引入的综合误差。

④ 满量程校准后可达到的精度。当 DTC 系列 ESP 压力扫描器搭配传统 PSI 8400 SDI 配置系统、DTC Initium 系统或Optimus系统使用时，其技术规格请参阅对应产品数据手册。

⑤ 采用二阶方程Px=C0+C1(Vx)+C2(Vx²) 测算的典型性能指标。

⑥ 采用四阶方程Px=C0+C1(Vx)+C2(Vx²)+C3(Vx³)+C4(Vx⁴) 测算的典型性能指标（原文 C2 为笔误，行业标准系数为 C4）。

⑦ 当指定双量程校准时，精度以校准后满量程的百分比形式表示。

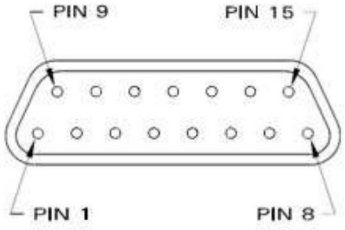
规格

除非另有说明，所有参数均为25℃环境、大气压为参考压力、预热 1 小时后测得。

PARAMETER	DTC		CONVENTIONAL		UNITS	COMMENTS
	32HD	64HD	32HD	64HD		
电气						
电源						
+5 VDC	0	0	55	75	mA	Max
+12 VDC	75	110	5	5	mA	Max
-12 VDC	25	25	3	3	mA	max
满量程输出	±3.5 – 4.5				VDC	optional output available
端口选择	5	6	5	6	bit	0-12 VDC, CMOS Logic
扫描速率	70,000		20,000		chs/sec	
电气连接	15 pin subminiature D-shell [1]					ITT Cannon (PN: MDM 15SSB)
环境 / 物理						
补偿温度范围	0 to 80				ºC	optional 100 ºC available
工作温度范围	-25 to 80				ºC	optional 100 ºC available
存储温度翻译	-25 to 100				ºC	
重量	3.9 (112)	5.1 (143)	3.7 (106)	4.9 (140)	oz. (g)	
加热仓						
设定值可调性	±3				ºC	
热补偿	N/A [9]		10:1			reduction in the effects of temperature to the scanner
环境温度	-55				ºC	min
功率要求	28 VDC @ 1.5A					max
电气连接	Two leads unterminated					Red: +28 VDC Black: GND
温度过载	90				ºC	with Auto Reset
重量	6.8 (192)	6.8 (192)	6.8 (192)	6.8 (192)	oz. (g)	

NOTES:

① DTC 系列扫描器的加热腔仅用于维持设备的最低工作温度。

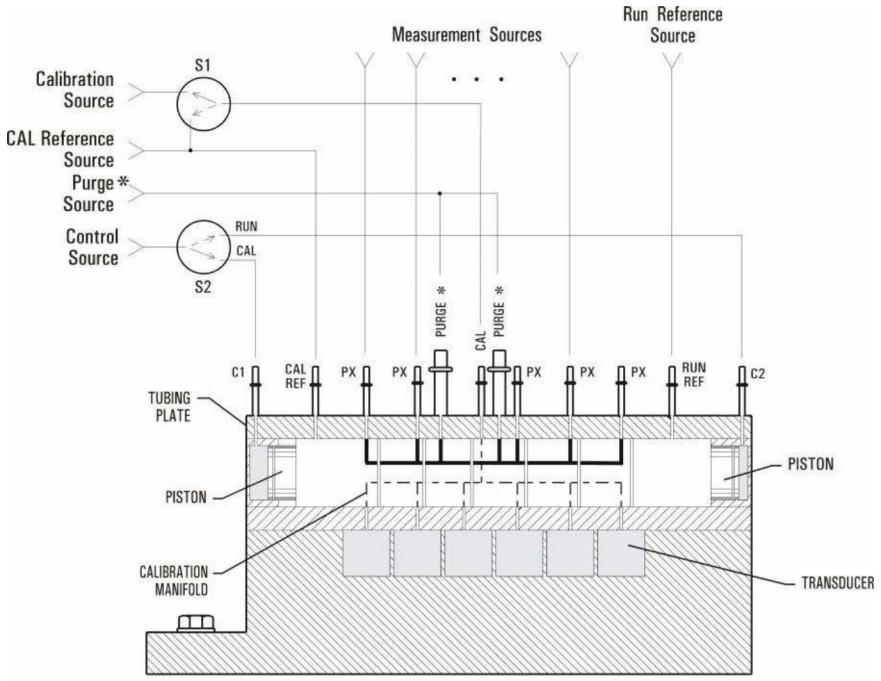


PIN	FUNCTION
1	Digital Address A0
2	Digital Address A1
3	Digital Address A2
4	Digital Address A3
5	Digital Address A4
6	+12 VDC
7	-12 VDC
8	+VS, Sensor Supply Voltage (+5)

