

Frequency to Analogue Converter

Type C16-10

Installation Guide



Document Ref: UDC16-10.vp Rev 4



WARNING!

It is important that this guide is read and fully understood before attempting installation or commissioning of the instrument. Instructions appearing in this document, and current safety legislation, must be observed to ensure personal safety and to prevent damage to the instrument or equipment connected to it.

The instrument should be installed, commissioned and operated only by suitably qualified and authorised personnel.

- The specifications for the instrument must not be exceeded. If the instrument is used in a manner not specified, the protection provided by the instrument may be compromised.
- The instrument must be installed in an enclosure that provides adequate protection against electric shock.
- Ensure that power to the instrument is switched off and signal wiring isolated from hazardous voltages before carrying out installation or maintenance.
- The instrument is designed for installation in a clean, dry environment (Pollution degree 1).
- Stroud Instruments Ltd strongly recommends that repairs and re-calibration work are done on a return to factory basis in order that our quality standards, product specifications and safety precautions are not compromised.
- The instrument is double insulated

Note: Clean only with a dry soft cloth.

Safety and EMC information

Safety: EN61010 -1
 Immunity: EN50082-1
 Emissions: EN50081-1
 CE certified

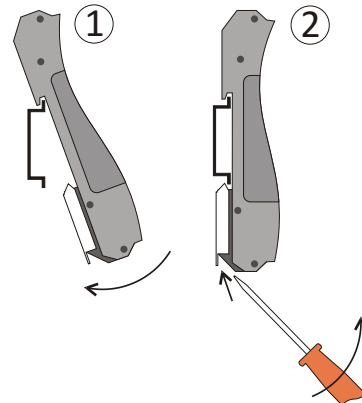
Installation

Location

- The instrument is designed for installation in a clean, dry environment
- Do not install near to switch gear, motor controllers or other sources of strong magnetic fields.
- Avoid exposure to direct sunlight and ensure the ambient temperature inside the enclosure that the unit is mounted in will not exceed our specification.

