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## Data sheet 6ES7650-8AR60-0AA0

ET 200PA SMART, analog input isolated, 8 AI thermocouples/4 AI PT100 diagnostics-capable, 1 x 20-pole required in 650-8PH

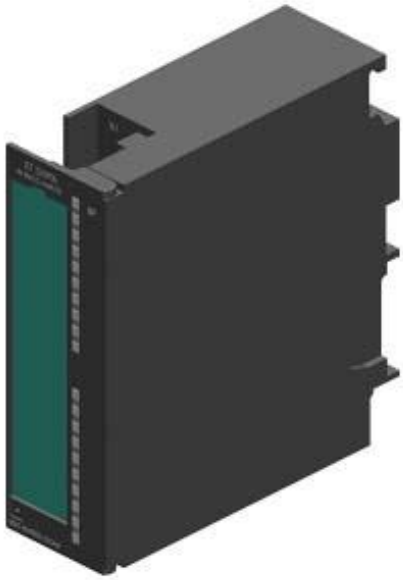


Figure similar

| | |
|---|---|
| **General information** | |
| Product function | |
| • Isochronous mode | No |
| **Input current** | |
| from backplane bus 5 V DC, max. | 120 mA |
| **Power loss** | |
| Power loss, typ. | 0.6 W |
| **Analog inputs** | |
| Number of analog inputs | 8; 8x thermocouples; 4x RTD thermoresistors |
| permissible input voltage for voltage input (destruction limit), max. | 35 V; max. 35 V continuous, 75 V for max. 1 s (pulse duty ratio 1:10) |
| Constant measurement current for resistance-type transmitter, typ. | 0.5 mA |
| Input ranges (rated values), voltages | |
| • -1 V to +1 V | Yes |
| — Input resistance (-1 V to +1 V) | 10 MΩ |


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| | |
|---|---|
| • -25 mV to +25 mV | Yes |
| — Input resistance (-25 mV to +25 mV) | 10 MΩ |
| • -250 mV to +250 mV | Yes |
| — Input resistance (-250 mV to +250 mV) | 10 MΩ |
| • -50 mV to +50 mV | Yes |
| — Input resistance (-50 mV to +50 mV) | 10 MΩ |
| • -500 mV to +500 mV | Yes |
| — Input resistance (-500 mV to +500 mV) | 10 MΩ |
| • -80 mV to +80 mV | Yes |
| — Input resistance (-80 mV to +80 mV) | 10 MΩ |
| Input ranges (rated values), thermocouples | |
| • Type B | Yes |
| — Input resistance (Type B) | 10 MΩ |
| • Type E | Yes |
| — Input resistance (Type E) | 10 MΩ |
| • Type J | Yes |
| — Input resistance (type J) | 10 MΩ |
| • Type K | Yes |
| — Input resistance (Type K) | 10 MΩ |
| • Type L | Yes |
| — Input resistance (Type L) | 10 MΩ |
| • Type N | Yes |
| — Input resistance (Type N) | 10 MΩ |
| • Type R | Yes |
| — Input resistance (Type R) | 10 MΩ |
| • Type S | Yes |
| — Input resistance (Type S) | 10 MΩ |
| • Type T | Yes |
| — Input resistance (Type T) | 10 MΩ |
| • Type U | Yes |
| — Input resistance (Type U) | 10 MΩ |
| • Type TXK/TXK(L) to GOST | No |
| Input ranges (rated values), resistance thermometer | |
| • Ni 100 | Yes |
| — Input resistance (Ni 100) | 10 MΩ |
| • Ni 200 | Yes |
| — Input resistance (Ni 200) | 10 MΩ |
| • Pt 100 | Yes |
| — Input resistance (Pt 100) | 10 MΩ |
| • Pt 200 | Yes |
| — Input resistance (Pt 200) | 10 MΩ |


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| | |
|---|---|
| Input ranges (rated values), resistors | |
| • 0 to 150 ohms | Yes |
| — Input resistance (0 to 150 ohms) | 10 MΩ |
| • 0 to 300 ohms | Yes |
| — Input resistance (0 to 300 ohms) | 10 MΩ |
| • 0 to 600 ohms | Yes |
| — Input resistance (0 to 600 ohms) | 10 MΩ |
| Thermocouple (TC) | |
| Temperature compensation | |
| — parameterizable | Yes |
| — internal temperature compensation | Yes |
| — external temperature compensation with Pt100 | Yes |
| — external temperature compensation with compensations socket | Yes |
| — for definable comparison point temperature | Yes; Compensation for 0 °C and 50 °C reference point temperature |
| Characteristic linearization | |
| • parameterizable | Yes |
| — for thermocouples | Type B, E, J, K, L, N, R, S, T, U |
| — for resistance thermometer | Pt100, Pt200, Ni100 (standard range and climate range) |
| Cable length | |
| • shielded, max. | 200 m; 50 m with thermocouples and input ranges ≤ 80 mV |