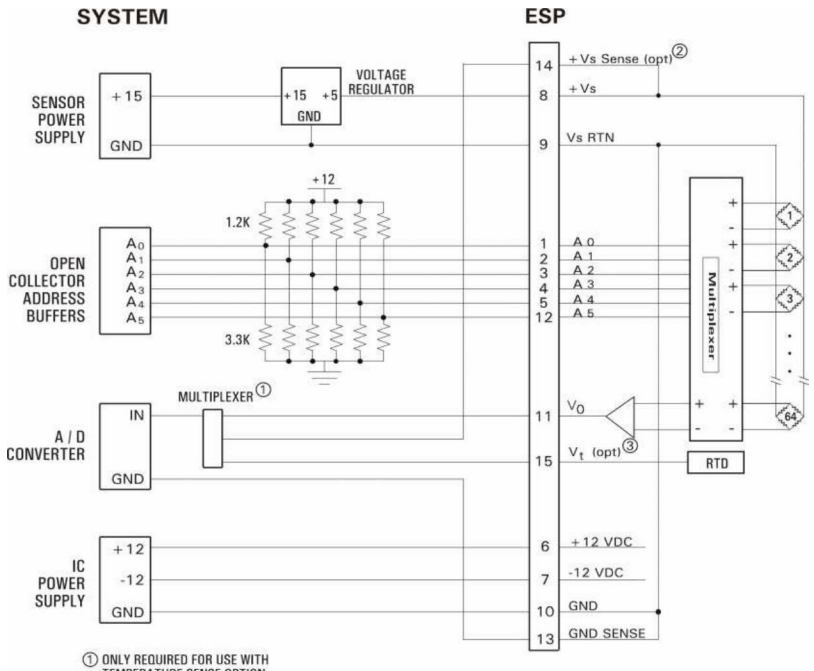
PIN	FUNCTION
9	-VS, Sensor Supply Voltage Return
10	GND
11	Voltage Output V0
12	Digital Address A5
13	GND Sense
14	+VS Sense (opt.)
15	Vt, Temperature Sense Output (opt.)

气动 / 电气接口

ESP-HD 系列扫描器的接口适配，需同时兼顾电气与气动两方面技术要求。PSI 公司的Optimus系统处理器、DTC Initium 系统及 FDS Initium 系统，可针对上述接口需求提供交钥匙式预制工程解决方案。若采用定制化数据采集系统，则需自主开发适配该类接口的相关配套方案。



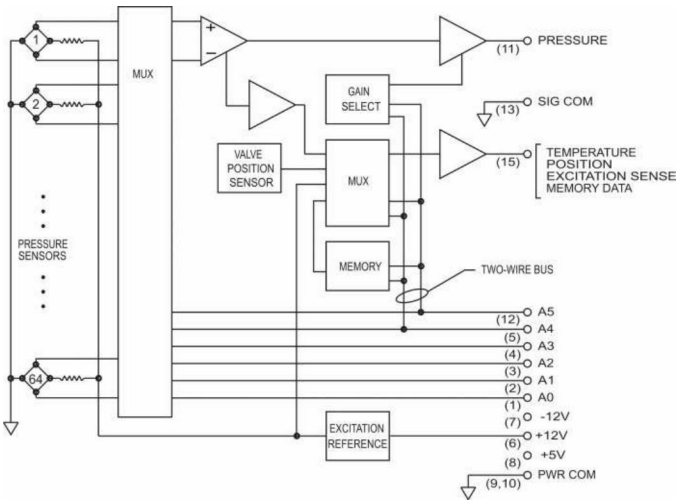
① S1 - FOR REZERO ONLY.
② S2 - TO SHUTTLE MANIFOLD.
③ * ONLY REQUIRED FOR SCANNERS ORDERED WITH PURGE OPTION.



① ONLY REQUIRED FOR USE WITH TEMPERATURE SENSE OPTION.
② FOR RATIOMETRIC CORRECTION OF SPAN.
③ FOR TEMPERATURE CORRECTION OF ZERO AND SPAN.

Options

Digital Temperature Compensation (DTC)



The DTC option of the ESP pressure scanners incorporates many advanced features including the Gen-2 amplifier technology to increase the utility of the scanners while providing digital temperature compensation of the silicon sensors. An onboard EEPROM stores the thermal calibration data for each channel. Also stored in the EEPROM is information identifying the range of the scanner, the number of channels, the model number, the serial number, the date of manufacturer, the date of calibration, and the model and serial number of the calibration unit used to calibrate the scanner. This data is serially transmitted to a data acquisition system such as the Optimus System Processor, DTC Initium System and the FDS Initium using the ESP address lines and then transferred to the Optimus System Processor via fiber optic cable. Using a proprietary PSI-developed method, the temperature of each sensor within the scanner is measured and transmitted along with the raw pressure measurements to the data acquisition system. Utilizing the calibration data within the EEPROM, the data acquisition system compensates for temperature changes to the sensors in real time. This reduces thermal errors by a factor of 20 thereby reducing on-line calibration requirements by up to 90%. The ESP scanners also incorporate a hall effect sensor which is used to indicate the position of the calibration manifold. This position information can be transferred to the system upon command. Another advanced feature is the ability to derange the ESP scanner upon command. This alters the gain on the amplifier to derange the scanner by a factor of three, enabling additional windtunnel tests to be conducted without instrumenting the model with lower range ESP scanners. To optimize the accuracy of the DTC scanner at the highest gain, the optional dual range calibration is recommended.

