

DETECTION & SENSING

Technical Guide



ABOUT CROUZET

Crouzet is an independent company manufacturing mechatronic components for demanding applications in Aerospace & Transportation, Energy, Building and Machinery Industry.

Crouzet provides **Switches and Sensors, Electromechanical Actuators, Electrical Protection Equipment, Cockpit Controls, Automation Controllers and Relays, and Instrumentation Services.**

Since 1921, Crouzet has a heritage of close collaboration with customers in the development of products, from standard components to fully customized solutions.

Crouzet's customers and partners can rely on our teams worldwide to always meet and often exceed their expectations. Driven by innovation, our experts are focused on designing and delivering the right product for the right application.

Crouzet is your trusted partner of choice to face industrial challenges of today and tomorrow.

WORLDWIDE PRESENCE



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A RANGE OF PRODUCTS ADAPTED TO THE DEMANDS OF THE MARKET OF DETECTION AROUND TH E WORLD

In order to best serve a large diversity of applications, Crouzet offers a wide range of standard products.

From the 1-pole simple plunger switch to the 3-pole adjustable-roller plunger switch, also Crouzet offers a complete range of high-performance products which optimise volume and weight whilst functioning over a wide current range from 1 mA to 7 A.

Our extensive range is also aimed at cost reduction and rationalized stock control, and enables you to have one supplier who can ensure quality and reliability at the best price.

The aim of this document is to enable the reader to familiarise themselves with our range and to choose the product most suited to their requirements. Nevertheless, please do not hesitate to contact our representatives who are always available for advice and can supply you with additional information.

PARTNERSHIP

In response to specifie customer requirements for limit switches, proximity switches and/or proximity sensors in severe environments, Crouzet offers an active partnership based on 40 years of experience.

This involves interpretation of such requirements, advice, involvement in specification development, research, prototypes, manufacture and performance testing of products.

Furthermore, Crouzet actively participates in the competitiveness of its customers' programmes. Expertise in high-performance logistics and production methods, associated with a total quality approach, minimises the global costs of product procurement and operation.

This gives increased delivery reliability, reduction in production cycles and therefore stock, product acceptance by the customer without checks etc.

Through its subsidiaries and agents, and in

particular in Europe, U.S.A. and Asia, Crouzet offers its customers efficient commercial assistance and after-sales support.

IN ALL CASES, CROUZET WILL FIND A WAY!

With Crouzet's expertise in mechanical position detectors, Crouzet offers a range of standards product, but has the ability and capacity to develop specific components, entirely adapted to the application into its environment. Today, Crouzet is a market leader in this technology for customised products.

QUALITY OF SERVICE THROUGHOUT THE PROGRAM

We remain at your side throughout the life of the program.

- › We have the in-house expertise to insure manufacturing engineering goes smoothly
- › We use up-to-date logistic tools such as IDE, to provide quality service
- › Our quality is of the highest level, ISO 9001, ISO 14001, EN / AS / JISQ / 9100 P3
- › Our production organisation is EASA part 21 approved
- › Our after-market services, EASA part 145 approved, include a specific customer support department, distributors all around the world, and an AOG service
- › NATO code: FA0X2

COMMERCIAL AIRCRAFT

| | |
|------------------|-----------------------------------|
| AIRBUS | A318 / A319 |
| | A320 / A321 |
| | A330 |
| | A340 |
| | A350XWB |
| | A380 |
| ANTONOV | AN148 / 158 / 178 |
| ATR | 42 / 72 |
| AVIC | ARJ21 |
| BOEING | 717 |
| | 737 MAX |
| | 747-8 |
| | 777 X |
| | 787 |
| BOMBARDIER | GLOBAL EXPRESS / GLOBAL 5000/6000 |
| | G 7000 / 8000 |
| | CRJ 700 |
| | CHALLENGER 300/350 |
| | CHALLENGER 601 |
| | LEARJET 60 |
| CASA | LEARJET 45 |
| | C212 |
| CESSNA | SOVEREIGN |
| DASSAULT | FALCON 900/900 EX/2000 / 2000 EX |
| | FALCON 5X / 7X / 8X |
| DORNIER | DO 228/328 |
| | DO 728 |
| DIAMOND AIRCRAFT | D-JET |
| ECLIPSE | ECLIPSE 500 |
| EMBRAER | ERJ 135/145 |
| | LEGACY 450/500 |
| GULFSTREAM | G 150 |
| | G 280 |
| | G 450 |
| | G 600 |
| | G 650 |
| HAWKER | HORIZON |
| IRKUT | MC-21 |
| PILATUS | PC-7 / PC-9 |
| | PC-12 / PC-24 |
| SUKHOI | SUPERJET 100 |

HELICOPTERS

| | |
|--------------------|--------------------------------|
| LEONARDO | A109P |
| | A129 |
| | AW139 |
| | AW149 / 169 / 189 |
| AIRBUS HELICOPTERS | CARACAL H225M |
| | COUGAR AS532 |
| | DAUPHIN H155 / H160 / N3E |
| | ECUREUIL AS 350 /AS 355 / H130 |
| | FENNEC AS550 / AS555 |
| | NH 90 |
| | PANTHER AS565 |
| HAL | SUPER PUMA AS 332 / AS 225 |
| | TIGER |
| | H120 / 135 / 145 / 175 |
| | ALH/LCH |
| KAI | KHP |

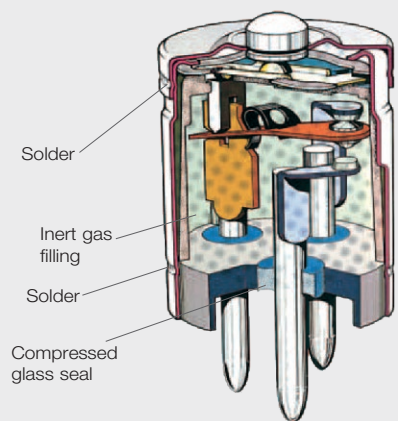
MILITARY AIRCRAFT

| | |
|-------------|--------------------|
| AIRBUS | A400M |
| CASA | CN235 |
| DASSAULT | RAFALE / MIRAGE |
| EUROFIGHTER | EFA (TYPHOON) |
| HAL | LCA |
| | IJT 36 |
| KAI | T50 (Golden Eagle) |
| PANAVIA | TORNADO |
| RAYTHEON | JPATS |

HERMETICALLY SEALED MICROSWITCH

TYPES 83 151 (-55 °C TO 150 °C)

BASIC CELL



This is the basic component for our whole range of standard 1-pole and 2-poles hermetically-sealed limit switches plus the 3-poles version (special Limit Switches).

The Crouzet hermetic microswitch combines a snap-action switching system with high resistance to shock and vibration in an hermetically sealed miniature case which encloses an atmosphere of inert gas around its contacts, ideal for switching very low level circuits and higher currents also.

