

Italian Sensors Technology



Application: Coils distance detection

UT1 - M30 Ultrasonic Sensors

Utrasonic Sensors Application note CAT3EUT1260801 Application note - UT1 - English - Ed.01/2012





PROBLEM DESCRIPTION

GENERAL DESCRIPTION

TECHNICAL SPECIFICATIONS & DIMENSIONS

Copyright:

M.D. Micro Detectors S.p.A. con Unico Socio

Strada S. Caterina 235 41122 Modena - Italy

tel. + 39 059 420411 fax + 39 059 253973 info@microdetectors.com www.microdetectors.com



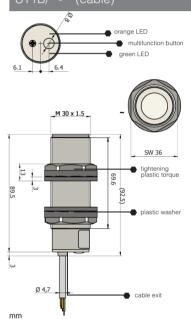
On the machines for "tissue" manufacturing and packaging, the production process includes the unwinding, wrapping, storage, cutting through different tools realizing packaging, wrapping, bagging, handle and many other diverter. The start up phase of the "unwinding", needs the use of large size "tissue" coils, where it is mandatory the coil diameter check, for replacing the reel once it starts to be over.

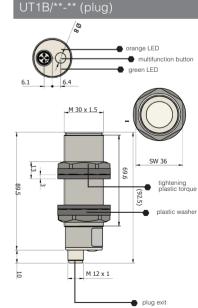
The ideal solution consists in using the Ultrasonic Sensor of the series UT1, which being completely independent from the type, color and shape of the used material, can grant excellent detecting performances. The UT1 sensor measures the distance from the coil, while uncoiling, reduces its diameter. The analog output, either current or voltage, provides a signal proportional to the detected distance, that means, from an application point of view, it checks the variation of the coil diameter

- M30 compact ultrasonic sensors with high performances and high sensing distances
- · Models with adjustable digital output: models with two programmable outputs and with single output
- Adjustable hysteresis output, model with double digital programmable designed for level detection
- Models with voltage or current output: programmable slope to optimize resolution
- Adjustable working area (window mode or object mode) by Teach-in button on all models for a quick and easy installation
 - Two multifunction LED indicators: Teach-in function and NO/NC selection (orange) and eco detection (green)
 - Temperature compensation on all working range

