ARINC 429 to Discrete Signal Converter (SR429/1)

Converting an ARINC 429 signal to discrete outputs is simple with the software-free, firmware-free SR429/1 signal converter from NEXSYS. The SR429/1 can be pre-configured to any specific ARINC label, or can be ordered as a universal converter that the integrator may set to any desired label prior to installation. In either case, the SR429/1 delivers each of the 23 data bits on its own dedicated output pin, providing the utmost in design and specification flexibility.

Key Features & Physical Characteristics

Simple Integration: The SR429/1 contains no software, firmware, or programmable logic. System design and implementation time is shortened by not requiring DO-178 and DO-254 qualification.

Performance: The SR429/1 meets or exceeds DO-160 and equivalent MIL-STD test levels. *See Table 7 Qualification Level Summary* for a full description of test parameters, including EMC.

Label: The SR429/1 accommodates a single valid ARINC label (000 – 377). The specified label can be factory preset, or set by the user when ordering a Universal unit – *See Table 1.*

Input Speed: The SR429/1 is a compliant ARINC 429 receiver that may be ordered as a high speed (100 kbps) or low speed (12.5 kbps) unit. Universal units can be set to either speed – *See Table 3.* Pins 1 - 4 incorporate ARINC input and shielded grounds – *See Table 4.*

Discrete Outputs: ARINC 429 bits 9 through 31 are latched as unique outputs on dedicated connector pins 9 - 31 – *See Table 4.* Each output contains the most recent data received for the selected label. Data is held until a new word containing the selected label is received.

Output Signal: Unit must be specified as "Active Low" or "Active Open" (See Table 6). For Active Low, unit powers up with all bits as 0 and each output as open (high impedance). When the associated data bit is high (1), output pins 9-31 are active low (ground). For Active Open, unit powers up with all bits as 0 and each output as low (ground). When the associated data bit is high (1), output pins 9-31 are active open (high impedance). The maximum current is 1 A per pin, all output pins combined cannot exceed 12 amps.

Master Reset: The SR429/1 includes a Master Reset (/MR) input (Pin 36) that resets back to its power up state and holds the unit in reset as long as the master reset line is held low. Upon release, the unit remains in the power up state and is ready to receive the specified data label.

Connector: The SR429/1 uses a filtered DC-37P connector to provide 330 pF capacitive coupling per pin to chassis ground for enhanced EMC capability.

Weight: 11 ounces (312 grams)

Grounding: Unit is required to be grounded to aircraft chassis for ARINC 429 wire shield termination. Bottom surface of mounting tabs are provided as a conductive surface. If grounding is through the attachment bolts #10 internal toothed paint cutting star washer must be used. Low resistance ground bond not required.

Mounting: Four #10-32 machine screws (not provided). Internal toothed #10 paint cutting lock washers recommended. Torque to 32 – 35 in-lb. Unit is to be mounted on a flat surface with < 0.04" maximum distortion.