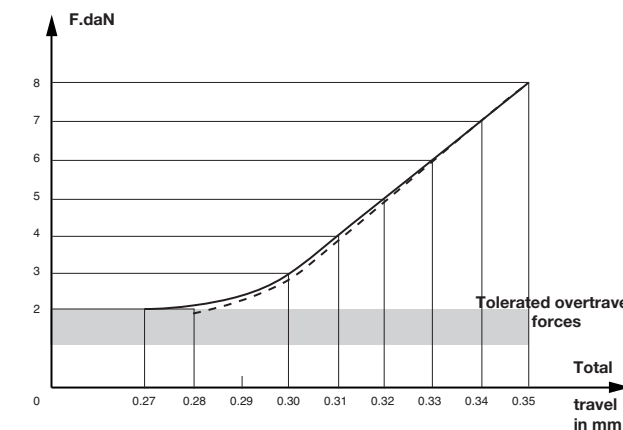
The meticulous care taken in the manufacture of this hermetically sealed cell in terms of assembly processes, cleanliness of components as well as inspection procedures, result in a product which is ideal for operation in severe environments where a high level of reliability is essential.

The Crouzet hermetically sealed cell is particularly well suited to sectors such as Aerospace, Armaments, Marine, Nuclear, etc.

ESSENTIAL CHARACTERISTICS

- › Switching power from 1 mA to 7 A.
- › Operating temperature: -55 °C to +150 °C (Type 83 151 2: -55 °C to +250 °C).
- › Vibration resistant up to 80 G.
- › Shock resistant up to 200 G.
- › High level of hermetic sealing: Leakage < 1×10^{-8} Pa.cm³/s
- › Long life: 200 000 cycles.
- › Small size: $\varnothing 11 \times 16$.
- › Numerous single pole and multipoles operating and fixing options.

DISTINCTIVE CHARACTERISTICS



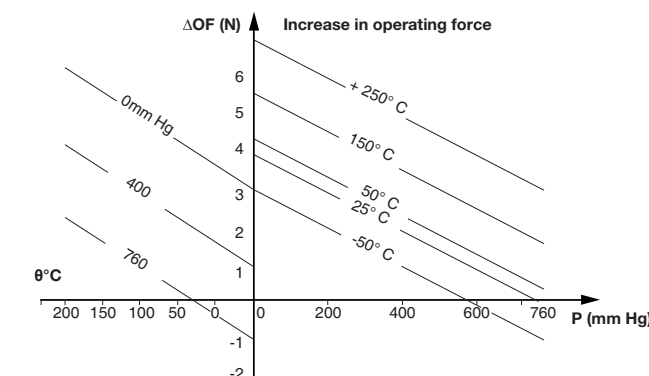
Mechanical strength

There is no sudden increase in the total travel of the detector when overtravel forces rising to as much as 80 N are applied. If, after doing this, the overtravel force is altered back to its normal level of 20 N with the same detector, only a very slight change will be apparent in the total travel (low remanence).

The detector will suffer damage if the overtravel force is raised to as much as 150 N.

Hermetic sealing

- › The microswitch is filled with inert gas (nitrogen-hydrogen mixture), the internal pressure being 1 bar.
 - › The hermetic sealing (membrane-cap - cap-base) is achieved with a continuous seam welding bead.
- Performance in qualification helium test condition. Qualification value: 1×10^{-8} atm cm³/s.



Change in operating force as a function of temperature and ambient pressure.

The force levels required to operate our hermetically sealed microswitches are affected by ambient pressure and temperature.

Here we give a graph showing how the operating force increases (ΔOF) as a function of these two parameters.

The characteristics are given for standard temperature (23 °C) and atmospheric pressure at sea level (760 mm Hg).

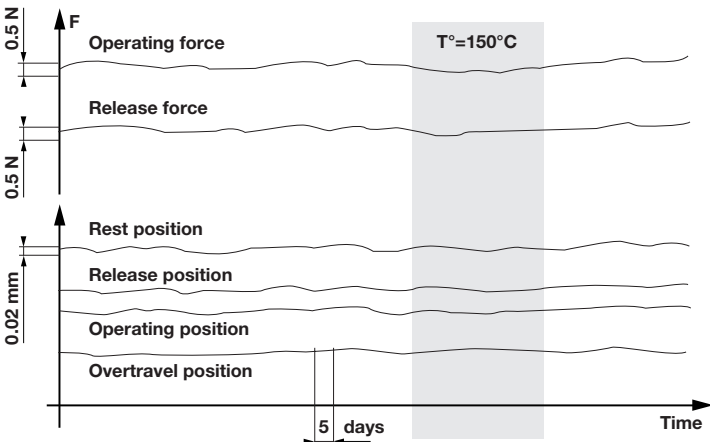
Our hermetically sealed microswitches can be used at pressures ranging from atmospheric to absolute vacuum and there are variants for use at higher pressures.

HERMETICALLY SEALED MICROSWITCH

TYPES 83 151 (-55 °C TO 150 °C)

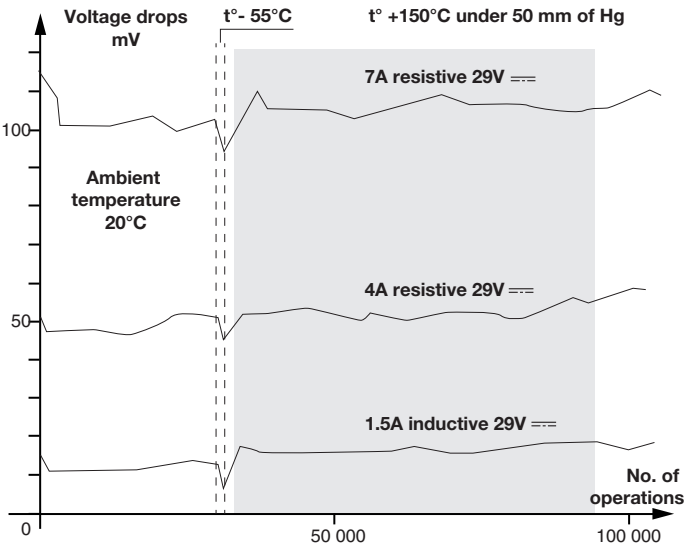
Reliability of characteristics

Below are two test extracts showing the stability of the essential characteristics over time and as a function of temperature.



Travels and forces

Change in the characteristics concerned under a constant load of 25 Newtons applied to the operating device.



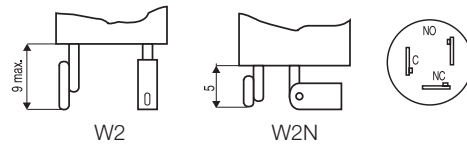
Voltage drops

Change in this characteristic in accordance with Air 8459 method - for 1.5-4 and 7 Amp load.

CONNECTIONS

Electrical connections are made through the base, by three ferronickel terminals, with copper core, sealed by compressed glass.

