DATA SHEET

RAO02

ABB Ability™ Symphony® Plus Hardware Selector

The RAO02 Redundant Analog Output module processes up to 16 high-level, group isolated, analog output field signals. Each channel is independently configurable for either 4 to 20 mA or 1 to +5 VDC ranges. FC 221 (I/O Device Definition) sets AO module operating parameters and each output channel is configured using FC 223 (Analog Output CH) to set indivdual output channel parameters such as engineering units, High/Low Alarm limits, default value in event of loss of communication with controller, etc.

D/A resolution of each channel is 12 bits. The RAO02 module has one D/A converter for each output channel.

In current mode, the RAO02 module supports HART v5.4 instruments and provides short circuit protection by limiting current to a maximum of 26 mA. The RAO02 module will also detect an open circuit in less than 5 seconds.

Features and benefits

- 16 independently configurable channels supporting:
- 4 to 20 mADC or 1 to +5 VDC
- Up to 24 HART v5.4 secondary variables Total
- Max 4 sec vars per analog input CH
- Sec HART variables available to control logic
- 12 to 16-Bit (with polarity) A/D resolutionV
- A/D update of all 16 Channels in 100 msecs
- Accuracy is ±0.1 % of Full Scale Range where FSR = 25 mA or 6.25 VDC

General info	
Article number	2VAA008428R1 (RAO02)
Type	Redundant Analog Output
Signal specification	AO: 4…20 mA,or 1…+5 VDC
Life cycle status	ACTIVE
Number of channels	16
Signal type	AO
HART	Yes
SOE	No
Redundancy	Yes
Form factor	Standard (190 mm)
Mounting	Horizontal Row or Vertical Column
MTBF (per MIL-HDBK-217-FN2)	PR A: 109,487 Hours
MTTR (Hours)	1 Hours

Detailed data	
Module power requirements	100mA typical @24 VDC ± 10%
Module power connection	POWER TB on cHBX01L or VBX01T
Field IO power	16 mA/CH typical, 22mA/CH maximum @ 24 VDC ±10%
Overvoltage category	Category I for power, inputs or outputs. Tested according to EN 61010-1
Max field cable length	600 meters (1968 feet)
Number of Channels	16 independently configurable AI channels
Signal ranges and types	Analog Inputs: 4…20 mA,or 1…+5 VDC with HART
No. of HART modems	1 HART modem per module
Max no. of secondary HART variables	Up to 24 secondary variables Total, up to 4 variables per CH (HART v 5.4)
Secondary HART variable update rate	2.5 seconds typical, 8.0 seconds max
Input Impedance	250 Ω current mode (externally powered), >= 250 kΩ voltage mode
Output load	0 to 750 Ω Current mode, minimum 22kΩ voltage mode
A/D Conversion	1 A/D converter per module
A/D Update rate	100 msec for all 16 channels
D/A Conversion	12-Bits
Accuracy, FSR	±0.01% FSR, FSR = 25 mA or 6.25 VDC
Temp effect on accuracy	Max ±0.003% per deg C
Field signal to Logic isolation	Galvanically isolated, 1500 V up to 1 minute
Channel isolation	1x16 group isolated, 1500 V up to 1 minute
Short circuit protection	Max 96 mA per CH

Diagnostics	
Front plate LED’s	STATUS LEDs: R (Run) and F (Fault) + 1 thru 8
Local availability	Mini USB connection on module front plate
Remote availability	HN800 device diagnostics via SPE

Environment and certification	
Temperature, Operating	-40 to +70 °C Tested according to IEC/EN 60068-2-1, IEC/EN 60068-2-2
Temperature, Storage	-40 to +85 °C Tested according to MIL-STD-810G
Relative humidity	20% to 95% @ 40°C non-condensing. Tested according to IEC/EN 60068-2-78, IEC/EN 61298-3
Vibration (operational sinusoidal)	5 to 60 Hz 0.137 mm (0.0054 in.), 60 to 150 Hz 1.0 G. Tested according to IEC/EN 60068-2-6
Vibration (transportation)	10 to 500 Hz. Tested according to MIL-STD-810G
Shock (storage)	15 G, 11 msec. Tested according to IEC/EN 60068-2-27
Drop	100 mm. Tested according to IEC/EN 60068-2-31
Protection class	IP20 according to EN 60529, IEC 529
Altitude (operational)	Sea level to 3,048 meters (10,000 ft.) Tested according to MIL-STD-810G
Altitude (storage)	Sea level to 12,192 meters (40,000 ft.) Tested according to MIL-STD-810G
Air quality	ISA S71.04 G1, ISA S71.04 G3 compliant versions SPCxxxA are also available
ESD immunity	Tested according to IEC/EN 61000-6-2, IEC/EN 61000-4-2, Severity level 3
Surge immunity	Tested according to IEC/EN 61000-6-2, IEC/EN 61000-4-5, Severity level 3
Electrical fast transient immunity	Tested according to IEC/EN 61000-6-2, IEC/EN 61000-4-4, Severity level 3
Radiated RFI immunity	Tested according to IEC/EN 61000-6-2, IEC/EN 61000-4-3, Severity level 3
Conducted Immunity	Tested according to IEC/EN 61000-6-2, IEC/EN 61000-4-6, Severity level 3
Magnetic field immunity	Tested according to IEC/EN 61000-6-2, IEC/EN 61000-4-8, Severity level 4
Radiated emission	Tested according to IEC/EN 61000-6-4, CISPR 11 + A1, CISPR 16-1-1, Group 1, Class A, ISM equipmentording to IEC/EN 61000-6-2, IEC/EN 61000-4-6, Severity level 3
Conducted emission	Tested according to IEC/EN 61000-6-4, CISPR 11 + A1, CISPR 16-1-1, Group 1, Class A, ISM equipment
Voltage dips and interruption immunity	Tested according to IEC/EN 61000-6-2, IEC/EN 61000-4-11
CSA non-hazardous locations	Certified for use as process control equipment in an ordinary (non-hazardous) location
CSA hazardous, nonincendive locations	Class I, Division 2, Groups A, B, C, D
CE Mark	CE Mark EMC directive 2004/108/EC & Low Voltage Directive 2006/95/EC
RoHS compliance	RoHS Directive 2015/863
WEEE compliance	DIRECTIVE/2012/19/EU

Compatibility	
Use with MTU	HBR01-EPD, HBR01-FPH, VBR01-EPD, VBR01-FPH
Module keying code for base	slot #1 = 04, slot #2 = 16

Dimensions	
Width	27 mm
Depth	106 mm
Height	190 mm
Weight	240 g

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