Figure 1: SR429/1 Dimensions
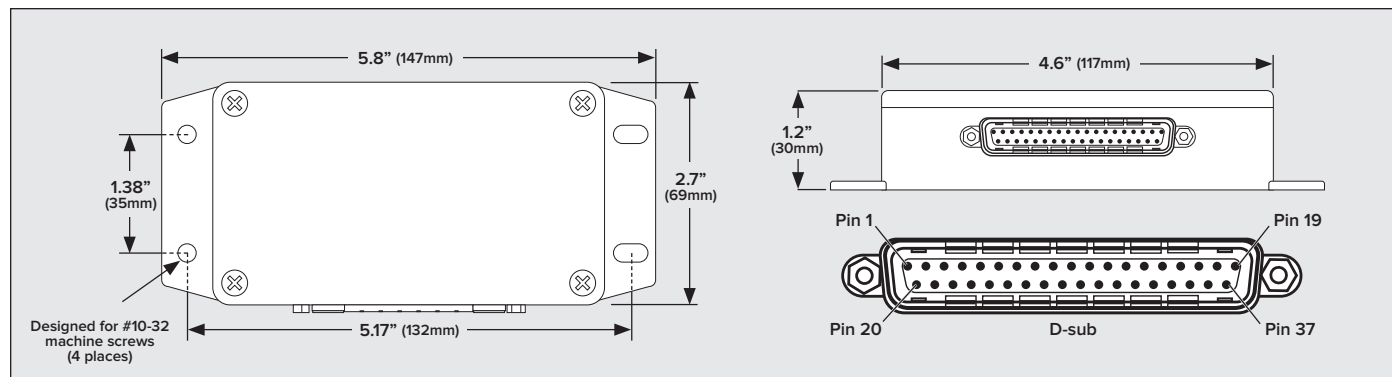
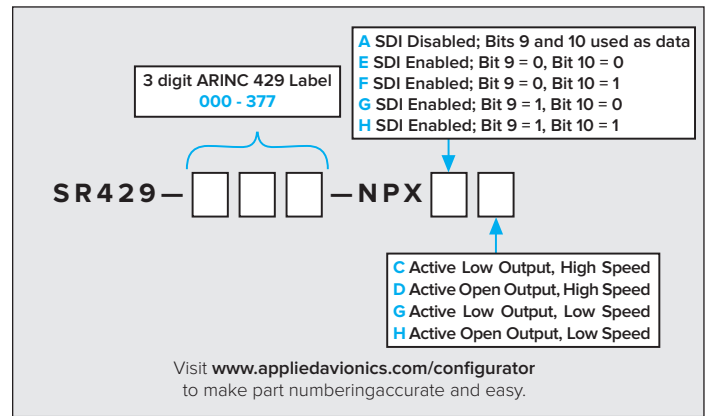The **SR429/1** is offered in two configurations:

Pre-configured Unit

Pre-configured units are factory set to operate on a single specific ARINC 429 label and will be configured with the specific label identified (i.e. SR429-353-NPXAC for ARINC 429 label 353).

Factory settings include:

- One (1) specific ARINC 429 Label (bits 1-8)
- Active Low or Active Open Output
- Use of SDI bits as additional destination information or as additional data (bits 9-10)
- Transmission speed (High speed or Low speed)

Unit is not designed for field access once it has left the factory.

Figure 2: Part Configuration Number - Pre-configured Unit

3 digit ARINC 429 Label
000 - 377

A SDI Disabled; Bits 9 and 10 used as data
E SDI Enabled; Bit 9 = 0, Bit 10 = 0
F SDI Enabled; Bit 9 = 0, Bit 10 = 1
G SDI Enabled; Bit 9 = 1, Bit 10 = 0
H SDI Enabled; Bit 9 = 1, Bit 10 = 1

S R 4 2 9 — ☐☐☐ — N P X ☐☐

C Active Low Output, High Speed
D Active Open Output, High Speed
G Active Low Output, Low Speed
H Active Open Output, Low Speed

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to make part numberingaccurate and easy.

Universal Unit

Universal units allow the user to select a specific ARINC label and can be useful in test or troubleshooting. Units can be re-configured for any ARINC label, SDI functionality or speed of transmission. The unit must be ordered with a specific output type (Active Low or Active Open).

How to set a Universal Unit:

1) Remove 4 screws in cover plate. Remove cover.
2) Locate bank of 12 DIP switches on circuit board.
   See Figure 3.
3) DIP switches #1-8 control the primary label address.
   See Table 1.
4) DIP switches #9-11 control the use of the Source Destination Identifiers. The setting of DIP switch 11 determines how the settings of DIP switches 9 and 10 are used. *See Table 2.*
5) DIP switch #12 determines the speed of transmission.
   See Table 3.
6) Replace cover and tighten 4 screws torqued to 12 in-lb.
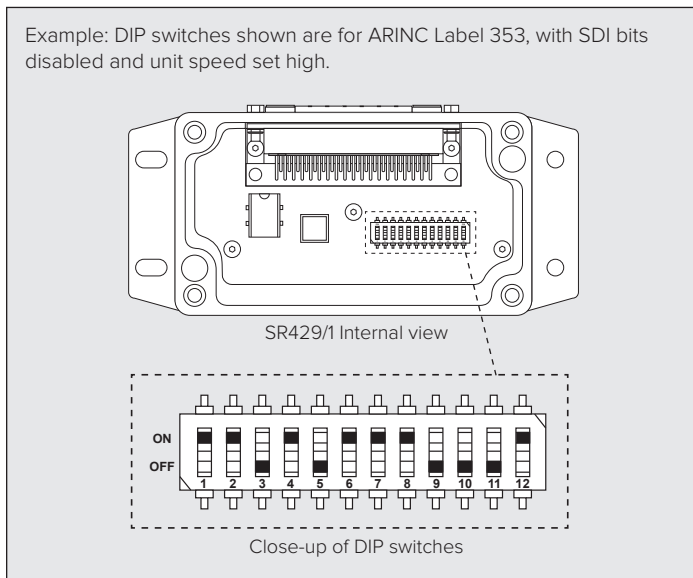
Figure 3: Dip Switch Location

Example: DIP switches shown are for ARINC Label 353, with SDI bits disabled and unit speed set high.

SR429/1 Internal view

ON
OFF
1 2 3 4 5 6 7 8 9 10 11 12

Close-up of DIP switches

Figure 4: Part Configuration Number - Universal Unit

S R 4 2 9 — U N V — N P X X ☐

L Active Low Output
M Active Open Output
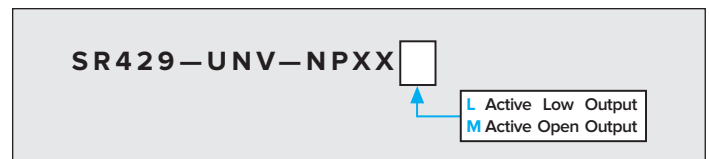
Table 1: DIP Switches #1-8

ARINC Label Char. #1			ARINC Label Char. #2				ARINC Label Char. #3			
Char. #1	DIP 8	DIP 7	Char. #2	DIP 6	DIP 5	DIP 4	Char. #3	DIP 3	DIP 2	DIP 1
0	Off	Off	0	Off	Off	Off	0	Off	Off	Off
1	Off	On	1	Off	Off	On	1	Off	Off	On
2	On	Off	2	Off	On	Off	2	Off	On	Off
3	On	On	3	Off	On	On	3	Off	On	On
			4	On	Off	Off	4	On	Off	Off
			5	On	Off	On	5	On	Off	On
			6	On	On	Off	6	On	On	Off
			7	On	On	On	7	On	On	On
DIP switches 1-8 decode the octal 8 bit ARINC 429 label (i.e. label 353) in a 2-3-3 format										
Off=0; On=1		DIP 8 = MSB, DIP 1 = LSB								

Table 2: DIP Switches #9-10

DIP 11	DIP 11 Definition	DIP 9	DIP 10
Off	SDI Disabled, Bits 9 & 10 used as data	Not Used	
On	SDI Enabled, Bits 9 & 10 used as additional sub-label info	Off (0)	Off (0)
		Off (0)	On (1)
		On (1)	Off (0)
		On (1)	On (1)

Table 3: DIP Switch #12

DIP 12	DIP 12 Definition
Off (0)	Low Speed (12.5 kbps)
On (1)	High Speed (100 kbps)