Temperature Sense Output Option for Conventional ESP Scanners

The temperature sense output option involves embedding a nickel foil RTD within the scanner to indicate internal scanner temperature. The analog signal from the RTD is output on one of the pins of the electrical connector. Silicon sensors are repeatable with temperature and, once characterized, can be compensated for thermal errors using algorithmic techniques. Scanners with this option are factory calibrated at temperature intervals throughout the operational temperature span of the scanner and a curve fit established for each sensor. A fourth order polynomial equation is generated for each sensor at standard temperature points of -25, 0, 25, 50 and 75ºC. These equations as well as the corresponding RTD voltages are provided to customers in a calibration report along with the scanner. The temperature sense option can be ordered with the scanner or existing scanners can be retrofitted by returning the scanner to the factory for upgrade. (See page 12 for order information.)

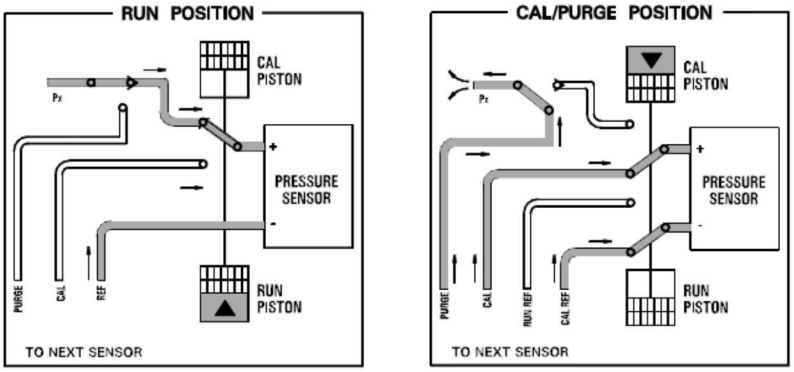
Pneumatic Connections

Pneumatic connections to the ESP scanners are made via user-specified 0.040” or 0.063” OD bulged stainless steel tubulations installed on the scanner tubing plate. Tubulations of 0.040” OD can optionally be installed at a 60º angle to minimize the overall height of the scanner. Scanners specified with Purge option must be installed at the standard 90º angle unless the Quick-Disconnect option is also specified. Flexible tubing is installed over the bulged tubulation and secured using retaining springs. Nylon tubing, retaining springs and tubing pliers to facilitate the installation of the tubing and springs are offered. (See page 12 for ordering information).

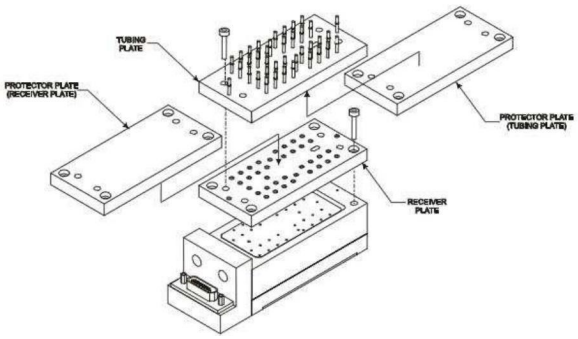
Options

Purge Option

The purge option involves a modification to the scanner's calibration valve to manifold purge pressure inputs to the measurement ports during calibration. Anytime the valve is placed in the calibrate position, purge pressure applied to the purge ports will purge the measurement lines of any contamination such as moisture. This option enables simultaneous purging and calibration (or rezero) which is especially useful in-flight test applications. The purge option is also useful for preventing model surface pressure taps from becoming clogged during the application of pressure sensitive paint. During use, purge pressure must be present whenever the valve is shifted to the calibrate position to prevent "reverse" purge from occurring.



Heater Chambers



Heater chambers are available to insulate the ESP miniature pressure scanners from temperature changes and reduce the thermal effects by a factor of ten. The heater chambers are constructed of Delrin, a lightweight material with good insulation qualities. The scanners are housed within an embedded copper liner to evenly distribute the heat generated by the foil heating element. The heater circuitry includes proportional temperature control, adjustable temperature set point, and thermal overload protection. The +28 VDC power supply is input via two unterminated leads. The ESP scanners are mounted to the heater chamber top plate which includes an opening to route measurement lines to the scanner. A rubber grommet is provided to allow the scanner electrical cable to enter the heater chamber while thermally sealing the opening. The heater chambers also incorporate mounting provisions. (See page 3 for heater chamber specifications, page 8-11 for dimensions and page 12 for order information.)

Quick Disconnect ESP Tubing Plates

Quick-Disconnect ESP tubing plates enable users to disconnect the tubing plate from ESP-32HD or ESP-64HD scanners without exposing the internal calibration manifold to potential contaminants. Separating the tubing plate from the scanner helps reduce setup times by allowing tubing connections to be completed while simultaneously conducting electrical checkout of the scanner. The Quick-Disconnect option enables angled tubulation to be specified in conjunction with the Purge option.

Quick-Disconnect tubing plates can be ordered as an option on new ESP scanners. Spare tubing plates are available at time of original order or for later purchase as a spare part. Retrofit of older scanners is not recommended due to minor manufacturing mechanical tolerance changes.

