S800 I/O modules

Uni- and Bipolar, RTD and TC Analog Inputs

Data Sheet

S800 I/O is a comprehensive, distributed and modular process I/O system that communicates with parent controllers and PLCs over industry-standard field buses. Thanks to its broad connectivity it fits a wide range of process controllers and PLCs from ABB and others. By permitting installation in the field, close to sensors and actuators, S800 I/O reduces the installation cost by reducing the cost of cabling. And thanks to features such as “hot swap” of modules, on-line reconfiguration and redundancy options, it contributes to keeping production – and thereby profits – up.

Feature	AI810	AI815	AI820	AI825	AI830/AI830A	AI835/AI835A
Number of channels	8	8	4	4	8	8
Type of input	Unipolar single ended	Unipolar single ended	Bipolar differential	Individually galvanic isolated	3-wire RTD Pt100, Cu10, Ni100, Ni120 and resistive potentiometer	Differential -30 mV to 75 mV linear, or TC types B, C, E, J, K, N, R, S and T
Measurement range (1)	0(4)...20 mA, 0(2)...10 V	0...20 mA, 0...5 V, 4... 20 mA, 1... 5 V	20...+20 mA, 0(4)...20 mA, -10...+10 V, 0(2)...10 V, -5...+5 V, 0(1)...5 V	-20...+20 mA, 0(4)...20 mA, -10...+10 V, 0(2)...10 V,	See Table 1	See Table 2
Under/over range	-5% / +15%	± 15%	± 15%	± 15%		
CJ-temperature measurement reference						4-wire connected IEC-751/Pt100 RTD alt. from application (13)
Front LED’s	F(ault), R(un), W(arning)					
Supervision	Internal power supply	Module error if: analog read back, reference voltage. Module error: Internal power supply, checksum, watch dog and memory error. Internal error: output readback. External error: open load, process power, Internal channel error if: low pass filter, multiplexer and test channels error. External channel error if: external power supply low, transmitter power and external shunt error.	Internal power supply	Internal power supply	Open-circuit, short-circuit (5), reference channel, internal power supply.	Module: reference channels, power supply low Channel TC: open-circuit Linear: none Pt100 (CH8): <-40 °C (-40 °F) and >100 °C (212 °F)

