MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

24765 AND 135613 CASE EXPANSION

24765-02-01

CASE EXPANSION TRANSDUCER

Used with the applicable 24765 case expansion systems configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Bently Nevada official manufacturer documentation

24765 and 135613 Case Expansion Transducer Systems

Datasheet

Bently Nevada Machinery Condition Monitoring

141598 Rev. K

Description

Thermal Case Growth Measurements in Large Turbines



An important position measurement in Turbine Supervisory Instrumentation (TSI) is case expansion. Case expansion (sometimes referred to as shell expansion) is the thermal growth of the machine case as it expands during machine startup and on-line operations. The case expansion transducer system is typically mounted on the foundation at the opposite end from where the turbine casing is attached to the foundation and provides information about the growth of the machine case relative to the foundation.

Case expansion is a parameter that you should use a dual transducer arrangement to measure. This arrangement provides information about the position of the sliding feet on the machine case. A condition that obstructs or jams one foot could distort the case and damage the machine. The dual case expansion transducer configuration in conjunction with the 3300 or 3500 monitors provides an alarm for this condition. The high temperature dual case expansion transducer configuration is compatible only with the 3500/45 Position Monitor.

Case expansion measurements also enable you to determine whether machine conditions are exceeding expected temperature growth differentials. This is primarily a startup parameter that determines whether the machine casing and rotor grow thermally at nearly the same rate. Different rates of thermal growth can cause the rotating and stationary parts of the machine to rub.

The case expansion transducer assembly consists of a linear variable differential transformer (LVDT), which is housed in a weatherproof, protective enclosure.

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How a Case Expansion Transducer Works

The case expansion transducer system uses the LVDT to measure the machine case thermal growth.

A rod on the LVDT connects to the machine. As the machine case grows, the rod moves inside the LVDT and changes the signal in the LVDT. The transducer electronically conditions the signal and outputs it to a monitor for display and alarms.

The High Temperature Case Expansion Transducer is designed to meet TYPE 4 requirements.

Specifications

24765 dc LVDT Assembly

Electrical

Input Power	+24 Vdc, 30 mA minimum
Scale Factor	
24765-01	0.346 V/mm (8.79 V/in).
24765-02	0.404 V/mm (10.25 V/in).
24765-03	0.143 V/mm (3.63 V/in).
Linear Range	
24765-01	± 12.7 mm (±0.5 in).
24765-02	± 25.4 mm (±1.00 in).
24765-03	± 51 mm (±2.00 in).
-3 dB Frequency	
24765-01	20 Hz
24765-02	15 Hz
24765-03	10 Hz
Output Impedance	7 kΩ. nominal, all models
Minimum Load Resistance	
24765-01	50 kΩ
24765-02	100 kΩ
24765-03	200 kΩ

Output

Ripple	< 1% full scale
Linearity	± 0.5% full-range
Stability	0.125% full-scale
Scale Factor Temperature Coefficient	0.07%/°C (0.04%/°F)

Environmental Limits

Operating Temperature	-18 °C to +71 °C (0 °F to +160 °F).
Storage Temperature	-54 °C to +93° C (-65 °F to +200 °F).
Shock	250 g for 11 ms
Vibration	10 g @ 0 to 2 kHz

Construction

Body	Series 400 magnetic stainless steel
Coil	Laminated glass epoxy
Lead Wire	25 AWG stranded copper, Teflon-insulated, 31 cm (12 in)

Mechanical

Height	88.9 mm (3.50 in).	
Width	117 mm (4.60 in).	
Length	24765-01 and -02	241 mm (9.50 in)
	24765-03	328 mm (12.90 in)
Weight	24765-01 and -02	2.3 kg (5.0 lbs)
	24765-03	2.7 kg (6.0 lbs)
Thread	6-40 UNF-2B core end 1/4-20 UNC-2A machine end	
Plunger Length	As required for application. Refer to the Dimensional Drawings section of this datasheet for fully	

	extended dimensions.
Diameter	6.4 mm (0.25 in)

Dimensions

Body Length	
24765-01	171 mm (6.75 in)
24765-02	206 mm (8.1 in)
24765-03	292 mm (11.5 in)
Body Diameter	20.6 mm (0.812 in), all models
Body End to Null Center	
24765-01	69.3 mm (2.73 in)
24765-02	86.6 mm (3.41 in)
24765-03	127 mm (4.99 in)
Core Length	
24765-01	80 mm (3.15 in)
24765-02	108 00 mm (4.25 in)
24765-03	135 mm (5.30 in)
Core Diameter	6.4 mm (0.25 in), all models

135613 dc LVDT

High Temperature Case Expansion Transducer System

Electrical

Input Power	+13.5 to +26 Vdc unregulated, 30 mA minimum
Voltage	+1 to +6 Vdc, all models
Output Noise	<10 mV

When operated in the presence of high-level RF energy, the 135613 High Temperature DC-LVDT may experience output fluctuation up to 7% (of full scale voltage) deviation from the nominal voltage.