配件与规格图纸

维护套件及备用管板

为提升现场更换传感器支架与放大器组件的作业能力，原厂提供专用维护套件，用于校准阀与管板的现场维保。全系列扫描器型号均有配套维护套件可选。

维护套件包含备用胀形接管、管板接管孔清洁钻头、接管与管板固定用密封胶；同时配备校准歧管及活塞的备用 O 型圈，且附赠足量润滑剂；额外的 O 型圈可单独采购，套件中亦标配备用管板螺丝。

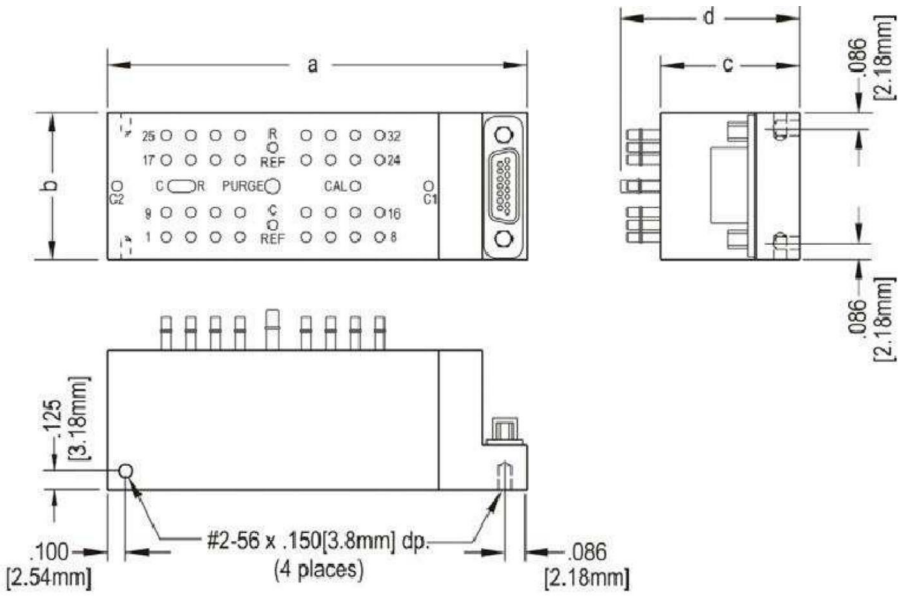
备用管板可用于更换损坏的管板，或更改扫描器的气动连接方式。订购备用管板时，需注明歧管配置类型（标准型 / 吹扫型）、ESP 扫描器型号及气动连接规格。使用本维护套件进行 ESP 扫描器维保的操作说明，详见《ESP 微型扫描器用户手册》（订购信息见本数据手册第 12 页）。

线缆

压力系统公司（Pressure Systems）提供多款配套线缆，含带线束的对接连接器，便于实现与系统的电气连接。该类线缆为定制化设计，可最大化提升抗干扰性与柔韧性，适用于 ESP 微型扫描器与Optimus系统处理器、DTC Initium 系统、FDS Initium 扫描器接口的连接，亦可适配定制化数据采集系统。线缆护套材质可选PVC与PTFE。