Paper factories

Nominal sensing distance Sn3,500 mm (1)minimum operating distance (blind zone)250 mmbeam angle12° ± 2°switching frequency (digital output)2 Hzresponse time (digital output)2 Hzdifferential travel H0,5%repeat accuracy0,2%inearity error0,5%operating temperature-20°+70°Ctemperature compensationyesthermal drift of Sr5%rated operational voltage Ue12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V)maximum ripple content5%leakage currentS10 µA (Vdc max)output voltage drop Ud2.2 V max (IL=100mA)No-Load supply current50 mA maxmaximum load current (digital output)100 mAminimum load resistance3 k Ω (analogue voltage drop)sensitivity adjustmentshort circuit, overvoltage pulsescircuit protectionsshort circuit, overvoltage pulsescircuit protectionsshort circuit, overvoltage pulseselectrical protections (analogue output)overvoltage pulsesprotection degreeIP67 (EN 60529) NEMA 4X/9'housing materialepoxy-glass resinweight90 g (plug exit) - 160 g (cable exit)storage temperature-35°+70°C (without freeze)	models	UT1B/E*-0*UL
Nominal sensing distance Sn 3,500 mm (¹) minimum operating distance (blind zone) 250 mm beam angle 12° ± 2° switching frequency (digital output) 2 Hz response time (digital output) 250 ms differential travel H 0,5% repeat accuracy 0,2% inearity error 0,5% operating temperature -20° +70°C temperature compensation yes thermal drift of Sr 5% rated operational voltage Ue 12 - 30 Vdc: 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V) maximum ripple content 5% leakage current ≤ 10 µA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA minimum load current (digital output) Teach-in button supply electrical protections short circuit, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses <th></th> <th></th>		
minimum operating distance (blind zone) 250 mm beam angle 12° ± 2° switching frequency (digital output) 2 Hz response time (digital output) 250 ms differential travel H 0,5% operating temperature 0,2% inearity error 0,5% operating temperature -20°+70°C temperature compensation ye8 thermal drift of Sr 5% rated operational voltage Ue 12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V) maximum ripple content 5% leakage current ≤ 10 µA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 3 k Ω (analogue voltage drop) sensitivity adjustment Teach-in button supply electrical protections short circuit, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material epoxy-glass		
beam angle12° ± 2°switching frequency (digital output)2 Hzresponse time (digital output)250 msdifferential travel H0,5%repeat accuracy0,2%linearity error0,5%operating temperature-20° +70°Ctemperature compensationyesthermal drift of Sr12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V)maximum ripple content5%leakage current≤ 10 µA (Vdc max)output voltage drop Ud2.2 V max (IL=100mA)No-Load supply current3 k Ω (analogue voltage drop)sensitivity adjustment100 mAminimum load cursent (digital output)not analogue voltage drop)sensitivity adjustmentShort circuit, overvoltage pulsesdigital output electrical protectionsshort circuit, overvoltage pulseselectrical protections (analogue output)overvoltage pulsesprotection degreeIP67 (EN 60529) NEMA 4X ^{co} housing materialepoxy-glass resinweight90 g (plug exit) - 160 g (cable exit)	Nominal sensing distance Sn	3,500 mm ⁽¹⁾
switching frequency (digital output) 2 Hz response time (digital output) 250 ms differential travel H 0,5% repeat accuracy 0,2% linearity error 0,5% operating temperature -20°+70°C temperature compensation yes thermal drift of Sr 5% rated operational voltage Ue 12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V) maximum ripple content 5% leakage current < 10 µA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA mininum load current (digital output) 100 mA sensitivity adjustment 5 k Ω (analogue voltage drop) sensitivity adjustment short circuit, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses fettor [P67 (EN 60529) NEMA 4X ⁶⁹ housing material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	minimum operating distance (blind zone)	250 mm
response time (digital output) 250 ms differential travel H 0,5% repeat accuracy 0,2% linearity error 0,5% operating temperature -20° +70°C temperature compensation yes thermal drift of Sr 5% rated operational voltage Ue 12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V) maximum ripple content 5% leakage current ≤ 10 µA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA minimum load resistance 3 k Ω (analogue voltage drop) sensitivity adjustment Teach-in button supply electrical protections short circuit, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material epoxy-glass resin weight 90 g (plug exit) - 16	beam angle	12° ± 2°
differential travel H0,5%repeat accuracy0,2%linearity error0,5%operating temperature-20° +70°Ctemperature compensationyesthermal drift of Sr5%rated operational voltage Ue12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V)maximum ripple content5%leakage current≤ 10 µA (Vdc max)output voltage drop Ud2.2 V max (IL=100mA)No-Load supply current50 mA maxmaximum load current (digital output)100 mAminimum load resistance3 k Ω (analogue voltage drop)sensitivity adjustmentTeach-in buttonsupply electrical protectionsshort circuit, overvoltage pulsesdigital output electrical protectionsshort circuit, overvoltage pulsesEMCConforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2electrical protections (analogue output)overvoltage pulsesprotection degreeIP67 (EN 60529) NEMA 4X ⁽²⁾ housing materialepoxy-glass resinweight90 g (plug exit) - 160 g (cable exit)	switching frequency (digital output)	2 Hz
repeat accuracy 0,2% linearity error 0,5% operating temperature -20°+70°C temperature compensation yes thermal drift of Sr 5% rated operational voltage Ue 12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V) maximum ripple content 5% leakage current ≤ 10 µA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA minimum load resistance 3 k Ω (analogue voltage drop) sensitivity adjustment polarity reversal, overvoltage pulses digital output electrical protections Short circuit, overvoltage pulses electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	response time (digital output)	250 ms
linearity error 0,5% operating temperature -20°+70°C temperature compensation yes thermal drift of Sr 5% rated operational voltage Ue 12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V) maximum ripple content 5% leakage current ≤ 10 µA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA minimum load current (digital output) 3 k Ω (analogue voltage drop) sensitivity adjustment Teach-in button supply electrical protections short circuit, overvoltage pulses digital output electrical protections Short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ^(P) housing material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	differential travel H	0,5%