DIN rail mounting

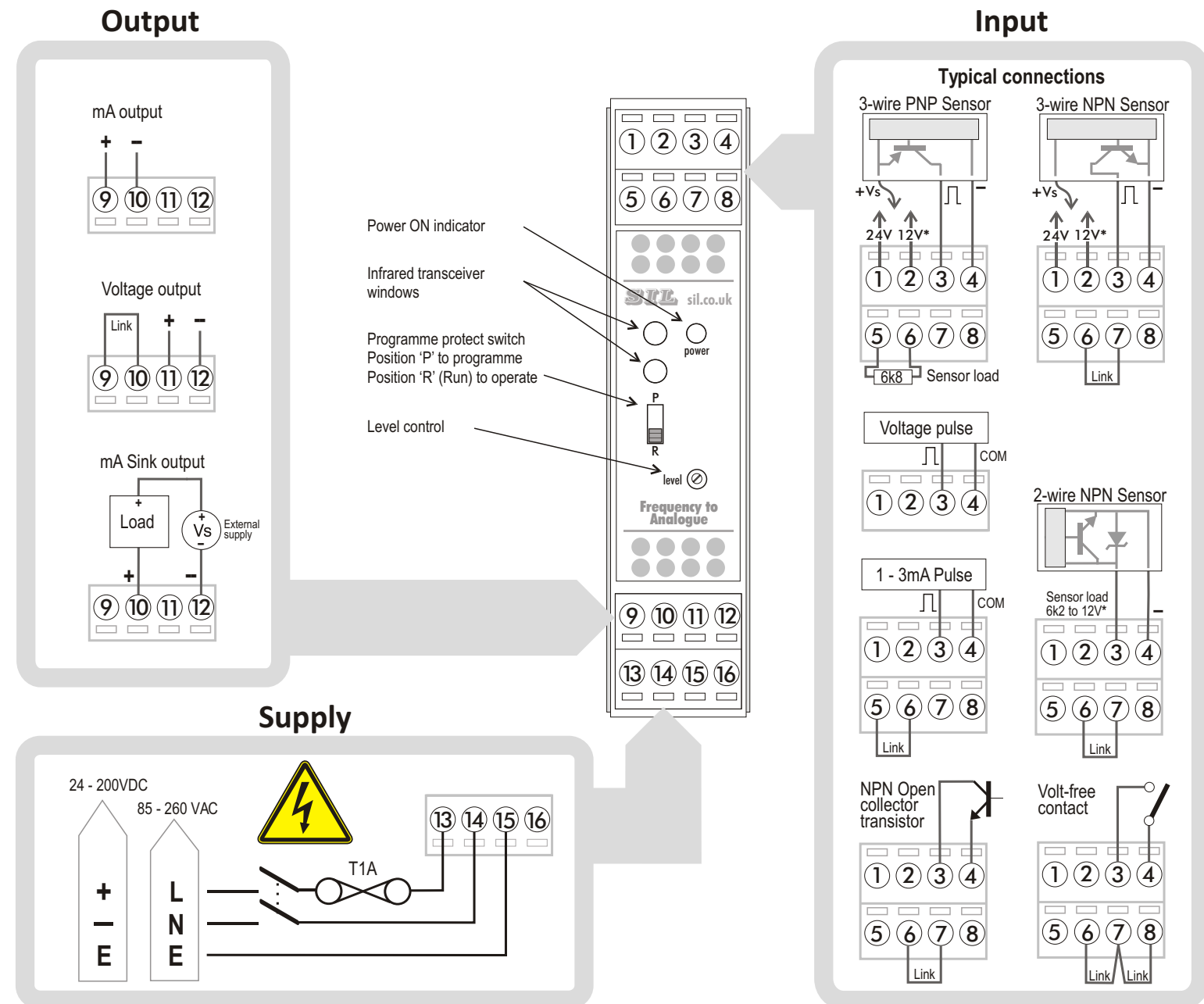
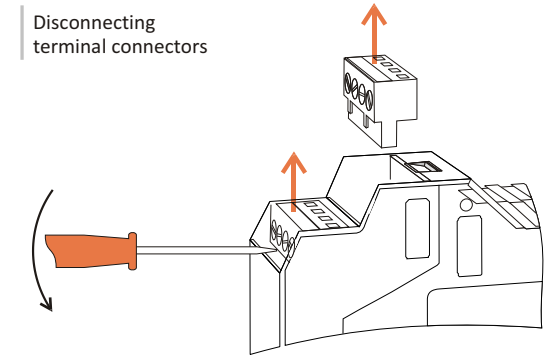
1. Hook the top DIN rail recess over the DIN rail, and press the bottom edge against the DIN rail until the spring-loaded latch clicks home.
2. To remove the instrument from the DIN rail, insert a small bladed screwdriver into the slot in the spring-loaded latch and gently lever the screwdriver up until the latch releases from the DIN rail.



Wiring and connections

- Segregate power supply and signal wiring.
- Use screened cable for all signal wiring with the screen earthed at one end only.
- All connections should be made using ferrules to avoid short-circuits between adjacent terminals.
- This instrument is equipped with a universal power supply and may be operated from either of the following supply ranges:
 DC supplies: 24 VDC to 200 VDC or AC supplies: 85 VAC to 260VAC
- Power supply wiring to the instrument should be protected by a 1A time-delay fuse and double pole switch - see below. The switch should be clearly marked as the isolating switch for the instrument.

Note: terminal connectors are removable.



Note: Transducer power supply (1) - on terminal 2 is either 12V (supplied as default), or otherwise as specified when ordered. See connection label on side of unit.

Operation

The Frequency to Analogue Converter provides an output current or voltage which is proportional to the frequency of an alternating voltage or pulse input signal. Digital and analogue filtering are provided to optimise performance to site conditions. Optional computer software and infra red link enable ranging to be adjusted, e.g. to suit a turbine meter replacement, and other parameters tuned to filter the effects of input signal noise.