Spec Diagrams

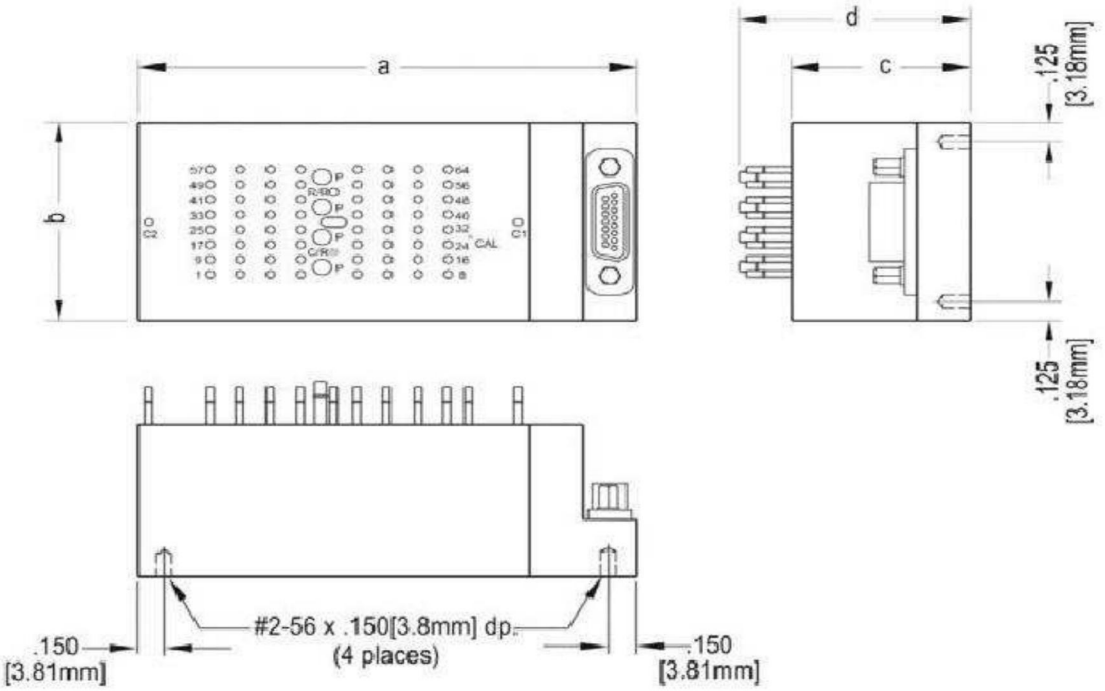
ESP-32HD



	ESP-32HD	a (length)		b (width)		c (height w/o tubes)		d (height incl. tubes)		c1/c2 tube dia.		purge tube dia.	
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Conventional	0.040" OD, straight	2.80	71.1	1.00	25.4	0.93	23.7	1.17	29.8	0.040	1.0	-	-
	0.040" OD, angled	2.80	71.1	1.00	25.4	0.93	23.7	1.16	29.6	0.040	1.0	-	-
	0.063" OD, straight	2.80	71.1	1.00	25.4	0.93	23.7	1.18	30.0	0.063	1.6	-	-
	0.040" OD, straight, purge	2.80	71.1	1.00	25.4	0.93	23.7	1.36	34.5	0.040	1.0	0.125	3.2
	0.063"OD, straight, purge	2.80	71.1	1.00	25.4	0.93	23.7	1.36	34.5	0.063	1.6	0.125	3.2
	0.040" OD, straight, QDC	2.80	71.1	1.00	25.4	1.12	28.4	1.36	34.6	0.040	1.0	-	-
	0.040" OD, angled, QDC	2.80	71.1	1.00	25.4	1.12	28.4	1.35	34.3	0.040	1.0	-	-
	0.063" OD, straight, QDC	2.80	71.1	1.00	25.4	1.12	28.4	1.37	34.7	0.063	1.6	-	-
	0.040" OD, straight, QDC, purge	2.80	71.1	1.00	25.4	1.12	28.4	1.54	39.2	0.040	1.0	0.125	3.2
	0.040" OD, angled, QDC, purge	2.80	71.1	1.00	25.4	1.12	28.4	1.53	39.0	0.040	1.0	0.125	3.2
	0.063" OD, straight, QDC, purge	2.80	71.1	1.00	25.4	1.12	28.4	1.54	39.2	0.063	1.6	0.125	3.2
DTC Series	0.040" OD, straight	3.10	78.7	1.00	25.4	0.93	23.7	1.17	29.8	0.040	1.0	-	-
	0.040" OD, angled	3.10	78.7	1.00	25.4	0.93	23.7	1.16	29.6	0.040	1.0	-	-
	0.063" OD, straight	3.10	78.7	1.00	25.4	0.93	23.7	1.18	30.0	0.063	1.6	-	-
	0.040" OD, straight, purge	3.10	78.7	1.00	25.4	0.93	23.7	1.36	34.5	0.040	1.0	0.125	3.2
	0.063"OD, straight, purge	3.10	78.7	1.00	25.4	0.93	23.7	1.36	34.5	0.063	1.6	0.125	3.2
	0.040" OD, straight, QDC	3.10	78.7	1.00	25.4	0.93	28.4	1.36	34.6	0.040	1.0	-	-
	0.040" OD, angled, QDC	3.10	78.7	1.00	25.4	0.93	28.4	1.35	34.3	0.040	1.0	-	-
	0.063" OD, straight, QDC	3.10	78.7	1.00	25.4	0.93	28.4	1.37	34.7	0.063	1.6	-	-
	0.040" OD, straight, QDC, purge	3.10	78.7	1.00	25.4	0.93	28.4	1.54	39.2	0.040	1.0	0.125	3.2
	0.040" OD, angled, QDC, purge	3.10	78.7	1.00	25.4	0.93	28.4	1.53	39.0	0.040	1.0	0.125	3.2
	0.063" OD, straight, QDC, purge	3.10	78.7	1.00	25.4	0.93	28.4	1.54	39.2	0.063	1.6	0.125	3.2