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ABB

Feature	AI810	AI815	AI820	AI825	AI830/AI830A	AI835/AI835A
Status indication of supervision	Module Error, Module Warning, Channel error	Module Error, Module Warning, Channel error	Module Error, Module Warning, Channel error	Module Error, Module Warning, Channel error	Module Error, Module Warning, Channel error (8)	Module Error, Module Warning, Channel error (8)
Profibus parameters bytes CI801, CI840 (User/Input/Output)	13/17/0	13/17/0	9/9/0	9/9/0	12/17/0	15/17/0
Execution time per scan using CI801 or CI840	3.00 ms	3.00 ms	1.50 ms	1.50 ms	0.40 ms	0.40 ms
Number of scan cycles per value update	4	4	4	4	10	10
Input impedance (at voltage or temp input)	290 KΩ	10 MΩ	200kΩ +/– 25% Common mode 800kΩ +/– 25% Normal mode	10 KΩ		> 1 MΩ
Input impedance (at current input)	≥230 Ω, ≤275 Ω	250 Ω	250 Ω	50 Ω (+125 Ω with overvoltage protected current input)		
Current limiting	PTC			PTC		
Maximum field cable length	600 meters (656 yd.)	600 meters (656 yd.)	600 meters (656 yd.)	600 meters (656 yd.)		600 meters (656 yd.)
Maximum field cable resistance					55 Ω	
Error dependent of the field cable resistance. (6)					Rerr = R* (0.005 + ΔR/100) Terr°C = Rerr / (R0 * TCR) Terr°F = Terr°C * 1.8	
Max. Differential d.c. input (Fault)	30 V d.c.		30 V	30 V at voltage and ovp current input, 6.3 V at 50 Ω input		
Common Mode Voltage			50 V d.c.			12 V d.c.
CMRR, 50 Hz, 60 Hz (10)			80 dB (>60 dB d.c.)	120 dB	>120 dB	120 dB
NMRR, 50 Hz, 60 Hz (11)	>40 dB	>40 dB	33 dB	>40 dB at 50 Hz, >55 dB at 60 Hz	>60 dB	>60 dB
Error	Max. 0.1%	Max. 0.1%	Max. 0.1%	Max. 0.1%	See Table A-8 (IEC51-1) (3)	Max. 0.1%
Resolution	12 bit	12 bit	14 bit plus sign	14 bit plus sign	See Table A-8	15 bits
Temperature drift	Typ. 70 ppm/°C Max. 100 ppm/°C	Max. 50 ppm/°C	Max. 70 ppm/°C	Max. 47 ppm/°C	See Table A-8	Typ. 15 ppm/°C, Max. 35 ppm/°C
Temperature drift Current	Typ. 50 ppm/°C Max. 80 ppm/°C		Max. 50 ppm/°C	Max. 78 ppm/°C		
Filter, analog (1st order Low-pass)						10 Hz
Filter (integration)						50 Hz or 60 Hz
Input filter (rise time 0-90%)	140 ms	290 ms	40 ms	130 ms		
Update cycle time	5 ms	<10 ms	<26 ms	<10 ms	150 ms + n*95 ms (4)	280 ms + n*80 ms (n = active channels)
Current consumption 24 V	40 mA	50 mA	70 mA	Typ. 90 mA, Max. 110 mA	50 mA	50 mA
Current consumption 5 V	70 mA	100 mA	80 mA	Typ. 70 mA, Max. 110 mA	70 mA	75 mA
Power dissipation	1.5 W	3.5 W	1.7W	Typ. 2.5 W, Max. 3.2 W	1.6 W	1.6 W
Maximum ambient temperature (2)	55/40 °C, (131/104 °F)	55/40 °C, (131/104 °F)	55/40 °C, (131/104 °F)	55/40 °C, (131/104 °F)	55/40 °C, (131/104 °F)	55/40 °C, (131/104 °F)
Module termination units	TU810, TU812, TU814, TU830, TU833, TU835, TU838 or TU850	TU810, TU812, TU814, TU830, TU833, TU835, TU838 TU844, TU845 or TU850 (12)	TU810, TU812, TU814, TU830 or TU833	TU811, TU813 or TU 831	TU810, TU812, TU814, TU830 or TU833	TU810, TU812, TU814, TU830 or TU833