Scale Factor	
135613-01 and -11	0.20 V/mm (5.0 V/in)
135613-02 and -12	0.10 V/mm (2.5 V/in)
135613-03 and -13	0.049 V/mm (1.25 V/in)
Linear Range	
135613-01 and -11	25.4 mm (1.00 in)
135613-02 and -12	50.8 mm (2.00 in)
135613-03 and -13	101.6 mm (4.00 in)
-3 dB Frequency	
135613-01 and -11	200 Hz (typical)
135613-02 and -12	200 Hz (typical)
135613-03 and -13	200 Hz (typical)
Stability	0.125% full-scale
Non-Linearity	Less than 0.25% full-scale
Temperature Coefficient	0.05%/°C (0.028%/°F) maximum

When operated in the presence of high-level RF energy, the 135613 transducer may experience output fluctuation up to 7% (of full scale voltage) deviation from the nominal voltage.

Ordering Information

For the detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (108M1756) available from Bently.com.

Case Expansion Transducer Assembly (dc)

24765-AA-BB

A: Linear Range Option	
01	25.4 mm (1.0 in)
02	0.8 mm(2.0 in)
03	101.6 mm (4.0 in)
B: Spring Option	
00	Without spring return
01	With spring return

High Temperature Case Expansion Transducer Assembly (dc)

135613 -AA-BB

A: Linear Range Option	
01	25.4 mm (1.0 in) with a 127 mm (5.00) rod
02	50.8 mm (2.0 in) with a 152.4 mm (6.00) rod
03	101.6 mm (4.0 in) with a 228.6 mm (9.00) rod
11	25.4 mm (1.0 in) with a 304.8 mm (12.0 in) rod
12	50.8 mm (2.0 in) with a 304.8 mm (12.00) rod
13	101.6 mm (4.0 in) with a 228.6 mm (9.00) rod
B: Spring Option	
00	Without spring return
01	With spring return

Spring Option 01 only available with Linear Range Options 01, 02, & 03

Accessories

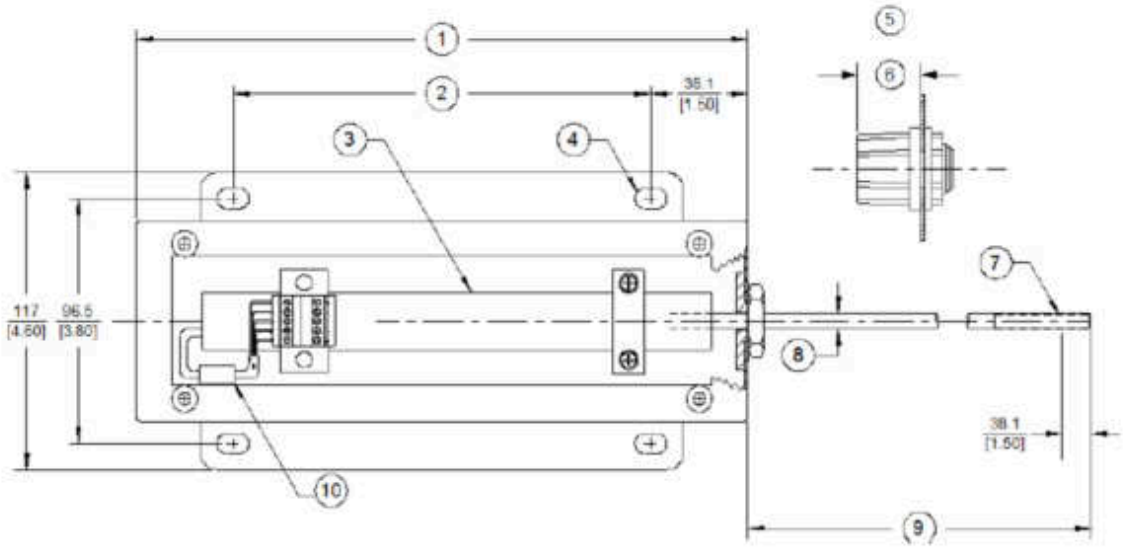
135941-01	127 mm (5.0 in) rod
135941-02	152.4 mm (6.0 in) rod
135941-03	228.6 mm (9.0 in) rod
135941-04	304.8 mm (12.0 in) rod
285741	Ferrite Bead

Ferrite bead required on transducer end of field wiring for CE installations.

For more information on this product, please refer to the DC-LVDT and Housing Assembly User Guide (document TW8029327).

Graphs and Figures

All dimensions shown in millimetres [inches] except as noted.