Input signal level

The 'Level' control accessed through the front panel, sets the sensitivity or trigger threshold for the instrument. Turning the level control anticlockwise will decrease the trigger point making the instrument more sensitive to lower amplitude signals. To reduce sensitivity to noise, the level control should be turned clockwise (decreases sensitivity) until the output signal falls and then back off the control until reliable triggering is achieved. NB see 'Level control sensitivity adjustment' in the 'Configuration' section.

Programme protect switch

To improve noise immunity in areas near to variable speed drives, switch gear or other sources of strong magnetic fields, the C16-10 is equipped with a Programme Protect Switch: position 'R' (Run) is for normal operational mode and position 'P' for programming the unit (optional programming kit required). Note: With the switch in position 'P' the output is held at the zero value.

Configuration

Please note: If calibration / configuration data is specified at the time of ordering i.e. a Type C16-10 /9 is ordered, ranges will have been factory set and tested. In this case the relevant details will be given on the data label fixed to the side of the unit. If not specified, i.e. a Type C16-10 is ordered, the unit will be supplied set to the following: Transducer supply (1) = 12V, Output type = 4-20mA, Frequency 0-100Hz, Filter settings to 'default' see 'Programmable options in Specifications' and the Level control sensitivity adjustment set for input voltage levels of greater than 6 volts.

Input signal selection

Preset input configurations for a range of input signals / transducer types are available at the input terminals. Refer to the connections diagram for details.

Internal configuration settings

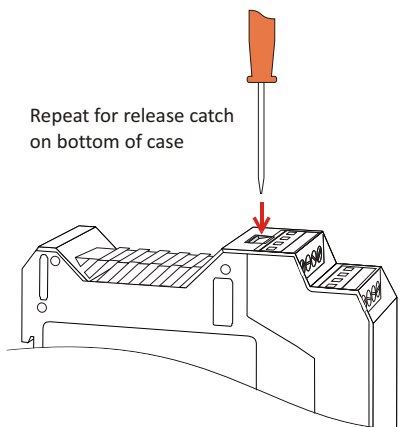
NOTE: The following procedures require the case to be opened.



WARNING: The Frequency to Analogue Converter must be isolated from power supply and any potentially hazardous signals before commencing this procedure.

Opening the case

1. Turn off all power to the unit and isolate all potentially hazardous signals. NB the terminals are removeable to facilitate a quick disconnect. see 'Wiring and connections'.
2. To open the unit release the top and bottom catches by pressing down with a small screwdriver as shown and withdraw the front panel and PCB assembly out of the case.