Feature	AI810	AI815	AI820	AI825	AI830/AI830A	AI835/AI835A
MTU keying code	AE	CC	BB	DA	AF	BA
Fusing of transmitter supply	on Extended MTU (TU830 max 1 AT per group)		on Extended MTU	on Extended MTU		
Sensor power distribution	Max 1 A per connection			No		
Dielectric test voltage	500 V a.c.	500 V a.c.	500 V a.c.	1900 V d.c. ch-ch, 3250 V d.c. ch-ground/system	500 V a.c.	500 V a.c.
Isolation	Groupwise isolated from ground (RIV=50 V)	Groupwise isolated from ground (RIV=50 V)	Groupwise isolated from ground (RIV=50 V)	Groupwise isolated from ground (RIV=250 V)	Groupwise isolated from ground (RIV=50 V)	Groupwise isolated from ground (RIV=50 V)
Rated insulation voltage (9)	50 V	50 V	50 V	250 V	50 V	50 V
Equipment class	Class I according to IEC 61140; (earth protected)	Class I according to IEC 61140; (earth protected)	Class I according to IEC 61140; (earth protected)	Class I according to IEC 61140; (earth protected)	Class I according to IEC 61140; (earth protected)	Class I according to IEC 61140; (earth protected)
Protection rating	IP20 according to IEC 60529	IP20 according to IEC 60529	IP20 according to IEC 60529	IP20 according to IEC 60529	IP20 according to IEC 60529	IP20 according to IEC 60529
Width	45 mm (1.77")	45 mm (1.77")	45 mm (1.77")	45 mm (1.77")	45 mm (1.77")	45 mm (1.77")
Depth	97 mm (3.8"), 106 mm (4.2") including connector	97 mm (3.8"), 106 mm (4.2") including connector	97 mm (3.8"), 106 mm (4.2") including connector	97 mm (3.8"), 106 mm (4.2") including connector	97 mm (3.8"), 106 mm (4.2") including connector	97 mm (3.8"), 106 mm (4.2") including connector
Height	119 mm (4.7")	119 mm (4.7")	119 mm (4.7")	119 mm (4.7")	119 mm (4.7")	119 mm (4.7")
Weight	0.2 kg (0.44 lbs.)	0.23 kg (0.51 lbs.)	0.2 kg (0.44 lbs.)	0.22 kg (0.49 lbs.)	0.22 kg (0.49 lbs.)	0.22 kg (0.49 lbs.)
Corrosive atmosphere ISA-S71.04	G2	G2	G2	G2	G2	G2
CE mark	Yes	Yes	Yes	Yes	Yes	Yes
El. safety, Haz loc, C1 Zone 2	cULus	cULus	cULus	cULus	cULus	cULus
El. safety, Haz loc, C1 Div 2	FM, CSA	No	FM, CSA	No	FM, CSA	FM, CSA
ATEX 100A Zone 2 Category 3 (1) G	No	No	No	No	No	No
GOST certificates	CoC, GGTN	CoC, GGTN	CoC, GGTN	CoC, GGTN	CoC, GGTN	CoC, GGTN
Electrical safety	EN 3810, EN 50178, IEC 601131-2, UL 508, CSA 22.2 No.142-M1987					
Hazardous Classified Locations	CSA 22.2 No.213-M1987, FM 3600, FM 3611, UL 1604					
Climatic operating conditions	0 to +55 °C (Storage -25 to +70 °C), RH=5 to 95 % no condensation, IEC/EN 61131-2 (7)					
Pollution degree	Degree 2, IEC 60664-1					
Mechanical operating conditions	IEC/EN 61131-2					
EMC	EN 55011, CISPR 11					
Immunity	IEC/EN 61000-4-2 to -8					
Overvoltage Categories	IEC/EN 60664-1, EN 50178					