Spec Diagrams

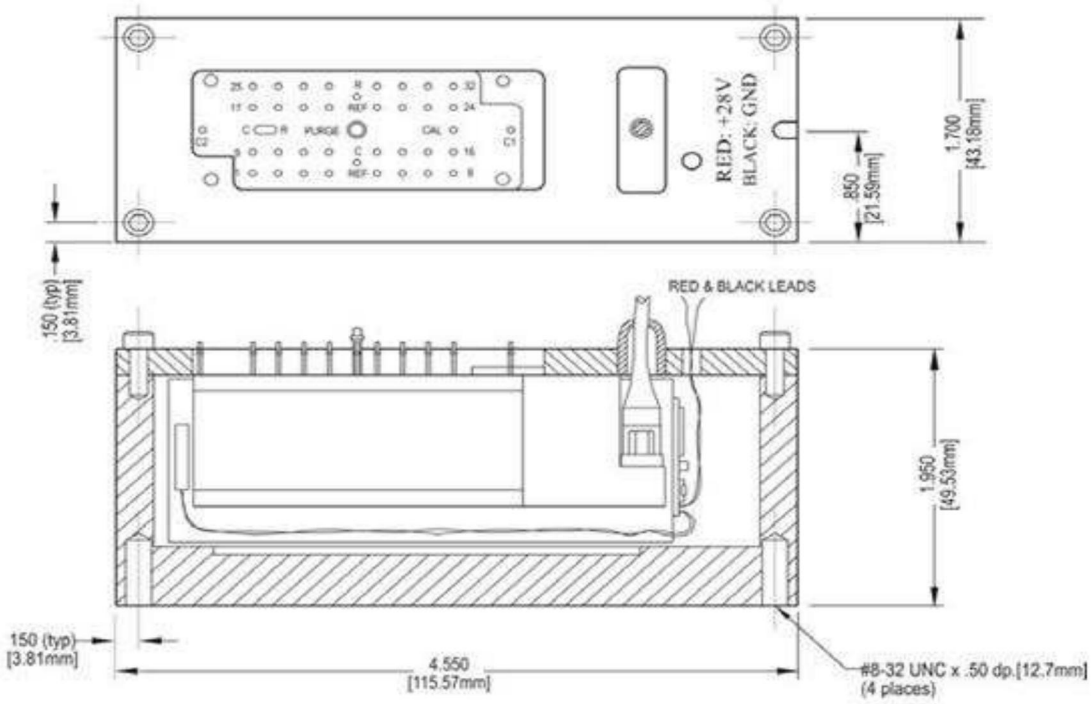
ESP-64HD



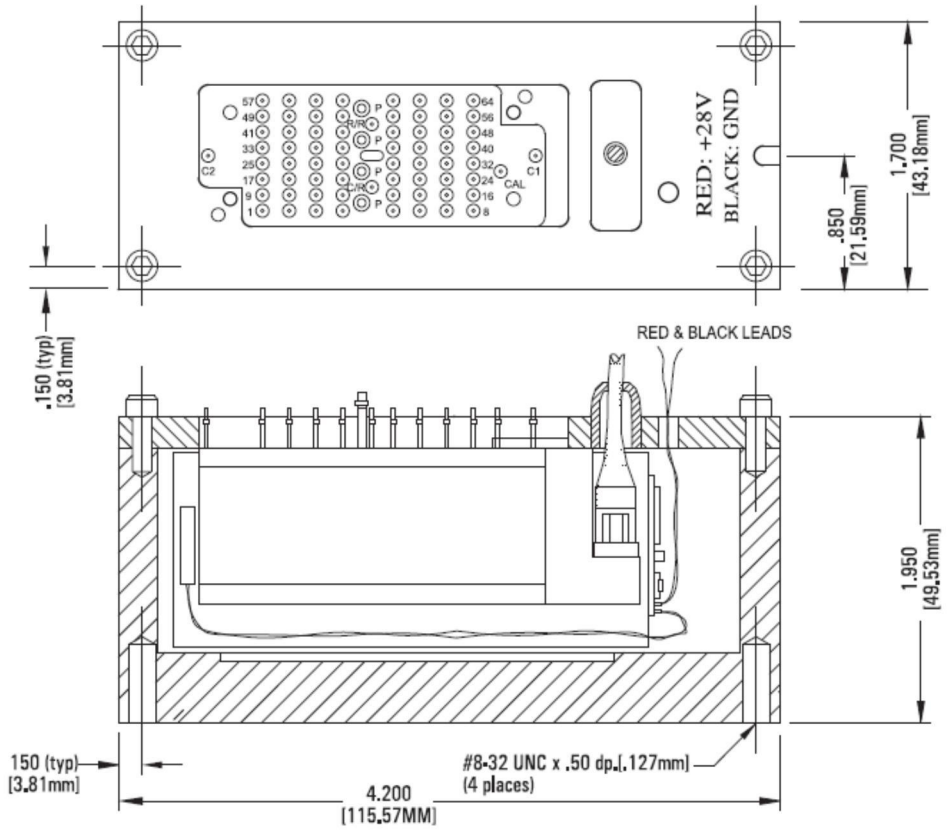
	ESP-64HD	a (length)		b (width)		c (height w/o tubes)		d (height incl. tubes)		c1/c2 tube dia.		purge tube dia.	
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Conventional	0.040" OD, straight	2.80	71.1	1.30	33.0	1.00	25.4	1.23	31.3	0.040	1.0	-	-
	0.040" OD, angled	2.80	71.1	1.30	33.0	1.00	25.4	1.19	30.1	0.040	1.0	-	-
	0.040" OD, straight, purge	2.80	71.1	1.30	33.0	1.13	28.6	1.55	39.4	0.040	1.0	0.090	2.3
	0.040" OD, straight, QDC	2.80	71.1	1.30	33.0	1.31	33.3	1.54	39.2	0.040	1.0	-	-
	0.040" OD, angled, QDC	2.80	71.1	1.30	33.0	1.31	33.3	1.50	38.1	0.040	1.0	-	-
	0.040" OD, straight, QDC, purge	2.80	71.1	1.30	33.0	1.31	33.3	1.74	44.1	0.040	1.0	0.090	2.3
	0.040" OD, angled, QDC, purge	2.80	71.1	1.30	33.0	1.31	33.3	1.55	39.5	0.040	1.0	0.063	1.6
DTC Series	0.040" OD, straight	3.15	80.0	1.30	33.0	1.00	25.4	1.23	31.3	0.040	1.0	-	-
	0.040" OD, angled	3.15	80.0	1.30	33.0	1.00	25.4	1.19	30.1	0.040	1.0	-	-
	0.040" OD, straight, purge	3.15	80.0	1.30	33.0	1.13	28.6	1.55	39.4	0.040	1.0	0.090	2.3
	0.040" OD, straight, QDC	3.15	80.0	1.30	33.0	1.31	33.3	1.54	39.2	0.040	1.0	-	-
	0.040" OD, angled, QDC	3.15	80.0	1.30	33.0	1.31	33.3	1.50	38.1	0.040	1.0	-	-
	0.040" OD, straight, QDC, purge	3.15	80.0	1.30	33.0	1.31	33.3	1.74	44.1	0.040	1.0	0.090	2.3
	0.040" OD, angled, QDC, purge	3.15	80.0	1.30	33.0	1.31	33.3	1.55	39.5	0.040	1.0	0.063	1.6