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Table 4: Pinout Table

Pin Number	Pin Name	Description
1	RXA	Positive connection to ARINC BUS
2	Shield GND	Shield ground for ARINC
3	RXB	Negative Connection to ARINC BUS
4	Shield GND	Shield ground for ARINC
5	Signal GND	Board signal ground (one required for each 3A of output) (12 amp maximum per unit)
6		
7		
8		
9	SD9	SDI Bit 9 value Open drain output (1A maximum)
10	SD10	SDI Bit 10 value Open drain output (1A maximum)
11	Bit 11	Data Bit 11 value Open drain output (1A maximum)
12	Bit 12	Data Bit 12 value Open drain output (1A maximum)
13	Bit 13	Data Bit 13 value Open drain output (1A maximum)
14	Bit 14	Data Bit 14 value Open drain output (1A maximum)
15	Bit 15	Data Bit 15 value Open drain output (1A maximum)
16	Bit 16	Data Bit 16 value Open drain output (1A maximum)
17	Bit 17	Data Bit 17 value Open drain output (1A maximum)
18	Bit 18	Data Bit 18 value Open drain output (1A maximum)
19	Bit 19	Data Bit 19 value Open drain output (1A maximum)
20	Bit 20	Data Bit 20 value Open drain output (1A maximum)
21	Bit 21	Data Bit 21 value Open drain output (1A maximum)
22	Bit 22	Data Bit 22 value Open drain output (1A maximum)
23	Bit 23	Data Bit 23 value Open drain output (1A maximum)
24	Bit 24	Data Bit 24 value Open drain output (1A maximum)
25	Bit 25	Data Bit 25 value Open drain output (1A maximum)
26	Bit 26	Data Bit 26 value Open drain output (1A maximum)
27	Bit 27	Data Bit 27 value Open drain output (1A maximum)
28	Bit 28	Data Bit 28 value Open drain output (1A maximum)
29	Bit 29	Data Bit 29 value Open drain output (1A maximum)
30	Bit 30	SSM Bit 30 value Open drain output (1A maximum)
31	Bit 31	SSM Bit 31 value Open drain output (1A maximum)
32-35	Reserved	Reserved for future use
36	/MR	Master Reset
37	+28VDC	

