# DSCA30/31

## Analog Voltage-input Signal Conditioners, Narrow Bandwidth

## DESCRIPTION

Each DSCA30/31 voltage-input module provides a single channel of analog input which is filtered, isolated, amplified, and converted to a high-level voltage output (Figure below). Signal filtering is accomplished with a five-pole filter which provides 85dB of normal-mode rejection at 60Hz and 80dB at 50Hz. An anti-aliasing pole is located on the field side of the isolation barrier, and the other four poles are on the system side. After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit. Isolation is provided by transformer coupling, again using a proprietary technique to suppress transmission of common mode spikes or surges.

Module output is either voltage or current. For current-output models a dedicated loop supply is provided at Terminal 3 (+OUT) with loop return located at Terminal 4 (–OUT). The system-side load may be either floating or grounded.

Special input circuits provide protection against accidental connection of power-line voltages up to 240VAC and against transient events as defined by ANSI/IEEE C37.90.1. Protection circuits are also present on the signal output and power input terminals to guard against transient events and power reversal. Signal and power lines are secured to the module using screw terminals which are in pluggable terminal blocks for ease of system assembly and reconfiguration.

The modules have excellent stability over time and do not require recalibration; however, zero and span settings are adjustable up to ±5% to accommodate situations where fine-tuning is desired. The adjustments are made using potentiometers located under the front panel label and are non-interactive for ease of use.

## FEATURES

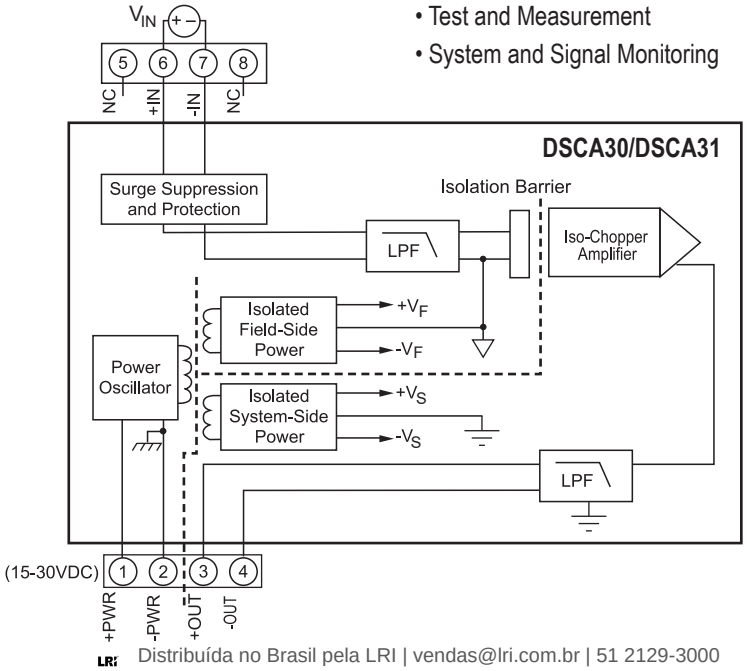
- Accepts Millivolt and Voltage Level Signals
- Industry-standard Output of 0 to +10V, ±10V, 0-20mA, or 4-20mA
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input Protected to 240VAC Continuous
- True 3-way Isolation
- Wide Supply Voltage Range
- 160dB CMR
- 85dB NMR at 60Hz, 80dB NMR at 50Hz
- ±0.03% Accuracy
- ±0.01% Linearity
- Easily Mounts on Standard DIN-rail
- UL/cUL Listed
- CE and ATEX Compliant
- Manufactured per RoHS III Directive 2015/863

## BENEFITS

- Protects User Equipment from Lightning and Heavy Equipment Power-line Voltage
- Reduces Electrical Noise in Measured Signals
- Convenient System Expansion and Repair
- Reduces EMC Concerns
- Signal Filtering in Noisy Environments
- Simplifies Sensor Interface and Signal Conditioning Design
- Provides Isolation of External Sensors
- Breaks Ground Loops

