

**1. GENERAL**

- .1 This section is a module, which specifies the Field Instrumentation, Sensing Devices and Actuators.
- .2 For general requirements relating to all sections see Section 15900.

**2. PRODUCTS**

**2.1 General**

- .1 Provide field instrumentation and sensing devices analog or digital as applicable which measure temperature, humidity, pressure, flow, current, voltage, equipment states, etc., and which input signals to the SCU terminal strip that conform to the input requirements.
- .2 Provide output devices and actuators which convert the digital or analog output signal from the SCU to activate relays or open and close valves, dampers, etc.
- .3 The end to end accuracy called for in Subsection 2.2 includes the combined effect of sensitivity, hysteresis, linearity and repeatability between the measured variable and the input to the analog-to-digital converter in the SCU or between the SCU input to the digital-to-analog converter and the controlled variable for the full sensing range.
- .4 The letter under the "Type" column in Subsection 2.2 is the same used in the points list.
- .5 Acceptable manufacturers of sensors are listed next to the sensor type where applicable:

**2.2 Analog Input Sensors**

- .1 Temperature

Application	Type	Operating Range	End to End Accuracy	Remarks
Duct Mounted	Tp	0°C to 60°C (32°F to 140° F)	±0.3°C (±0.5°F)	c/w thermal wells
Pipe Well Mounted	Tw	0°C to 50°C (32°F to 122°F)	±0.2°C (±0.4°F)	
		0°C to 100°C (32°F to 212°F)	±0.5°C (±0.9°F)	
Averaging	Ta	50°C to 150°C (122°F to 302°F)	±0.5°C (0.9°F)	Length to suit duct size
		-30°C to 60°C- (22°F to 140°F)	±0.5°C (±0.9°F)	

**INPUT/OUTPUT DEVICES**

Application	Type	Operating Range	End to End Accuracy	Remarks
Space Temp.	Tr	2°C to 46°C (36°F to 115°F)	±0.6°C (±1.08°F)	c/w tamper-proof cover
Outside Air	To	-50°C to 50°C- (58°F to 122°F)	±0.5°C (±0.9°F)	c/w solar-shield
Surface Temp.	Ts	0°C to 50°C (32°F to 122°F)	±0.3°C (±0.5°F)	

.2 Relative Humidity

Acceptable Manufacturers: Hy-Cal, General Eastern

Application	Type	Operating Range	End to End Accuracy	Remarks
Duct Mounted	Hp	5-90% RH	±3% 0°C to 60°C (32°F to 140°F)	
Space	Hr	5-90% RH	±5%	c/w tamper-proof cover
Outside Air	Ho	5-100% RH	±5%	c/w solar-shield

.3 Pressure

Acceptable Manufacturers for Sp and Vp Sensors: Modus, Setra

Application	Type	Operating Range	End to End Accuracy	Remarks
Static-Water	Ps	0 to 104 kPa (0 to 15 psi) 0 to 208 kPa (0 to 30 psi) 0 to 689 kPa (0 to 100 psi) 0 to 2,000 kPa (0 to 290 psi)	±3% ±3% ±3% ±3%	

**INPUT/OUTPUT DEVICES**

Application	Type	Operating Range	End to End Accuracy	Remarks
Static-Air	Sp	0 to 500 Pa (0 to 2 in wg) 0 to 1,250 Pa (0 to 5 in wg) 0 to 2,500 Pa (0 to 10 in.wg)	±2% ±2% ±2%	
Instrument	Ia	0 to 120 kPa0 to 17 psi	±2%	
Velocity Pressure monitoring station (air)	Vp	0-62.5 - Pa (0-0.25 in wg) 0-125 Pa (0-0.5 in wg) 0-250 Pa 0-1.0 in wg)	±1.0%	<ul style="list-style-type: none"> <li>- multi-point static &amp; total pressure sending element manifold</li> <li>- self-averaging manifold</li> <li>- air equaliser &amp; straightener</li> <li>- max, pressure loss 36 Pa (0.15 in.w.g.) @ 10 m/s (2000 fpm)</li> <li>- lowest sensitivity 1% of range</li> </ul>
Velocity Pressure monitoring station (water, steam)	Pv	As required	±2.0% full scale	<ul style="list-style-type: none"> <li>- annubar or orifice plate</li> </ul>

4 Electrical

Application	Type	Operating Range	End to End Accuracy	Remarks
Watt Meters	Kw	110/208V	±0.25% full scale	3 current transformers
Current Transformers	Ct	As required	±0.25% full scale	2 potential transformers as applicable for 'Y' or 'D' configuration

**2.3 Analog Output Devices**

Application	Type	Operating Range	End to End Accuracy	Remarks
To Damper Motors	Dm	0-10 VDC 4-20 MA 20-104 kPa (3-15 psi)	±2% full scale	
To Valve Actuators	Vm	0-10 VDC 4-20 MA 20-104 kPa (3-15 psi)	±1% full scale	

**2.4 Digital Input Devices**

Application	Type	Operating Range	End to End Accuracy	Remarks
Pressure Switches	Pd	As required	±1.5%	- adjustable set- point and differential - automatic reset
Temperature	Td	As required	±1°C (1.8°F)	- adjustable set- point and differential - automatic reset - normal reset for freeze protection
Current Sensing Relays	Ri	As required	N/A	- adjustable trip c/w LED Status Indication
Motor Status Relays	St	As required	N/A	- auxiliary contacts
Level	Ls	N/A	N/A	- pressure range suitable to application - adjustable set- point and differential
Motion	Md			- passive infrared sentrol Series 6147

**2.5 Digital Output Devices**

Application	Type	Operating Range	End to End Accuracy	Remarks
Relays	Ry	N/A	N/A	- double voltage DPDT plug-in type with terminal base contacts rated at 5 Amp 120 VAC

**3. SIGNAL TRANSMISSION**

- .1 Provide a digital transmission network to communicate between all SCU's as required.
- .2 Digital transmission at 56,600 baud minimum.

**END OF SECTION**