Soldered

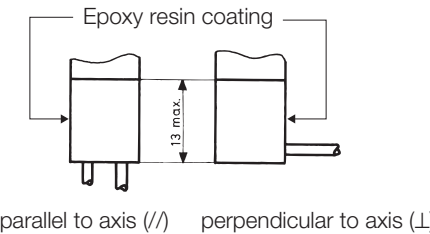


Electrical diagram (actuator at rest position)

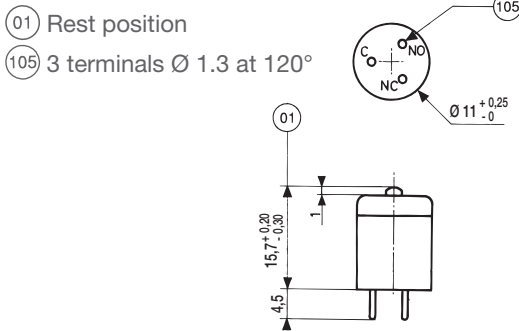


Wires: 0.38 mm² Air 4524 - length 0.50 m.
Category 140 °C 170 °C.

Wired



Dimensions (mm)



PERFORMANCE DATA

| Product characteristics | | Value | Unit | Under |
|--|-------------------------|---------------|--------|------------------------|
| Min. Current | | 1 | mA | 5 V DC |
| Nominal Current | | | | |
| | Resistive | 3 | A | 48 V DC ⁽¹⁾ |
| | Lamp | 1 | A | 115 V - 400 Hz |
| | Lamp | 2 | A | 30 V DC ⁽¹⁾ |
| | Resistive | 3 | A | 30 V DC ⁽¹⁾ |
| | Inductive L/R = 0.005 s | 1.5 | A | 30 V DC ⁽¹⁾ |
| | Resistive | 1 | A | 220 V AC |
| | Inductive - cos φ 0.8 | 0.4 | A | 220 V AC |
| | | 200 000 | Cycles | |
| Dielectric rigidity between connections and ground | | 1 200 | V | |
| Rigidity between connections | | 1 000 | V | |
| Insulation resistance (at 500 V DC) | | 100 | MΩ | |
| Voltage drop at 1 A ⁽²⁾ | | 0.02 | V | |
| Operating temperature | | -55 to +150 | °C | |
| Shock resistance ⁽³⁾ | | 200/11 | G/ms | |
| Vibration resistance | | 80/20 → 2 000 | G/Hz | |

(1) for a service life of 100 000 cycles - Permitted current 4 A inductive 7 A resistive for normally open or normally closed contacts.
(2) Over soldered connections - for wired connections add 0.1 V per meter.
(3) Value for microswitch without auxiliary actuator

HERMETICALLY SEALED MICROSWITCHES WITH ACCESSORIES

BASIC CELL (-55 °C TO +150 °C) TYPE 83 151 001

| Criteria | Connections | with lateral flange | with 90° flange | Threaded barrel fixing |
|--|--------------------------|---------------------|-----------------|------------------------|
| Pole(s) | | 1 | 1 | 1 |
| Soldered connections | W2 | 83 151 012 | 83 151 014 | 83 151 013 |
| | W2N | 83 151 042 | 83 151 044 | 83 151 043 |
| Wire 0.38 mm ² - 0.5 m long | with parallel wires | 83 151 022 | 83 151 024 | 83 151 023 |
| | with perpendicular wires | 83 151 032 | 83 151 034 | 83 151 033 |

| Characteristics | Unit | | | |
|----------------------------|------------------|---------|---------|---------|
| Max. Operating force | N | 10 | 10 | 10 |
| Min. Release force | N | 1.5 | 1.5 | 1.5 |
| Permitted Overtravel force | N | 20 | 20 | 20 |
| Positive Overtravel stop | | | | |
| Service life | Operations - min | 200 000 | 200 000 | 200 000 |
| Max. Pre-travel | mm | 0.25 | 0.25 | 0.25 |
| Max. Differential travel | mm | 0.05 | 0.05 | 0.05 |
| Min. Overtravel | mm | 0.08 | 0.08 | 0.08 |
| Weight (without wires) | g | 5 | 5 | 13 |

Dimensions (mm)

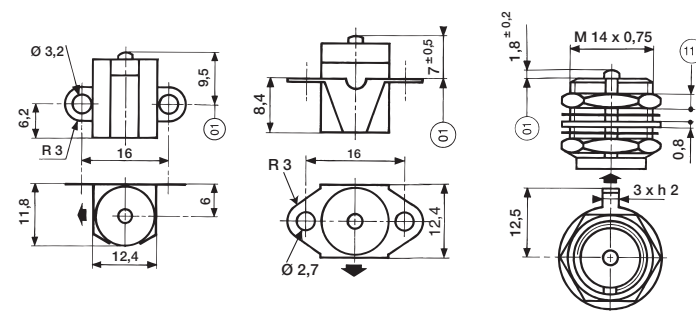
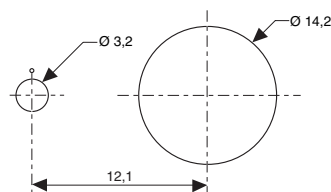
Add the dimensions of the various connections to find the total dimensions

► indicates the wire direction

① Tripping point

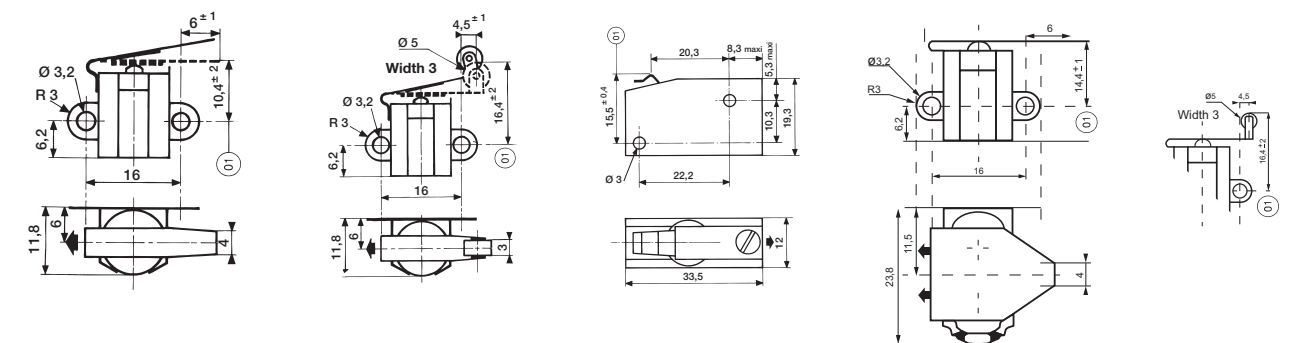
(111) Nut h 2.5 x 17 / flat

Panel cut-out



| with lateral flange + lever | with lateral flange + roller lever | Housing + lever | with lateral flange + lever | with lateral flange + roller lever |
|-----------------------------|------------------------------------|-----------------|-----------------------------|------------------------------------|
| 1 | 1 | 1 | 2 | 2 |
| 83 560 011 | 83 560 012 | 83 560 014 | 83 560 311 | 83 560 312 |
| 83 560 041 | 83 560 042 | 83 560 049 | 83 560 341 | 83 560 342 |
| 83 560 021 | 83 560 022 | 83 560 030 | 83 560 321 | 83 560 322 |
| 83 560 031 | 83 560 032 | 83 560 039 | 83 560 331 | 83 560 332 |

| 5 | 5 | 2.5 → 8 | 15 | 15 |
|-----------|-----------|------------|-----------|-----------|
| 0.5 | 0.5 | 1.5 | 1.5 | 1.5 |
| | | 50 | | |
| | | • | | |
| 100 000 | 100 000 | 100 000 | 100 000 | 100 000 |
| 6 | 6 | 0.3 → 0.75 | 6 | 6 |
| 0.8 | 0.8 | 0.3 | 1.5 | 1.5 |
| 0.4 → 0.8 | 0.4 → 0.8 | 0.3 | 0.4 → 0.8 | 0.4 → 0.8 |
| 6 | 7 | 21 | 12 | 13 |