## APPLICATIONS

- Analog Signal Filtering
- Industrial Process Control
- Test and Measurement
- System and Signal Monitoring
- Temperature Measurement
- Torque Measurement
- Civil Engineering
- Geotechnical Monitoring




**DSCA30/DSCA31 Block Diagram** - For Module Dimensions and Pinouts, See Page 4-35

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## Specifications

Typical* at $T_A$ = +25°C and +24VDC Supply Voltage

| Module | DSCA30 | DSCA31 |
|---|---|---|
| Input Range | ±10mV to ±100mV | ±1V to ±40V |
| Input Bias Current | ±0.5nA | ±0.05nA |
| Input Resistance | | |
| Normal | 50MΩ | 500kΩ (min) |
| Power Off | 65kΩ | 500kΩ (min) |
| Overload | 65kΩ | 500kΩ (min) |
| Input Protection | | |
| Continuous | 240Vrms (max) | 240Vrms (max) |
| Transient | ANSI/IEEE C37.90.1 | ANSI/IEEE C37.90.1 |
| Output Range | See Ordering Information | See Ordering Information |
| Load Resistance ($I_{OUT}$) | 600Ω (max) | 600Ω (max) |
| Current Limit | 8mA ($V_{OUT}$), 30mA ($I_{OUT}$) | 8mA ($V_{OUT}$), 30mA ($I_{OUT}$) |
| Output Protection | | |
| Short to Ground | Continuous | Continuous |
| Transient | ANSI/IEEE C37.90.1 | ANSI/IEEE C37.90.1 |
| CMV, Input to Output, Input to Power | | |
| Continuous | 1500Vrms (max) | 1500Vrms (max) |
| Transient | ANSI/IEEE C37.90.1 | ANSI/IEEE C37.90.1 |
| CMV, Output to Power | | |
| Continuous | 50VDC (max) | 50VDC (max) |
| CMR (50Hz or 60Hz) | 160dB | 160dB |
| Accuracy(1) | ±0.03% Span | ±0.03% Span |
| Linearity | ±0.01% Span | ±0.01% Span |
| Adjustability | ±5% Zero and Span | ±5% Zero and Span |
| Stability | | |
| Input Offset | ±0.5µV/°C | ±5µV/°C |
| Output Offset | ±6ppm/°C ($V_{OUT}$), ±20ppm/°C ($I_{OUT}$) | ±6ppm/°C ($V_{OUT}$), ±20ppm/°C ($I_{OUT}$) |
| Zero Suppression | ±50ppm($V_z$)(2)/°C | ±50ppm($V_z$)(2)/°C |
| Gain | ±35ppm/°C | ±55ppm/°C |
| Output Noise, 100kHz BW | 250µVrms ($V_{OUT}$), 1µArms ($I_{OUT}$) | 250µVrms ($V_{OUT}$), 1µArms ($I_{OUT}$) |
| Bandwidth, –3dB | 3Hz | 3Hz |
| NMR | 85dB at 60Hz, 80dB at 50Hz | 85dB at 60Hz, 80dB at 50Hz |
| Response Time, 90% Span | 165ms | 165ms |
| Power Supply | | |
| Voltage | 15 to 30VDC | 15 to 30VDC |
| Current | 25mA ($V_{OUT}$), 55mA ($I_{OUT}$) | 25mA ($V_{OUT}$), 55mA ($I_{OUT}$) |
| Sensitivity | ±0.0001%/% | ±0.0001%/% |
| Protection | | |
| Reverse Polarity | Continuous | Continuous |
| Transient | ANSI/IEEE C37.90.1 | ANSI/IEEE C37.90.1 |
| Mechanical Dimensions (h)x(w)x(d) | 2.95" x 0.89" x 4.13" (75mm x 22.5mm x 105mm) | 2.95" x 0.89" x 4.13" (75mm x 22.5mm x 105mm) |
| Mounting | DIN EN 50022 -35x7.5 or -35x15 rail | DIN EN 50022 -35x7.5 or -35x15 rail |
| Environmental | | |
| Operating Temp. Range | –40°C to +80°C | –40°C to +80°C |
| Storage Temp. Range | –40°C to +80°C | –40°C to +80°C |
| Relative Humidity | 0 to 95% Noncondensing | 0 to 95% Noncondensing |
| Emissions EN61000-6-4 | ISM, Group 1 | ISM, Group 1 |
| Radiated, Conducted | Class A | Class A |
| Immunity EN61000-6-2 | ISM, Group 1 | ISM, Group 1 |
| RF | Performance A ±0.5% Span Error | Performance A ±0.5% Span Error |
| ESD,EFT | Performance B | Performance B |