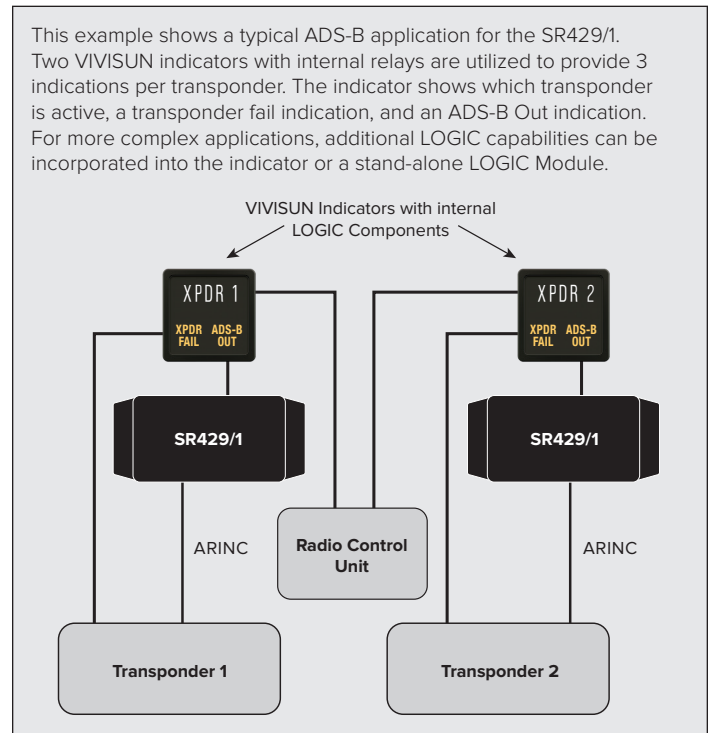## Table 5: Operating Parameters

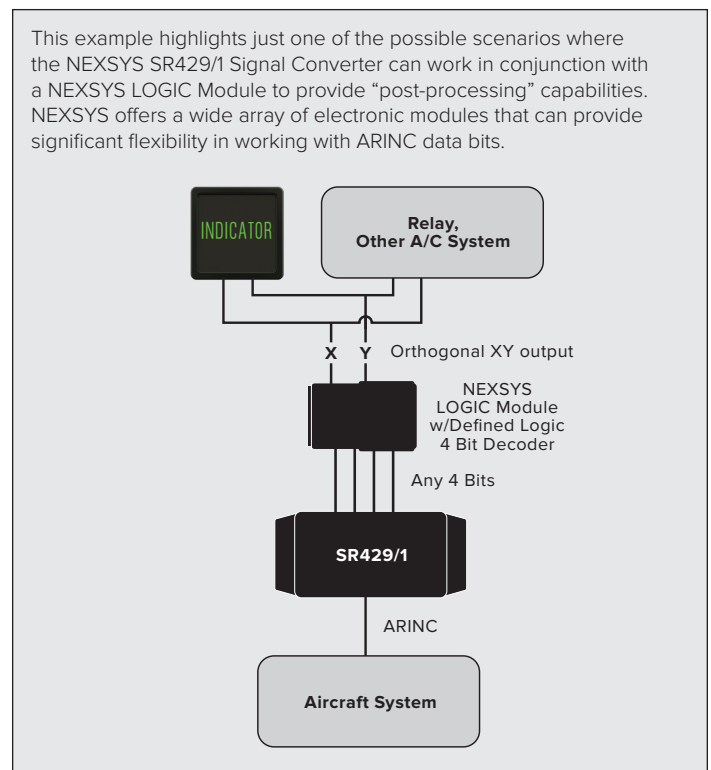| Description	Parameters
Operating Parameters	
Operating Voltage (Max./Nom./ Min.)	+32 VDC /+28 VDC/+18 VDC
Power Supply Input Current	8 ma
Reset from power loss	5 s maximum
/Master Reset (active low)	30 ms min
High Level Input Voltage (V_{IH})	3 V minimum
Low Level Input Voltage (V_{IL})	1.1 V maximum
Low Level Input Current (I_{IL})	1 mA maximum
ARINC 429 inputs	Per ARINC 429 specification
Low Level Output Voltage @ 1A (V_{OL})	0.4 VDC typical, 0.6 VDC Max
High Level Output Voltage (V_{OH})	32 VDC maximum
Output Load Capacity	
Resistive/Motor	1.0 A maximum
Lamp/Inductive	0.8 A maximum
Total output current all used outputs	12 A maximum when using all available grounds
Operating life	1,000,000 cycles at 85°C rated loads
Temperature	
Operating / non-operating temperature	-55°C to +85°C/+125°C

Table 6: Output Level by Configuration

ARINC 429 Word Data Bit	Output Level *	
	Active Low Configuration	Active Open Configuration
0 **	Open (High Impedance)	Ground
1 (Active)	Ground	Open (High Impedance)

* All outputs are open drain. Outputs have been inverted in Active Open configuration.
** Also represents power-up and reset state.

Example 1: Typical ADS-B application of SR429/1

This example shows a typical ADS-B application for the SR429/1. Two VIVISUN indicators with internal relays are utilized to provide 3 indications per transponder. The indicator shows which transponder is active, a transponder fail indication, and an ADS-B Out indication. For more complex applications, additional LOGIC capabilities can be incorporated into the indicator or a stand-alone LOGIC Module.

Example 2: ARINC Data Decoder

This example highlights just one of the possible scenarios where the NEXSYS SR429/1 Signal Converter can work in conjunction with a NEXSYS LOGIC Module to provide "post-processing" capabilities. NEXSYS offers a wide array of electronic modules that can provide significant flexibility in working with ARINC data bits.