| | |
|---|---|
| Analog value generation for the inputs | |
| Measurement principle | Sigma Delta |
| Integration and conversion time/resolution per channel | |
| • Resolution with overrange (bit including sign), max. | 16 bit; 9 to 15 bit + sign |
| • Integration time, parameterizable | Yes |
| • Integration time (ms) | 2,5 / 16,67 / 20 / 100 ms |
| • Basic conversion time, including integration time (ms) | |
| — additional conversion time for wire-break monitoring | 2.5 ms |
| • Interference voltage suppression for interference frequency f1 in Hz | 400 / 60 / 50 / 10 |
| Smoothing of measured values | |
| • parameterizable | No |

| | |
|---|---|
| Encoder | |
| Connection of signal encoders | |
| • for voltage measurement | Yes |


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|---|---|
| • for resistance measurement with two-wire connection | Yes; Without compensation of the line resistances |
| • for resistance measurement with three-wire connection | Yes; Without compensation of the line resistances |
| • for resistance measurement with four-wire connection | Yes |

| Errors/accuracies | |
|---|---|
| Linearity error (relative to input range), (+/-) | 0.003 % |
| Temperature error (relative to input range), (+/-) | 0.002 %/K; Temperature error: 0.001 to 0.002 %/K |
| Crosstalk between the inputs, min. | 70 dB; Crosstalk attenuation between the inputs (UISO < 60 V) |
| Repeat accuracy in steady state at 25 °C (relative to input range), (+/-) | 0.003 % |
| Operational error limit in overall temperature range | |
| • Voltage, relative to input range, (+/-) | 0.09 % (±25 mV), 0.06 % (±50 mV), 0.05 % (±80 mV), 0.04 % (±250 mV / ±500 mV / ±1 V) |
| Basic error limit (operational limit at 25 °C) | |
| • Voltage, relative to input range, (+/-) | 0.018 % (±25 mV), 0.014 % (±50 mV), 0.011 % (±80 mV), 0.008 % (±250 mV / ±500 mV / ±1 V) |
| • Resistance, relative to input range, (+/-) | 0.006 %; 150, 300, 600 Ohm |
| • Resistance thermometer, relative to input range, (+/-) | 0.1 %; Ptxxx standard: ±0.2 K, Ptxxx climate: ±0.05 K, Ni100 standard: ±0.1 K, Ni100 climate: ±0.05 K |
| • Thermocouple, relative to input range, (+/-) | Type T: > -150 °C ±0.2 K, Type U: > -50 °C ±0.2 K, Type E: > -100 °C ±0.2 K, Type J: > -150 °C ±0.2 K, Type L: > -50 °C ±0.2 K, Type K: > -100 °C ±0.2 K, Type N: > -50 °C ±0.2 K, Type R: > +200 °C ±0.3 K, Type S: > +100 °C ±0.3 K, Type B: > +700 °C ±0.3 K |
| Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency | |
| • Series mode interference (peak value of interference < rated value of input range), min. | 40 dB |
| • Common mode interference, min. | 130 dB |

| Interrupts/diagnostics/status information | |
|---|---|
| Status indicator | No |
| Diagnostics function | Yes; Parameterizable |
| Alarms | |
| • Diagnostic alarm | Yes; Parameterizable |
| • Hardware interrupt | No |
| Diagnostic messages | |
| • Diagnostic information readable | Yes |
| • Overrange | Yes; Group diagnostics for overrange and underrange |
| • Wire-break in signal transmitter cable | Yes; Parameterizable |
| • Group error | Yes |
| Diagnostics indication LED | |
| • Group error SF (red) | Yes |


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|---|---|
| **Potential separation** | |
| Potential separation analog inputs | |
| • between the channels | No |
| • between the channels and backplane bus | Yes |
| **Permissible potential difference** | |
| between the inputs (UCM) | 75 V DC/60 V AC |
| between MANA and M internally (UISO) | 75 V DC/60 V AC |
| **Isolation** | |
| Isolation tested with | 500 V AC/707 V DC, type test |
| **Connection method** | |
| required front connector | 20-pin |
| **Dimensions** | |
| Width | 40 mm |
| Height | 125 mm |
| Depth | 120 mm |
| **Weights** | |
| Weight, approx. | 210 g |

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