NOTES:
*Contact factory or your local Dataforth sales office for maximum values.
(1) Includes linearity, hysteresis, and repeatability.
(2) $V_z$ is the nominal input voltage that results in 0V or 0mA output.

## Ordering Information

| Model | Input Range | Output Range† |
|---|---|---|
| DSCA30-01 | –10mV to +10mV | 1 |
| DSCA30-02 | –50mV to +50mV | 1 |
| DSCA30-03 | –100mV to +100mV | 1 |
| DSCA30-04 | –10mV to +10mV | 2, 3, 4 |
| DSCA30-05 | –50mV to +50mV | 2, 3, 4 |
| DSCA30-06 | –100mV to +100mV | 2, 3, 4 |
| DSCA30-07 | 0 to +10mV | 2, 3, 4 |
| DSCA30-08 | 0 to +50mV | 2, 3, 4 |
| DSCA30-09 | 0 to +100mV | 2, 3, 4 |
| DSCA31-01 | –1V to +1V | 1 |
| DSCA31-02 | –5V to +5V | 1 |
| DSCA31-03 | –10V to +10V | 1 |
| DSCA31-04 | –1V to +1V | 2, 3, 4 |
| DSCA31-05 | –5V to +5V | 2, 3, 4 |
| DSCA31-06 | –10V to +10V | 2, 3, 4 |
| DSCA31-07 | –20V to +20V | 1 |
| DSCA31-08 | –20V to +20V | 2, 3, 4 |
| DSCA31-09 | –40V to +40V | 1 |
| DSCA31-10 | –40V to +40V | 2, 3, 4 |
| DSCA31-11 | 0 to +1V | 2, 3, 4 |
| DSCA31-12 | 0 to +5V | 2, 3, 4 |
| DSCA31-13 | 0 to +10V | 2, 3, 4 |
| DSCA31-14 | 0 to +20V | 2, 3, 4 |
| DSCA31-15 | 0 to +40V | 2, 3, 4 |

## †Output Ranges Available

| Output Range | Part No. Suffix | Example |
|---|---|---|
| 1. –10V to +10V | NONE | DSCA30-01 |
| 2. 0V to +10V | NONE | DSCA30-04 |
| 3. 4-20mA | C | DSCA30-04C |
| 4. 0-20mA | E | DSCA30-04E |
| 5. 0 to +5V | A | N/A |
| 6. 0 to 1mA | B | N/A |

**Installation Notes:**

1.) This Equipment is Suitable for Use in Class I, Division 2, Groups A, B,C, D, or Non-hazardous Locations Only.

2.) WARNING - Explosion Hazard - Substitution of Components May Impair Suitability for Class I, Division 2.

3.) WARNING - Explosion Hazard - Do Not Disconnect Equipment Unless Power Has Been Switched Off or the Area is Known to be Non-hazardous.

4.) The Power to These Devices Shall Be Limited by an Over-current Protection Device, UL Certified Fuse (JDYX/JDYX2) Rated 6A Max.

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