Table 7: Qualification Level Summary

Test Description	Specification	Section	Category	Reference Levels
Altitude	RTCA/DO-160 MIL-STD-202 MIL-STD-810	4 105C 500	A2, F2 B Procedure II	-15,000, +55,000 Feet
Temperature	RTCA/DO-160 MIL-STD-810	4 501/502	F2 Procedure III	-55°C and +85°C
Temperature Variation	RTCA/DO-160 MIL-STD-202 MIL-STD-810	5 107 503	S2 A 1	5 Cycles -55°C / +85°C
High Temperature Survival (Non-Operating)	MIL-STD-202	108A	A	+85°C, 96 Hours (Switch)+125°C, 96 Hours (NEXSYS Modules)
Humidity	RTCA/DO-160 MIL-STD-202	6 106	B N/A	240 Hours, +38°C / 65°C, > 90% RH 240 Hours, -10°C / 65°C, > 90% RH
Operational Shock and Crash Safety	RTCA/DO-160 MIL-STD-202 MIL-STD-810	7 213 516	B B N/A	20 G Sawtooth 20G Acceleration, 75 G Half-Sine N/A
Acceleration	RTCA/DO-160 MIL-STD-202 MIL-STD-810	7 212 513	B A Procedure III	20 G, 3 Axis
Vibration	RTCA/DO-160 MIL-STD-202	8 204	R, U B	10 to 2000 Hz, Sine on Random 10 to 2000 Hz 15 G
Explosive Atmosphere	RTCA/DO-160 MIL-STD-202	9 109C	E B	N/A
Waterproofness	RTCA/DO-160 MIL-PRF-22885	10 4.7.20	R Splash-proof	450 Litres / Hour 15 Gallons / Minute -10°C /+ 40°C 85% RH
Sand and Dust	RTCA/DO-160 MIL-STD-202	12 110	D N/A	Silica Media
Fungus Resistance	RTCA/DO-160 MIL-PRF-22885	13 3.5.2	F N/A	Compliance by Material Selection
Salt Fog	RTCA/DO-160 MIL-STD-202	14 101	T A	96 Hour Tests
Power Input Aircraft Power	RTCA/DO-160	16.6.1.3 (Momentary Power Interrupt)	B	50ms dropout
		16.6.1.5, 16.6.2.2	B	Tests not applicable to Category A
		16.6.2.3	A	12V +/- 0.24V for 7 sec.
		16.6.2.4	A	37.8V -0/+2V for 1 sec.
	MIL-HDBK-704-8	LDC (102, 301, 401, 501, 602)	N/A	N/A
Spike / Transient	RTCA/DO-160	17	A	Power 600V, 10μsec, 50 ohms
Audio Frequency Conducted Susceptibility	RTCA/DO-160 MIL-STD-461	18 CS101	Z Curve 2	Power Input, 4V P to P, 1 to 150KHz
Induced Signal Susceptibility	RTCA/DO-160	19	CW	10,000V/m, 120A/m, 350 and 800Hz
RF Conducted Susceptibility*	RTCA/DO-160 MIL-STD-461	20 CS114	Y Curve 5	300mA, 10KHz to 400MHz 109dBμA, 10KHz to 200MHz
RF Radiated Susceptibility*	RTCA/DO-160 MIL-STD-461	20 RS103	Y 200V/m	200V/m 2MHz to 18GHz
Conducted RF Emissions	RTCA/DO-160 MIL-STD-461	21 CE102	P N/A	150KHz to 152MHz 10KHz to 10MHz
Radiated RF Emissions	RTCA/DO-160 MIL-STD-461	21 RE102	P N/A	100MHz to 6GHz 10KHz to 6GHz
Lightning Induced Transient*	RTCA/DO-160 MIL-STD-461	22 CS117	XXK3L3 L1	Waveform 3, 600V, 1MHz, 10MHz, Single, Multiple, Burst Waveform 4, 300V, 69μsec Waveform 5A, 300V, 120μsec
Military Transient*	MIL-STD-461 MIL-STD-461	CS115 CS116	N/A N/A	5A 30nS 30/Sec for 1 minute Damped Sinusoidal, 10KHz to 100MHz
Dielectric Withstanding	MIL-STD-202	301		1000 VAC
Electrostatic Discharge	RTCA/DO-160 MIL-STD-461	25 CS118	A Level 4	15,000V, 150pF, 330 ohms
Magnetic Effect	RTCA/DO-160	15	Z	1° Deflection, at < 0.3m
Flamability	RTCA/DO-160 UL-94	26 N/A	C V-0	Metal Housing - No Vent Openings Per UL-94 Flamability

* Stated EMC performance based on tests performed on an individually monitored component using unshielded cables as defined by the applicable EMC test document. The EMC performance of an installed system using NEXSYS components can be dependent on the actual installation environment and interconnection method.

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