Conventional Heater Chambers

ESP-32HD

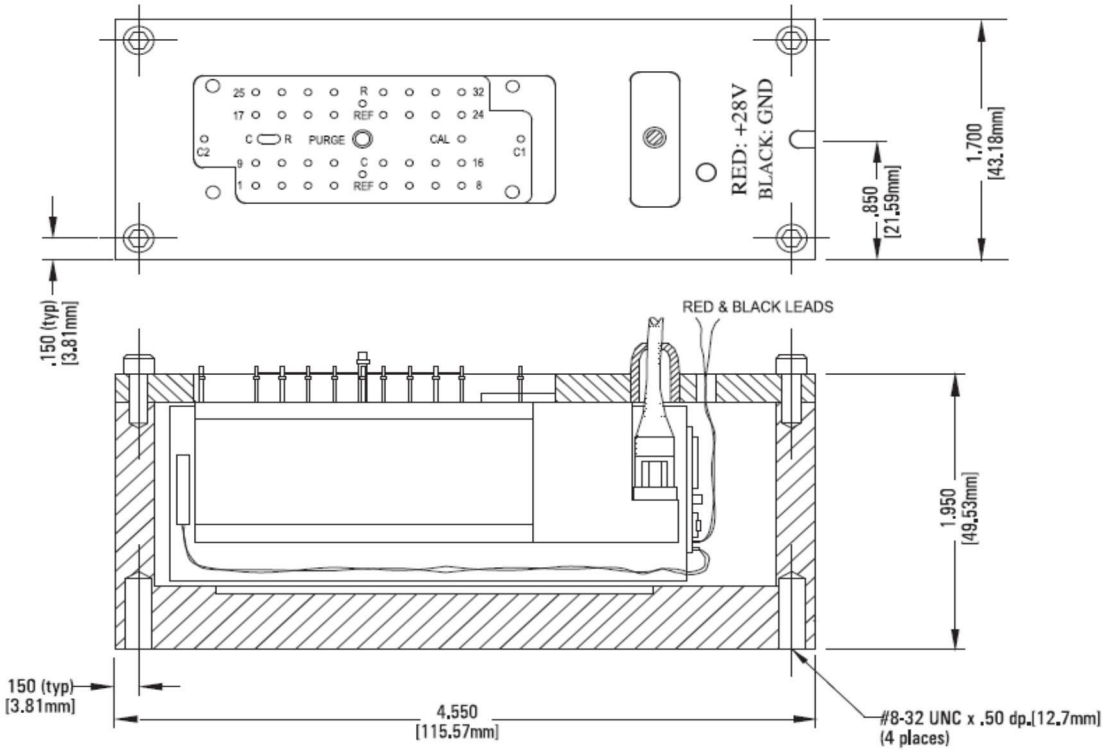


ESP-64HD

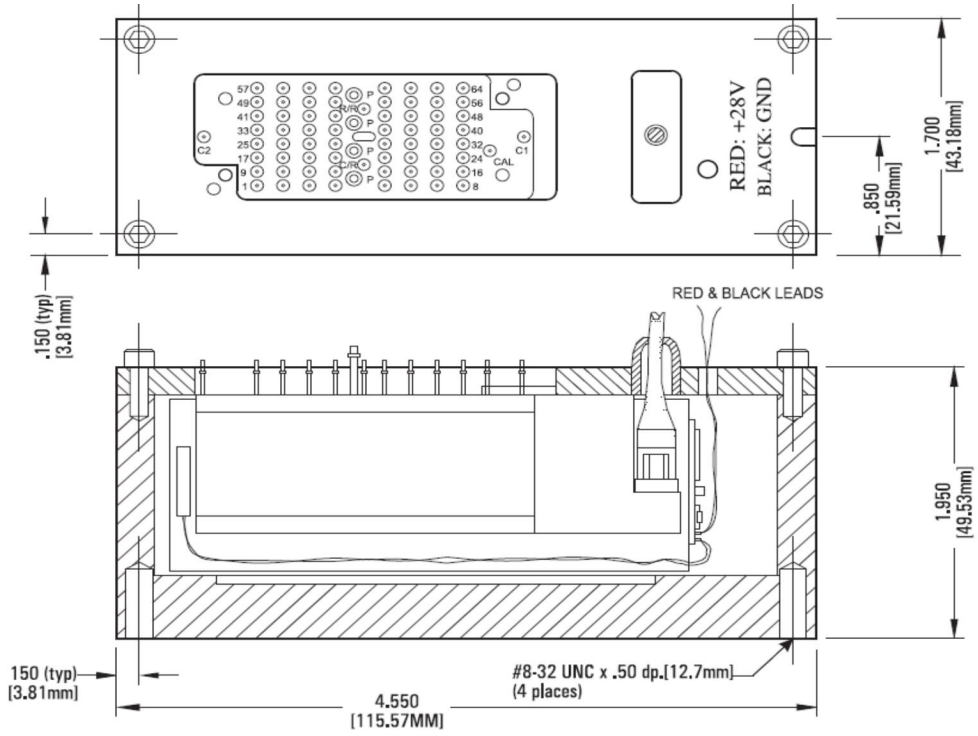


DTC Series Heater Chambers

ESP-32HD



ESP-64HD



Ordering Information

Pressure Scanner:
PN: 32HD-AABBCCDDEE ESP-32HD Scanner, 32 channels
PN: 64HD-AABBCCDDEE ESP-64HD Scanner, 64 channels

AA = Pressure Ranges

01, ±10 "WC	06, ± 10 psid	11, ± 7.5 psid	16, ± 3 psid	21, ± 12 psid
02, ± 20 "WC	07, -12 to +15 psid	12, -12 to +50 psid	17, ± 25 psid	
03, ± 1 psid	08, -12 to +30 psid	13, ± 1.5 psid	18, ± 20 psid	23, -12 to +100 psid
04, ± 2.5 psid	09, -12 to +45 psid	14, 0 to +75 psid	19, ± 4 "WC	
05, ± 5 psid	10, 0 to +100 psid	15, ± 2 psid	20, ± 4 psid	

BB = Pneumatic Connection (OD, angle)

01, 0.040", 90°
02, 0.040", 60° (not available with Purge option)
03, 0.063", 90° (16HD/32HD only)
21, 0.040", 90°, quick disconnect (32HD/64HD only)
22, 0.040", 60°, quick disconnect (32HD/64HD only)
23, 0.063", 90°, quick disconnect (32HD only)

CC = Manifold Options

00, Standard
02, Purge option

DD = Temperature Sense

00, Standard
02, Temp Sense Without Temperature Calibration
03, Temp Sense with Temperature Calibration
11, Digital Temperature Compensation (DTC) Single range calibration
28, Chell DAQ System Compatible, (DTC) Single range calibration
29, Chell DAQ System Compatible, (DTC) Dual range calibration

EE = Amplifier Section (32HD & 64HD only)