HERMETICALLY SEALED MICROSWITCHES

HIGH PRESSURE FROM 2 TO 6 BAR

WITH BASIC CELL (-55 °C TO +150 °C)

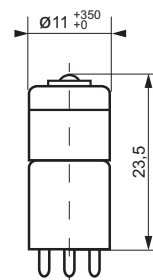
These variants of the basic type 83 151 feature a compensating system which allow them to be used at pressures above atmospheric.

For other characteristics please refer to basic model type 83 151 0

| Characteristics | | | |
|-----------------------------------|-----|-----|-----|
| Permitted pressure | Bar | 2 | 6 |
| Max. Operating force * | N | 25 | 47 |
| Max. permitted Overtravel force * | N | 45 | 80 |
| Min. Release force * | N | 11 | 22 |
| Weight (without leads) | g | 8,5 | 8,5 |

* Figures at atmospheric pressure at ground level

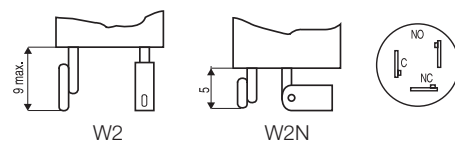
Dimensions (mm)



Connections

W2 Ref. 83 151 504

W2N Ref. 83 151 503



NOTES

HERMETICALLY SEALED MICROSWITCHES

TYPES 83 151 (250 °C)

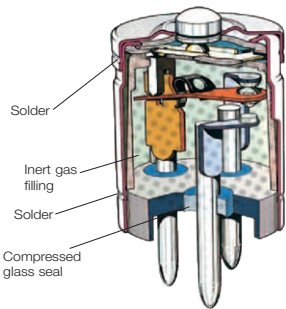
WITHOUT ACCESSORIES (BASIC CELL -55°C TO +250 °C) TYPE 83 151 201

This basic component is the same design as the 83 151 001 standard cell but is adapted for operation in high temperatures up to 250 °C.

| Characteristics | Unit | Value |
|-------------------------------------|-----------------|----------------|
| Nominal current at 30 VDC | | |
| Resistive | A | 1 |
| Inductive L/R = 5 ms | A | 1 |
| Service life at nominal current | Min. operations | 20 000/100 000 |
| Voltage drop at 1 A ⁽¹⁾ | V | 0.06 |
| Max. Operating force ⁽²⁾ | N | 14 |
| Min. Release force | N | 1.5 |
| Max. permitted Overtravel force | N | 20 |
| Max. Pre-travel | mm | 0.25 |
| Max. Differential travel | mm | 0.05 |
| Min. Overtravel | mm | 0.08 |
| Weight (without wires) | g | 13 |

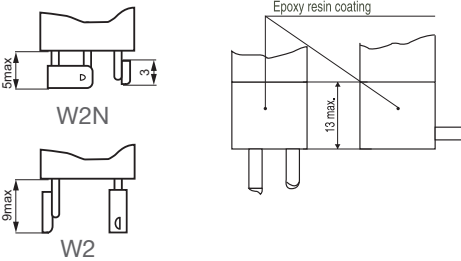
(1) On soldered connections. for wired connections add 0.18 V per meter. Category 250°, 280°.

(2) Characteristics at: θ = 250°C atmospheric pressure at ground level.

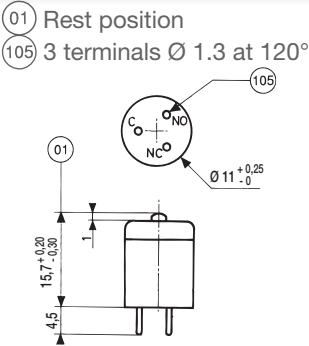


Connections

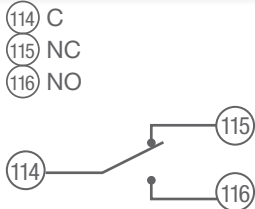
with wires: 500 mm of length or soldered terminals



Dimensions (mm)



Electrical diagram

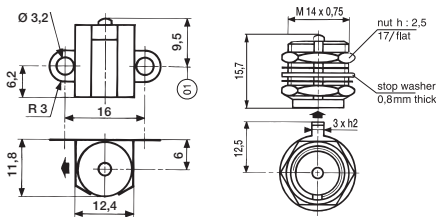


WITH ACCESSORIES (BASIC CELL -55 °C TO +250 °C) TYPE 83 151 201

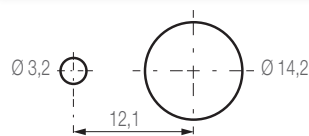
Control accessories equipped with type 83 151 201 sensitive changeover

| Criteria | 1 | 1 |
|------------------------|------------|------------|
| Pole(s) | 1 | 1 |
| W2 terminals output | 83 151 212 | 83 151 213 |
| // wires output | 83 151 222 | 83 151 223 |
| ⊥ wires output | 83 151 232 | 83 151 233 |
| W2N terminals output | 83 151 242 | 83 151 243 |
| Weight (without wires) | 6 g | 13 g |

Add the dimensions of the various connections for the total dimensions. The mechanical characteristics are those of the 83 151 201 changeover. ➡ indicates the direction of the wires.



Panel cut-out



LIMIT SWITCHES - BASED ON HERMETICALLY SEALED MICROSWITCHES (250 °C)

BASIC CELL (-55°C TO +250 °C) TYPE 83 151 201

| Criteria | |
|----------------------|------------|
| Pole(s) | 1 |
| W2 terminals output | 83 770 211 |
| // wires output | 83 770 221 |
| ⊥ wires output | 83 770 231 |
| W2N terminals output | 83 770 241 |

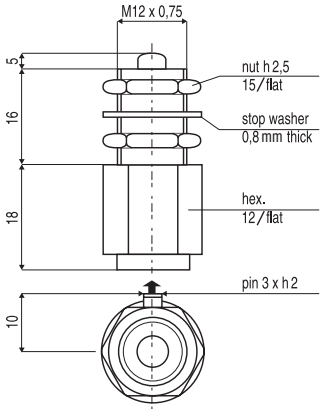
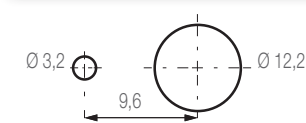
Dimensions (mm)