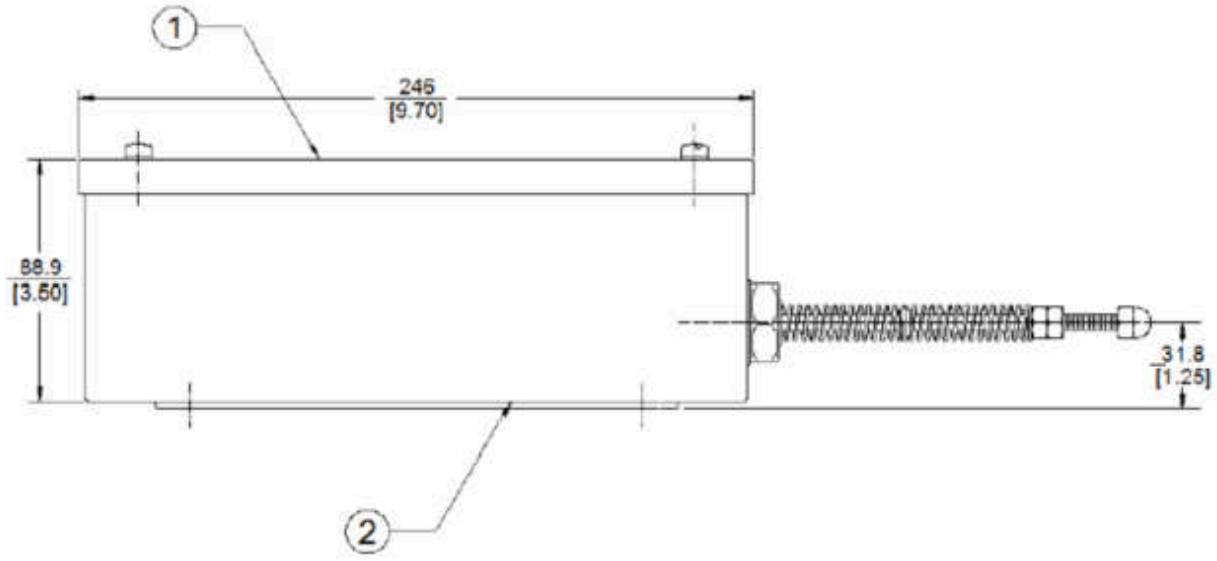


1. Dimension "B" See 135613-AA Dimensions in Millimetres [Inches] on the next page.
2. Dimension "A"
3. LVDT
4. 7.92 mm x 12.7 mm [0.312 in x 0.500 in] oval, 4 places
5. 1/2-inch conduit fitting, supplied but not installed
6. External protrusion, 20.6 mm [0.81 in]
7. 1/4-20 UNC-2A
8. 4.7 mm [0.187 in] diameter
9. Dimension "C", fully extended position
10. Ferrite Bead

Figure 1: 135613-AA Dimensional Drawing (Top View)

Table 1: 135613-AA Dimensions in Millimetres [Inches]

Linear Range Option	Dimension "A	Dimension "B"	Dimension "C"
-01	165 [6.50]	241 [9.50]	100.3 [3.95]
-02	165 [6.50]	241 [9.50]	120.6 [4.75]
-03	251 [9.90]	327.7 [12.90]	196.8 [7.75]
-11	165 [6.50]	241 [9.50]	280 [11.02]
-12	165 [6.50]	241 [9.50]	270 [10.63]
-13	251 [9.90]	327.7 [12.90]	272 [10.71]



1. Cover
2. Housing

Figure 2: 135613-AA Dimensional Drawing (Side Views)

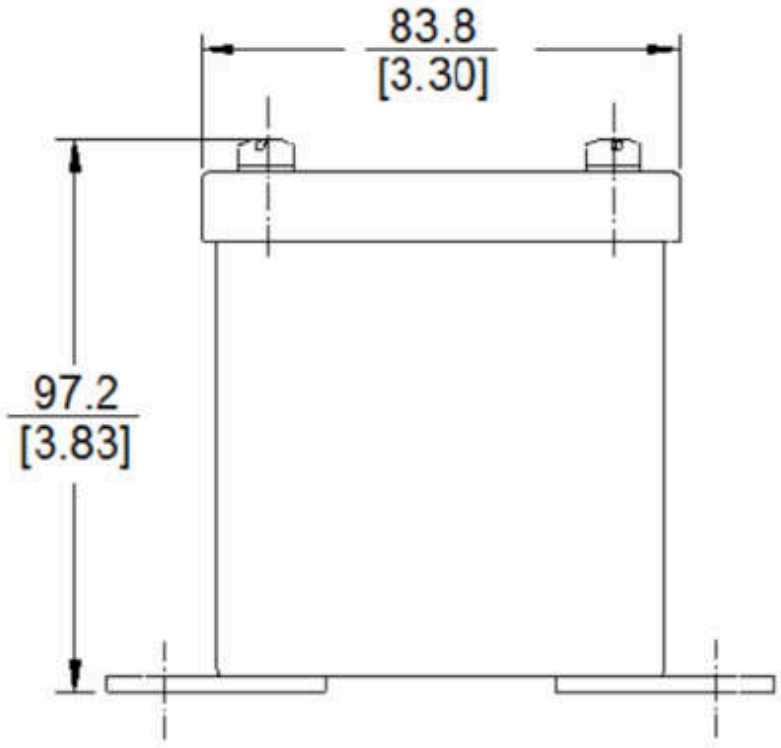


Figure 3: 135613-AA Dimensional Drawing (End View)