20, Gen-2 DTC (DD must = 11)
21, Motor Drive Attachment
22, Motor Drive & 100°C Operation (32HD Only)
23, 20 to 100°C Operation (32HD Only)

Order Example: 32HD-0103021120 ESP-32HD Scanner, ±10"WC, .063", 90°, purge, Digital Temperature Compensation with single range calibration

Spare Quick-Disconnect:

32QD-AABBCC0000	**Quick-Disconnect ESP Tubing Plate Kit, 32 ports**
64QD-AABBCC0000	**Quick-Disconnect ESP Tubing Plate Kit, 64 ports**

AA = Kit Configuration
- 02, Tubing plate only
- 03, Protective plate only

BB = Pneumatic Configuration (OD, angle)
- 00, N/A
- 21, 0.040", 90° (32HD/64HD only)
- 22, 0.040", 60° (32HD/64HD only)
- 23, 0.063", 90° (32QD only)

CC = Manifold Options
- 00, Standard
- 02, Purge

Notes:

32QD with purge option uses 0.125" OD purge tubes on all pneumatic configurations
64QD with purge option uses 0.090" OD purge tubes on 90° pneumatic configurations and 0.063" OD purge tubes on 60° pneumatic configurations. Not available with heater chamber option

Heater Chamber:

PN: 32HC-AA00000000	**ESP-32HD Heater Chamber**
PN: 64HC-AA00000000	**ESP-64HD Heater Chamber**

AA = Type of Scanner
- 01, Conventional
- 02, DTC

中国大陆
西安鑫源宇通电子科技有限公司
陕西省西安市高新区科技六路西段
西安国家数字出版基地A栋12402
Tel: 400-780-9688
sales@senstechxyz.com

中国香港
深大实业有限公司
香港新界沙田安平街6号新贸易中心B座13楼06室
Tel:+86 17792099916
info@caltropinstruments.com

新加坡
深大实业有限公司
香港新界沙田安平街6号新贸易中心B座13楼06室
Tel:+86 17792099919
info@senstechxyz.com