(1) Configured per channel. Live zero diagnosis must be handled by the FCI or controller.

(2) 40 °C (104 °F) applies to compact MTUs with I/O-modules or S800L-modules mounted on vertical DIN rail.

(3) Without error dependent of the field cable resistance

(4) n=Number of active channels

(5) For Cu10, not short circuit.

(6) Rerr = Error in ohm, R = Wire resistance, ΔR = Difference in % between resistance in field cables

(7) 0 to +40 °C compact MTUs on vertical DIN-rail. Approvals are issued for +5 to +55 °C.

(8) Additional information is available via PROFIBUS-DPV1 services

(9) RIV defines the maximum working voltages

(10) At 10 Ohms load, e.g. CU10. CMMR is >80 dB at <400 Ohms load and >110 dB at 100 Ohms

(11) >40 dB for 50 Hz and 60 Hz ±1 %

(12) Only if HART compatible power supply is used.

(13) Only with AI835A

Table 1

Temperature Range	Sensor Type	Max error 50 Hz	Max error 60 Hz	Resolution 50 Hz	Resolution 60 Hz	Max Temp Drift
-80...80 °C	Pt100 (1)	0.10 °C	0.11°C	0.025 °C	0.030 °C	0.0017 °C/°C
-112...176 °F	Pt100 (1)	0.18 °F	0.20 °F	0.046 °F	0.055 °F	0.003 °F/°F
-200...250 °C	Pt100 (1)	0.15 °C	0.16 °C	0.026 °C	0.031 °C	0.0028 °C/°C
-328...482 °F	Pt100 (1)	0.27 °F	0.29 °F	0.046 °F	0.055 °F	0.0050 °F/°F
-200...850 °C	Pt100 (1)	0.31 °C	0.34 °C	0.056 °C	0.067 °C	0.007 °C/°C
-328...1562 °F	Pt100 (1)	0.57 °F	0.61 °F	0.10 °F	0.12 °F	0.013 °F/°F
-60...180 °C	Ni100 (2)	0.10 °C	0.12 °C	0.031 °C	0.037 °C	0.0021 °C/°C
-76...356 °F	Ni100 (2)	0.19 °F	0.21 °F	0.056 °F	0.067 °F	0.0038 °F/°F
-80...260 °C	Ni120 (3)	0.27 °C	0.29 °C	0.022 °C	0.026 °C	0.0029 °C/°C
-112...500 °F	Ni120 (3)	0.49 °F	0.51 °F	0.039 °F	0.046 °F	0.0053 °F/°F
-100…260 °C	Cu10 (4)	1.0 °C	1.2 °C	0.26 °C	0.31 °C	0.024 °C/°C
-148…500 °F	Cu10 (4)	1.8 °F	2.2 °F	0.46 °F	0.56 °F	0.0043 °F/°F
0…400 Ω	Resistor	0.083 Ω	0.091 Ω	0.020 Ω	0.024 Ω	0.0020 Ω/°C
-200…880 °C (5)	Pt100	0.29 °C	0.32 °C	0.056 °C	0.067 °C	0.007 °C/°C
-328…1616 °F (5)	Pt100	0.53 °F	0.58 °F	0.10 °F	0.12 °F	0.013 °F/°F
-200…880 °C (6)	Pt100	0.30 °C	0.32 °C	0.055 °C	0.066 °C	0.007 °C/°C
-328…1616 °F (6)	Pt100	0.53 °F	0.58 °F	0.10 °F	0.12 °F	0.012 °F/°F
-80…80 °C (7)	Pt100	0.10 °C	0.11 °C	0.025 °C	0.030 °C	0.0017 °C/°C
-112…176 °F (7)	Pt100	0.18 °F	0.19 °F	0.046 °F	0.055 °F	0.003 °F/°F
-200…250 °C (7)	Pt100	0.14 °C	0.15 °C	0.025 °C	0.031 °C	0.0027 °C/°C
-328…428 °F (7)	Pt100	0.25 °F	0.28 °F	0.046 °F	0.055 °F	0.005 °F/°F
-200…850 °C (7)	Pt100	0.30 °C	0.33 °C	0.056 °C	0.067 °C	0.007 °C/°C
-328…1562 °F (7)	Pt100	0.54 °F	0.59 °F	0.10 °F	0.12 °F	0.013 °F/°F
-200…649 °C (8)	Pt100	0.25 °C	0.27 °C	0.053 °C	0.064 °C	0.0052 °C/°C
-328…1200 °F (8)	Pt100	0.45 °F	0.49 °F	0.096 °F	0.12 °F	0.0094 °F/°F

(1) According to IEC 751, IPTS-68, TCR = 0.00385
(2) According to DIN 43760, TCR = 0.00617
(3) According to MIL-T-24388C, TCR = 0.00672, R_o = 120 Ω (MINCO)
(4) According to TCR = 0.00427, R25 = 10 Ω (MINCO)
(5) According to US Industrial Std, TCR = 0.00391. Only supported by AI830A
(6) According to US Lab Std IPTS-68, TRC = 0.00392. Only supported by AI830A
(7) According to IEC 751, ITS-90 (JIS C 1604-1997), TRC = 0.00385. Only supported by AI830A
(8) According to JIS C 1604:1981. Only supported by AI830

Table 2

Input Type	Temperature Range
TC type B (1)	44...1820 °C, 111...3308 °F
TC type C	0...2300 °C, 32...4172 °F
TC type D (3)	0…2300 °C, 32…4172 °F
TC type E (1)	-270...1000 °C, -454...1832 °F
TC type J (1)	-210...1200 °C, -346...2192 °F
TC type K (1)	-270...1372 °C, -454...2501 °F
TC type L (3)	-200…900 °C, -328…1652 °F
TC type N (1)	-270...1300 °C, -454...2372 °F
TC type R (1)	-50...1768 °C, -58...3214 °F
TC type S (1)	-50...1768 °C, -58...3214 °F
TC type T (1)	-270...400 °C, -454...752 °F
TC type U (3)	-200…600 °C, -328…1112 °F
Linear range	-30...75 mV
Pt100 RTD (for CJC) (2)	-40...100 °C, -40...212 °F

(1) Linearization per IEC 584-1 1995, and following ITS 90 requirements.
(2) Sensor Type applies to Channel 8 only, for the measuring of the Cold Junction Compensation temperature.
(3) Only for AI835A.

Available S800 I/O Data Sheets

- Communication interfaces
- Uni- and Bipolar, RTD and TC Analog Inputs
- Uni- and Bipolar Analog Outputs
- Digital Inputs
- Digital Outputs
- Pulse, Frequency and NAMUR inputs
- Redundant and High Integrity Analog modules
- Redundant and High Integrity Digital modules
- Digital inputs with SOE
- Analog modules with intrinsic-safety interface
- Digital modules with IS interface
- Analog modules in S800L mechanics
- Digital modules in S800L mechanics
- Power supplies and voters

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