Add the dimensions of the various connections to find the total dimensions

- Mechanical characteristics:
- Max. operating force 22 N
 - Min. release force 1.5 N
 - Max. permitted overtravel force 50 N positive overtravel stop
 - Pre-travel 0.1 to 0.3 mm
 - Max. differential travel 0.05 mm
 - Min. overtravel 3 mm
 - Weight (without wires) 20 g

➡ indicates the direction of the wires

Panel cut-out



LIMIT SWITCHES - BASED ON HERMETICALLY SEALED MICROSWITCHES (150 °C)

MECHANICAL CAPACITY

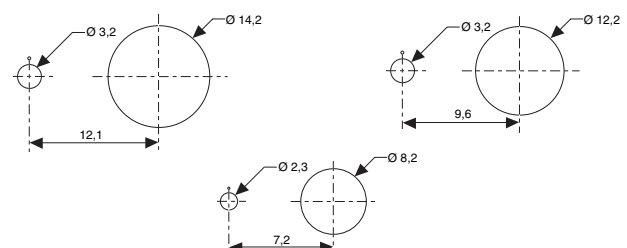
We have adapted the telescopic sub-assemblies for our hermetically sealed microswitch according to pressure and operating temperature requirements. Our products can therefore be used at atmospheric pressure or in an absolute vacuum and at a temperature of -50 °C to +150 °C.

BASIC CELL (-55 °C TO +150 °C) TYPE 83 151 001

| Criteria | Connections | Short travel |
|---------------------------|--------------------------|--------------|
| Pole(s) | | 1 |
| Soldered connections | W2 | 83 770 012 |
| | W2N | 83 770 042 |
| Wire 0.38 mm² 0.50 m long | with parallel wires | 83 770 022 |
| | with perpendicular wires | 83 770 032 |

| Characteristics | Unit | |
|----------------------------|------------------|----------------|
| Max. Operating force | N | 12 |
| Min. Release force | N | 1.5 |
| Permitted Overtravel force | N | 20 |
| Positive Overtravel stop | | |
| Max. Pre-travel | mm | 0.3 |
| Max. Differential travel | mm | 0.05 |
| Min. Overtravel | mm | 1 |
| Shock resistance | G/ms | 100/11 |
| Vibration resistance | G/Hz | 50/800 → 2 000 |
| Weight (without wires) | g | 21 |
| Service life | Operations - min | 100 000 |

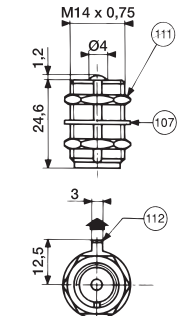
Panel cut-out



Dimensions (mm)

Add the dimensions of the various connections for the total dimensions
➤ indicates the direction of the wires

- 30 Ball bearing Ø 3
- 106 Nut h 2 - 11/flat
- 107 Stop washer - 0.8 thick
- 111 Nut h 2.5 - 17/flat
- 112 Locating pin - h.2
- 120 Nut h 2.5 - 15/flat



Connections

Soldered



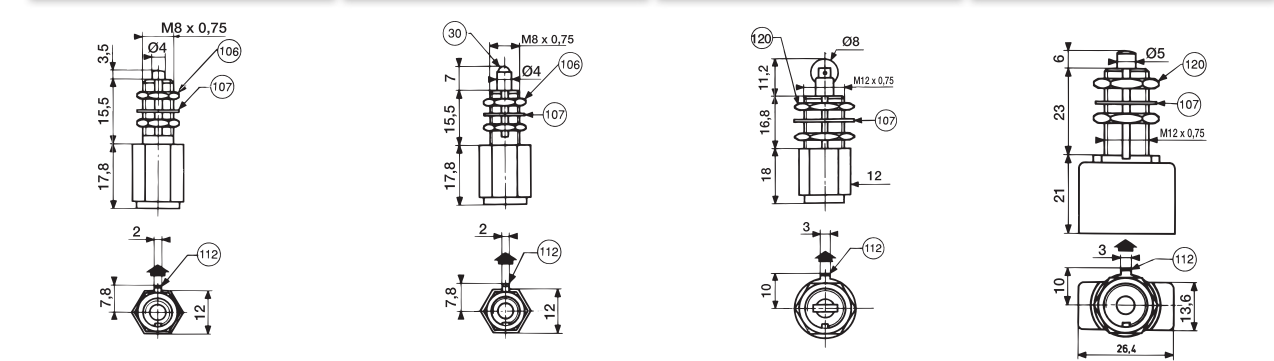
Wired



Wires: 0.38 mm²
Length: 0.50 m
Category 140 °C 170 °C

| Plunger | Ball plunger | Roller Plunger | Plunger |
|------------|--------------|----------------|------------|
| 1 | 1 | 1 | 2 |
| 83 770 011 | 83 770 014 | 83 770 015 | 83 771 011 |
| 83 770 041 | 83 770 044 | 83 770 045 | 83 771 041 |
| 83 770 021 | 83 770 024 | 83 770 025 | 83 771 021 |
| 83 770 031 | 83 770 034 | 83 770 035 | 83 771 031 |

| 12 | 12 | 12 | 30 |
|----------------|----------------|----------------|----------------|
| 1.5 | 1.5 | 1.5 | 3 |
| 50 | 50 | 50 | 80 |
| • | • | • | • |
| 0.3 | 0.3 | 0.3 | 0.5 |
| 0.05 | 0.05 | 0.05 | 0.15 |
| 3 | 3 | 3 | 5 |
| 100/11 | 100/11 | 100/11 | 100/11 |
| 50/800 → 2 000 | 50/800 → 2 000 | 50/800 → 2 000 | 50/800 → 2 000 |
| 15 | 15.5 | 20 | 47.5 |
| 100 000 | 100 000 | 100 000 | 100 000 |



Electrical diagram (actuator at rest)



BASIC SENSITIVE MICROSWITCH

TYPE 83 141 002 (-55 °C TO +150 °C)

WITHOUT ACCESSORIES

This microswitch is notable for its excellent performance in a very compact space (13 x 10 x 5 mm). It is the basic element of our range of standard 1-pole, 2-pole, 3-pole waterproof Limit Switches, and special 4-pole Limit Switches.

The meticulous care taken in the manufacture of this microswitch in terms of assembly processes, cleanliness of components as well as inspection procedures, results in a product which is ideal for operation in severe environments where a high level of reliability is essential. It is particularly well suited to the Aerospace, Armaments, Marine sectors, etc.