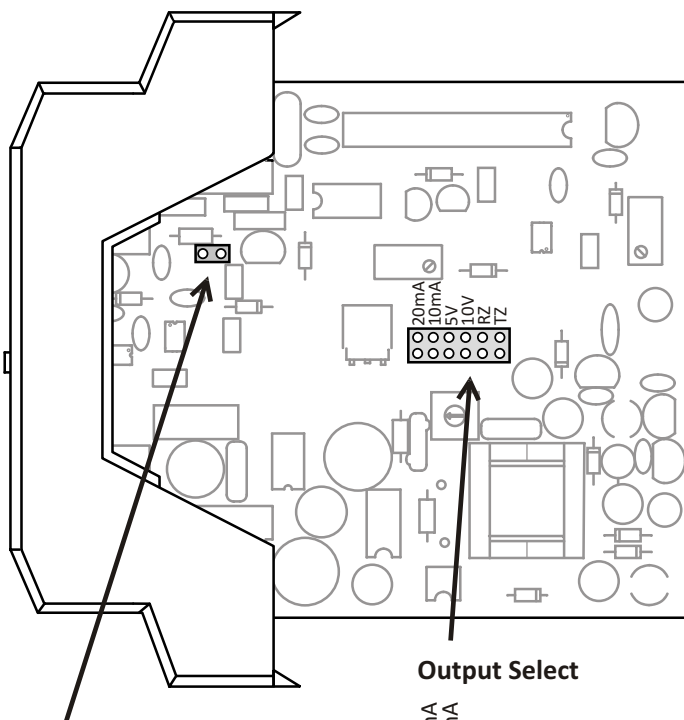


Level control sensitivity adjustment

The C16-10 is designed to accept voltage levels from 10 mV p.t.p. up to 250 V R.M.S. To cater for this wide range, link J5 is provided to set the trigger level sensitivity for (i) input signals ≤ 6 Volts and (ii) input signals > 6 Volts (default setting).

1. Refer to 'J5 Voltage inputs' in the 'Configuration link settings' diagram and set the link to suit.
2. Reassemble the case as follows: Insert the front panel / PCB assembly into the case ensuring that the two leading edges of the side panels are correctly located into the front panel section (the sides of case must fit flush with the sides of the front section).
3. Reconnect / reinsert the removeable terminals ensuring wiring / removable terminals are returned to their correct locations.

Configuration links



J5 Level control sensitivity
 Input range > 6 Volts (set by default)
 Input range ≤ 6 Volts

Output Select

- | | | | | | | |
|--|--|--|---|--|--|----------|
| <input checked="" type="checkbox"/> 20mA | <input checked="" type="checkbox"/> 10mA | <input type="checkbox"/> 5V | <input type="checkbox"/> 10V | <input type="checkbox"/> RZ | <input type="checkbox"/> TZ | 0 - 20mA |
| <input type="checkbox"/> 20mA | <input type="checkbox"/> 10mA | <input checked="" type="checkbox"/> 5V | <input checked="" type="checkbox"/> 10V | <input type="checkbox"/> RZ | <input type="checkbox"/> TZ | 4 - 20mA |
| <input type="checkbox"/> 20mA | <input type="checkbox"/> 10mA | <input type="checkbox"/> 5V | <input type="checkbox"/> 10V | <input checked="" type="checkbox"/> RZ | <input type="checkbox"/> TZ | 0 - 10mA |
| <input type="checkbox"/> 20mA | <input type="checkbox"/> 10mA | <input type="checkbox"/> 5V | <input type="checkbox"/> 10V | <input type="checkbox"/> RZ | <input checked="" type="checkbox"/> TZ | 0 - 5V |
| <input type="checkbox"/> 20mA | <input type="checkbox"/> 10mA | <input checked="" type="checkbox"/> 5V | <input type="checkbox"/> 10V | <input type="checkbox"/> RZ | <input type="checkbox"/> TZ | 1 - 5V |
| <input type="checkbox"/> 20mA | <input type="checkbox"/> 10mA | <input type="checkbox"/> 5V | <input checked="" type="checkbox"/> 10V | <input type="checkbox"/> RZ | <input type="checkbox"/> TZ | 0 - 10V |

Output signal configuration

NOTE: Without trimming the side accessible 'Span' and 'Zero' controls the range change may introduce an error of typically 1%

To maintain specified accuracy, a timer-counter, digital voltmeter (and standard resistor for current outputs) of sufficient accuracy are required for this procedure.