operating temperature -20° +70°C temperature compensation yes thermal drift of Sr 5% rated operational voltage Ue 12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V) maximum ripple content 5% leakage current ≤ 10 µA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA minimum load resistance 3 k Ω (analogue voltage drop) sensitivity adjustment Teach-in button supply electrical protections short circuit, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ^(p) housing material PBT active head material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	repeat accuracy	0,2%
temperature compensation yes thermal drift of Sr 5% rated operational voltage Ue 12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V) maximum ripple content 5% leakage current ≤ 10 µA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA minimum load current (digital output) 100 mA supply electrical protections 3 k Ω (analogue voltage drop) sensitivity adjustment Teach-in button supply electrical protections short circuit, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material PBT active head material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	linearity error	0,5%
thermal drift of Sr 5% rated operational voltage Ue 12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V) maximum ripple content 5% leakage current ≤ 10 µA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA minimum load resistance 3 k Ω (analogue voltage drop) sensitivity adjustment Teach-in button supply electrical protections short circuit, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material PBT active head material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	operating temperature	-20°+70°C
rated operational voltage Ue 12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V) maximum ripple content 5% leakage current ≤ 10 μA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA minimum load current (digital output) 3 k Ω (analogue voltage drop) sensitivity adjustment Teach-in button supply electrical protections short circuit, overvoltage pulses digital output electrical protections Short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	temperature compensation	yes
rated operational voltage Ue voltage analogue output (0-10 V)* maximum ripple content 5% leakage current ≤ 10 µA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA minimum load resistance 3 k Ω (analogue voltage drop) sensitivity adjustment Teach-in button supply electrical protections polarity reversal, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	thermal drift of Sr	5%
Image: current ≤ 10 μA (Vdc max) output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA minimum load resistance 3 k Ω (analogue voltage drop) sensitivity adjustment Teach-in button supply electrical protections polarity reversal, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	rated operational voltage Ue	12 - 30 Vcc; 15 - 30 Vdc: voltage supply for voltage analogue output (0-10 V)
output voltage drop Ud 2.2 V max (IL=100mA) No-Load supply current 50 mA max maximum load current (digital output) 100 mA minimum load resistance 3 k Ω (analogue voltage drop) sensitivity adjustment Teach-in button supply electrical protections polarity reversal, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	maximum ripple content	5%
No-Load supply current50 mA maxmaximum load current (digital output)100 mAminimum load resistance3 k Ω (analogue voltage drop)sensitivity adjustmentTeach-in buttonsupply electrical protectionspolarity reversal, overvoltage pulsesdigital output electrical protectionsshort circuit, overvoltage pulsesEMCConforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2electrical protections (analogue output)overvoltage pulsesprotection degreeIP67 (EN 60529) NEMA 4X ⁽²⁾ housing materialepoxy-glass resinweight90 g (plug exit) - 160 g (cable exit)	leakage current	≤ 10 µA (Vdc max)
maximum load current (digital output)100 mAminimum load resistance3 k Ω (analogue voltage drop)sensitivity adjustmentTeach-in buttonsupply electrical protectionspolarity reversal, overvoltage pulsesdigital output electrical protectionsshort circuit, overvoltage pulsesEMCConforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2electrical protections (analogue output)overvoltage pulsesprotection degreeIP67 (EN 60529) NEMA 4X ⁽²⁾ housing materialepoxy-glass resinweight90 g (plug exit) - 160 g (cable exit)	output voltage drop Ud	2.2 V max (IL=100mA)
minimum load resistance 3 k Ω (analogue voltage drop) sensitivity adjustment Teach-in button supply electrical protections polarity reversal, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	No-Load supply current	50 mA max
sensitivity adjustment Teach-in button supply electrical protections polarity reversal, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	maximum load current (digital output)	100 mA
supply electrical protections polarity reversal, overvoltage pulses digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material PBT active head material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	minimum load resistance	3 k Ω (analogue voltage drop)
digital output electrical protections short circuit, overvoltage pulses EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material PBT active head material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	sensitivity adjustment	Teach-in button
EMC Conforming to the EC Directive 2004/108/EC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material PBT active head material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	supply electrical protections	polarity reversal, overvoltage pulses
EMC requirements according to EN 60947-5-2 electrical protections (analogue output) overvoltage pulses protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material PBT active head material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	digital output electrical protections	short circuit, overvoltage pulses
protection degree IP67 (EN 60529) NEMA 4X ⁽²⁾ housing material PBT active head material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	EMC	
housing material PBT active head material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	electrical protections (analogue output)	overvoltage pulses
active head material epoxy-glass resin weight 90 g (plug exit) - 160 g (cable exit)	protection degree	IP67 (EN 60529) NEMA 4X ⁽²⁾
weight 90 g (plug exit) - 160 g (cable exit)	housing material	PBT
	active head material	epoxy-glass resin
storage temperature -35°+70°C (without freeze)	weight	90 g (plug exit) - 160 g (cable exit)
	storage temperature	-35°+70°C (without freeze)





⁽¹⁾Metallic target 200 x 200 mm

⁽²⁾ Protection granted only by plug mounted in a correct way