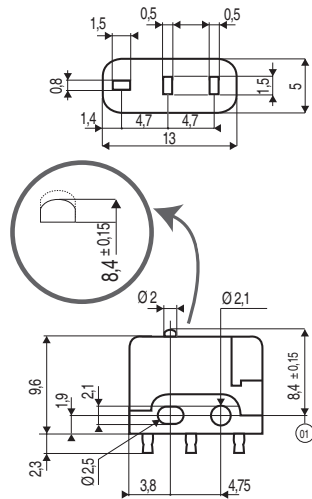
This microswitch, used in our 83 777 and 83 778 series limit switches, combines a reliable snap-action switching system with high resistance to shocks and vibrations, ideal for switching both very low level and high currents.

| Characteristics | Under | Unit | Value |
|----------------------------------|---------|-------------------|-------------|
| Nominal current | 10 VDC | A | 0.01 |
| Resistive | 30 VDC | A | 4 |
| | 220 VAC | A | 1 |
| Inductive L/R = 0.005 s | 30 VDC | A | 2 |
| | 220 VAC | A | 0.5 |
| Service life at nominal current* | | operations - min. | 100 000 |
| Operating temperature | | °C | -55 to +150 |
| Max. Operating force | | N | 2 |
| Min. Release force | | N | 0.4 |
| Max. Pre-travel | | mm | 0.5 |
| Max. Differential travel | | mm | 0.08 |
| Min. Overtravel | | mm | 0.1 |
| Weight | | g | 1 |

* Value for microswitch without auxiliary actuator

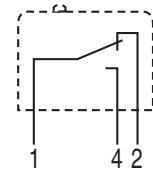
Dimensions (mm)

01 Tripping point



Electrical diagram

Plunger in released position



Connections

Solder tags

WATERPROOF LIMIT SWITCHES

TYPE 83 777 BASED ON SENSITIVE MICROSWITCH

This range of limit switches satisfies applications which require lightweight miniature devices without sacrificing mechanical and electrical performance.

They are particularly well suited to severe environments such as: Aerospace, Armaments, Marine, etc.

The plungers for this range of limit switches are equipped with an ice-scraper seal.

BASIC SENSITIVE MICROSWITCH 83 141 002

Simple plunger

| Characteristics | | | |
|--|---------|-------------------|---------------|
| Nominal current | 10 VDC | A | 0.01 |
| | 30 VDC | A | 4 |
| | 220 VAC | A | 1 |
| | 30 VDC | A | 2 |
| Resistive | 220 VAC | A | 0.5 |
| | 30 VDC | A | 0.5 |
| Inductive L/R = 0.005 s | 220 VAC | A | 0.5 |
| | 30 VDC | A | 0.5 |
| Service life at nominal current | | operations - min. | 50 000 |
| Dielectric strength between connections and ground | | V | 1 500 |
| Dielectric strength between connections | | V | 1 000 |
| Insulation resistance (at 500 VDC) | | MΩ | 100 |
| Voltage drop at 1 A * | | V | 0.06 |
| Operating temperature | | °C | -55 to +125 |
| Shock resistance | | G/ms | 50/11 |
| Vibration resistance | | G/Hz | 10/20 → 2 000 |

* for flying leads, add 0.1 V / meter.

| Connections | Electrical diagram |
|---|--|
| Wires: 0.38 mm ² - 0.50 m long - Output parallel to device axis, - Output perpendicular to device axis | Plunger in released position - 1 pole |
| Connector: type HE 301 - NFC 93422 - MIL.C 26482.G series 1 - VG 95328 | - 2 pole |
| | - 3 pole |

Seal

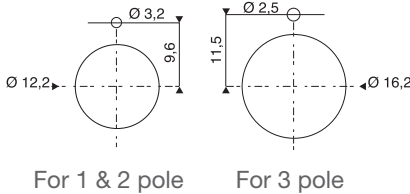
We guarantee that our products are sealed to level IP 66.

| Criteria | |
|------------------|------------------|
| Connection wires | parallel |
| | perpendicular |
| Connector | HE 301 1H 10 6P |
| | HE 301 1H 12 10P |

| Characteristics | |
|--------------------------|----|
| Max. Operating force | N |
| Min. Release force | N |
| Max. Total travel force | N |
| Max. Pre-travel | mm |
| Max. Differential travel | mm |
| Min. Overtravel | mm |
| Weight (with wires) | g |

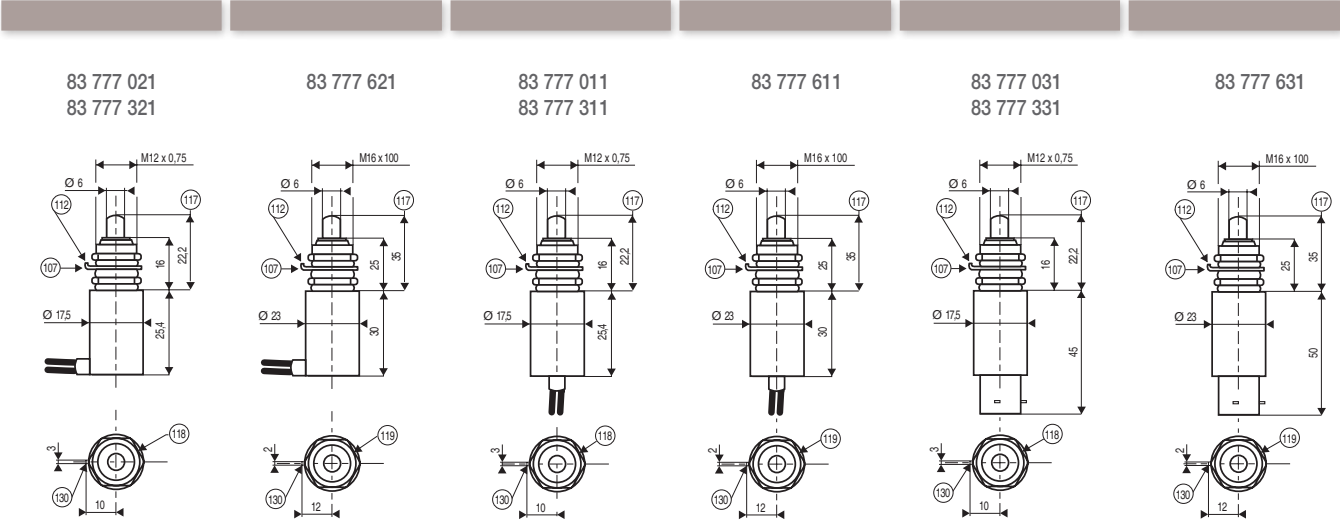
| Dimensions (mm) |
|--------------------------------|
| (107) Stop washer width 0.8 |
| (112) Locating pin |
| (117) Free position |
| (118) Nuts h. 2.5 - 15 on flat |
| (119) Nuts h. 3 - 21 on flat |
| (130) Pin h.2 |

Panel cut-out



| 1 pole | 2 pole | 3 pole | 1 pole | 2 pole | 3 pole | 1 pole | 2 pole | 3 pole |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 83 777 021 | 83 777 321 | 83 777 621 | 83 777 011 | 83 777 311 | 83 777 611 | 83 777 031 | 83 777 331 | 83 777 631 |
| • | • | • | • | • | • | • | • | • |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| 10 | 10 | 18 | 10 | 10 | 18 | 10 | 10 | 18 |
| 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| 0.2 | 0.5 | 0.5 | 0.2 | 0.5 | 0.5 | 0.2 | 0.5 | 0.5 |
| 3.2 | 3.2 | 5.5 | 3.2 | 3.2 | 5.5 | 3.2 | 3.2 | 5.5 |
| 30 | 41 | 80 | 30 | 41 | 80 | 34 | 34 | 73 |



WATERPROOF LIMIT SWITCHES

TYPE 83 778 BASED ON SENSITIVE MICROSWITCH

This range of limit switches satisfies applications which require lightweight miniature devices without sacrificing mechanical and electrical performance.