1. Refer to the 'Output select' links below and set the output signal as required.

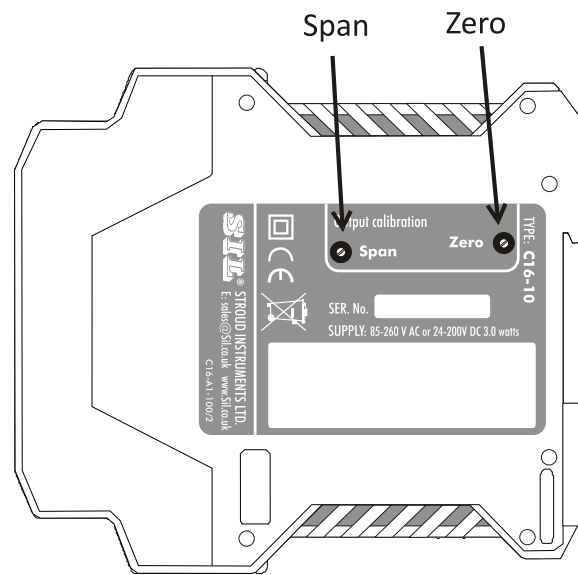


WARNING - Electric shock hazard
Do not attempt to adjust 'Span' and 'Zero' controls with the unit out of its case.

2. Reassemble the case as follows: Insert the front panel / PCB assembly into the case ensuring that the two leading edges of the side panels are correctly located into the front panel section (the sides of case must fit flush with the sides of the front section).
3. Attach the C16-10 to the DIN rail.
4. Reconnect wiring / reinsert the removeable terminals ensuring wiring / removable terminals are returned to their correct locations.

Calibration adjustment

1. After a warm-up time of 30 minutes
 - (i) Set the input frequency to Zero value and adjust the 'Zero' trim to achieve the required output zero.
 - (ii) Set the input frequency to Fullscale value and adjust the 'Span' trim to the required output full scale.
 - (iii) repeat steps (i) and (ii) as required.



Configuration of frequency range and digital filtering

These parameters are user configurable using the optional Programming Kit. Full details are provided in the programming guide on the software CD.

Specifications

Notes:

1. Input and output types, other than those shown are possible, e.g. 3-wire NPN or PNP sensors, 2-wire NPN sensors, etc. - Our sales team will be pleased to advise.

Input Types - user selectable

Voltage: ± 10mV p.t.p. to ± 100V p.t.p. sine, square or triangular waveforms
Open collector: (npn), **Current input:** 1—3 mA (NAMUR) e.g from proximity switch, **Volt-free contact.**

Input Range: See programmable options

Transducer Power Supplies

(1) 12VDC @ 10mA max (default setting) or customer specified voltage in the range 5V to 15V.
 (2) 24VDC @ 20mA max.

Outputs - user selectable

0-10mA (2000R), 0-20 mA (1000R), 4-20 mA (1000R)
Maximum output impedances in ohms shown in brackets.
 0-5v, 1-5V, 0-10V, 2-10V (500R minimum)
 Current sink 4-20mA @ 50 volts max.

Response Time

Varies between 1 sec. and 1 period of input signal.

Isolation

The input and output are isolated from each other and from the power supply. Maximum voltage 250V RMS or 400V DC. Resistance 50 x 10⁶ ohms measured at 1000V DC.

Programmable Options

Parameter	Min.	Max.	Default
Zero scale frequency (Hz)	0	5000	0
Full scale frequency (Hz)	0.1	5000	100
Minimum threshold (% of FS)	0	100	1
Change threshold (% of FS)	0	100	10
Static state timeout (s)	2	4000	2
Averaging count	1	20	5

Calibrated Accuracy

Error ± 0.2% FSD at 100% when factory calibrated.
 NB Error introduced by User output range changes, typically 1% but may be corrected by span control.

Linearity Error

± 0.1% FSD (from 1 to 100% FSD)

Output Ripple

0.1% (peak to peak) of FSD

Load Resistance Effect

0.001% of span / 100 ohm change

Stability

Over 24 hours ± 0.1% FSD, Over 1 year ± 0.25% FSD

Temperature Coefficients

Zero: ± 0.02% span / °C, Span: ± 0.02% span / °C

Environmental

Temperature: operating -10 to +60°C, storage -20 to +70°C
 Humidity: 0 – 95% RH non-condensing

Power Supply

85 - 260 VAC 50/60Hz; 24 - 200 VDC (3W nominal)

Supply Voltage Rejection

Span change: <0.02% span / % supply change.