They are particularly well suited to severe environments such as: Aerospace, Armaments, Marine, etc.

The plungers for this range of limit switches are equipped with orientable roller.

BASIC SENSITIVE MICROSWITCH 83 141 002

Plunger with orientable roller in 45° steps

| Characteristics | | | |
|--|---------|-------------------|---------------|
| Nominal current | 10 VDC | A | 0.01 |
| | 30 VDC | A | 4 |
| | 220 VAC | A | 1 |
| | 30 VDC | A | 2 |
| Inductive L/R = 0.005 s | 220 VAC | A | 0.5 |
| Service life at nominal current | | operations - min. | 50 000 |
| Dielectric strength between connections and ground | | V | 1 500 |
| Dielectric strength between connections | | V | 1 000 |
| Insulation resistance (at 500 VDC) | | MΩ | 100 |
| Voltage drop at 1 A* | | V | 0.06 |
| Operating temperature | | °C | -55 to +125 |
| Shock resistance | | G/ms | 50/11 |
| Vibration resistance | | G/Hz | 10/20 → 2 000 |

* for flying leads, add 0.1 V/ meter.

| Connections | Electrical diagram |
|---|--|
| Wires: 0.38 mm ² - 0.50 m long - Output parallel to device axis, - Output perpendicular to device axis | Plunger in released position - 1 pole |
| Connector: HE 301 type - NFC 93422 - MIL.C 26482. G series 1 - VG 95328 | - 2 pole |
| | - 3 pole |

Seal

We guarantee that our products are sealed to level IP 66.

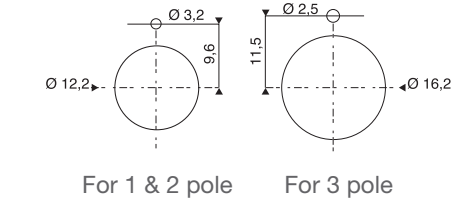
| Criteria | |
|------------------|------------------|
| Connection wires | parallel |
| | perpendicular |
| Connector | HE 301 1H 10 6P |
| | HE 301 1H 12 10P |

| Characteristics | |
|--------------------------|----|
| Max. Operating force | N |
| Min. Release force | N |
| Max. Total travel force | N |
| Max. Pre-travel | mm |
| Max. Differential travel | mm |
| Min. Overtravel | mm |
| Weight (with wires) | g |

Dimensions (mm)

- 107 Stop washer 0.8 thick
- 112 Locating pin
- 117 Free position
- 120 Nuts h. 2.5 and 6 - 15 on flat
- 121 Nuts h. 3 and 6 - 21 on flat
- 122 Roller Ø 9.6 - Width. 3
- 123 Roller Ø 12.7 - Width. 3
- 130 Pin h. 2

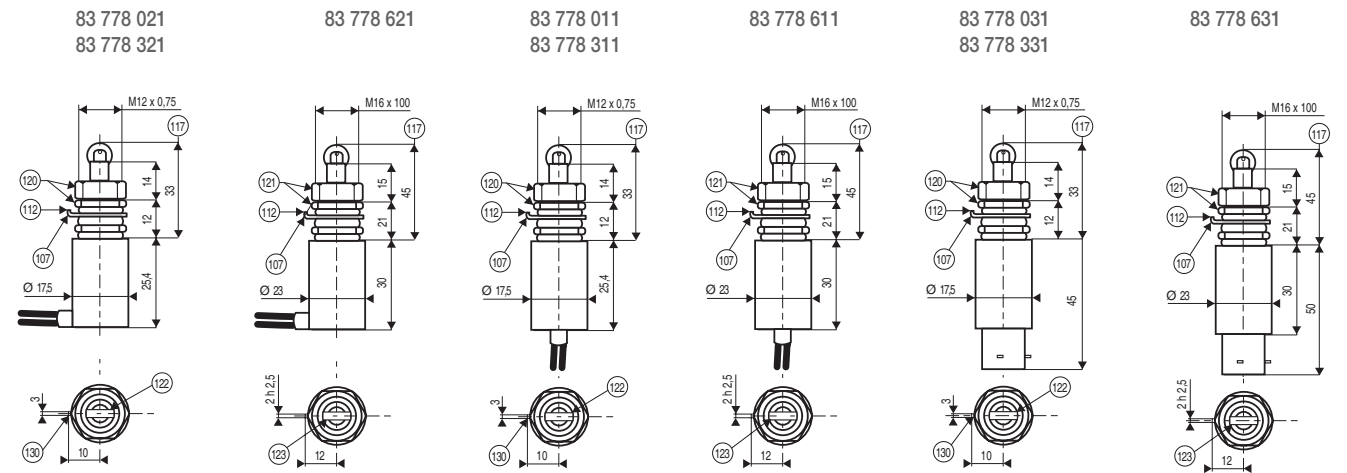
Panel cut-out



| 1 pole | 2 pole | 3 pole | 1 pole | 2 pole | 3 pole | 1 pole | 2 pole | 3 pole |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 83 778 021 | 83 778 321 | 83 778 621 | 83 778 011 | 83 778 311 | 83 778 611 | 83 778 031 | 83 778 331 | 83 778 631 |
| • | • | • | • | • | • | • | • | • |

| | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| 10 | 10 | 18 | 10 | 10 | 18 | 10 | 10 | 18 |
| 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| 0.2 | 0.5 | 0.5 | 0.2 | 0.5 | 0.5 | 0.2 | 0.5 | 0.5 |
| 3.2 | 3.2 | 5.5 | 3.2 | 3.2 | 5.5 | 3.2 | 3.2 | 5.5 |
| 37 | 46 | 87 | 37 | 46 | 87 | 40 | 40 | 80 |

Dimensions (mm)



MECHANICAL POSITION DETECTORS



Limit switch

IN ALL CASES, CROUZET WILL FIND A WAY!

with Crouzet's expertise in mechanical position detectors, Crouzet offers a range of standard product, but has the ability and capacity to develop specific components, entirely adapted to the application into its environment.

Today, Crouzet is a market leader in this technology for customised products.

CROUZET PROVIDES UPON REQUEST:

- › Hermetic cells
- › Special housings
- › Cable or connector output
- › Multi-pole functions
- › Multi-actuation systems
- › High speed actuation
- › High temperature devices



Limit switches

3 FLIGHT CONTROL

- › Trimable Horizontal Stabilizer Actuator
- › Spoilers
- › Flap & slat

2 THRUST REVERSER

- › Stowed or deployed status

1 DOORS AND ACTUATORS

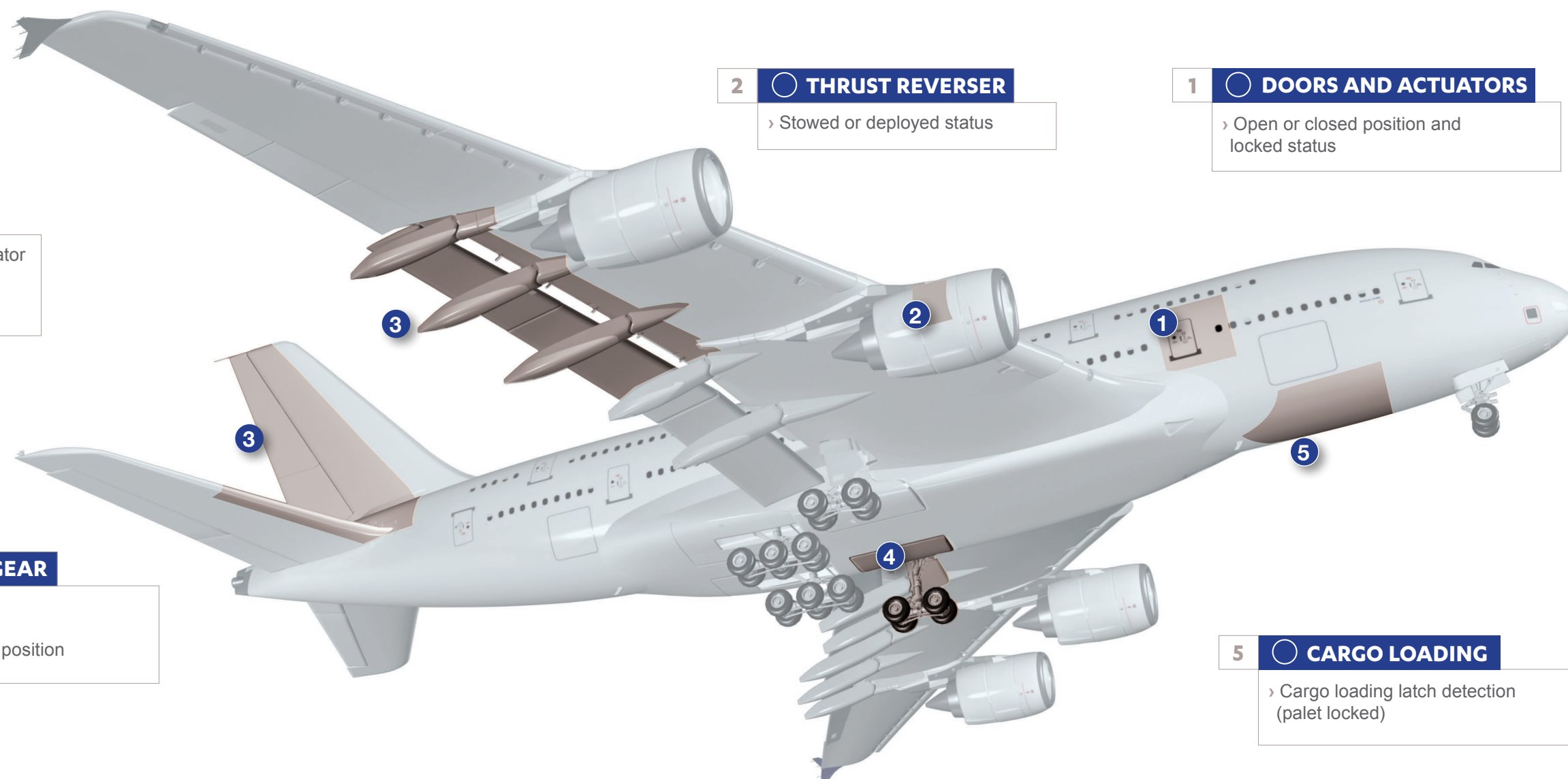
- › Open or closed position and locked status

4 LANDING GEAR

- › Weight on wheels
- › Up position
- › Down and locked position

5 CARGO LOADING

- › Cargo loading latch detection (palet locked)



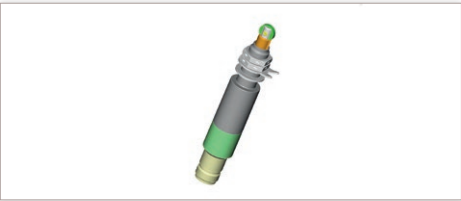
LIMIT SWITCH

FOR THRUST REVERSER DOOR TERTIARY LOCK FUNCTION

Specifications

Part numbers **DDP770375**

| Summary of environmental conditions | | |
|--|----------------|--|
| Condition | RTCA / DO-160E | Requirement |
| Operating low temperature | Section 4 | Category F3 (-40 °F / -40 °C) |
| Operating high temperature | Section 4 | Category F3 (+225 °F / +108 °C) |
| Short-time operating temperature | Section 4 | Category F3 (+225 °F / +108 °C) |
| Ground survival low temperature | Section 4 | Category F3 (-67 °F / -55 °C) |
| Ground survival high temperature | Section 4 | Category F3 (+250 °F / +121 °C) |
| Temperature variation | Section 5 | Category A |
| Thermal shock | - | 2 hours @ -67 °F (-55 °C), Operation: 5 cycles within 1 min |
| Altitude | Section 4 | Category F3 (-2 000 to +55 000 feet) |
| Humidity, Waterproofness and Icing | - | CET Method I or II test |
| Operational shock | Section 7 | Category A |
| Crash shock | Section 7 | Category A |
| Vibration | Section 8 | Category R, Curve W |
| Explosion | Section 9 | Environment I, Category A |
| Fluid susceptibility | Section 11 | Category F |
| Sand and Dust | Section 12 | Category D |
| Fungus resistance | Section 13 | Category F |
| Salt fog | Section 14 | Category T |
| Magnetic effects | Section 15 | Category Z |
| Power input | Section 16 | Category A |
| Voltage spike | Section 17 | Category A |
| Audio frequency conducted susceptibility | Section 18 | Category Z |
| Induced signal susceptibility | Section 19 | Category Z |
| Radio frequency susceptibility | Section 20 | Category W |
| Emission of radio frequency energy | Section 21 | Category H |
| Lightning-induced transient susceptibility | Section 22 | Category A4 / C4 |
| ESD susceptibility | Section 25 | Category A |
| Flammability | Section 26 | Category A |

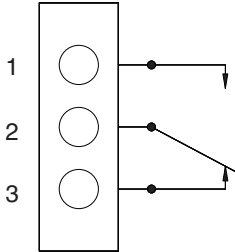


| Electrical characteristics | |
|--|--|
| Minimum Operational voltage | 12 VDC |
| Maximum Operational voltage | 32 VDC |
| Close circuit current | 2 to 500 mA |
| Min. Open circuit resistance (Dry) | 100 000 Ω |
| Max. Closed circuit resistance | 10 Ω |
| Bonding resistance: (connector to switch body) | 2.5 mΩ new, 10 mΩ field service |
| Contacts | Gold, hermetically sealed |
| Insulation resistance | 100 MΩ min at 68 °F (20 °C) at 500 V DC for 60 sec. |
| Dielectrical withstanding | 1 060 V rms/50-60 Hz / 60 s (II < 1 mA) |

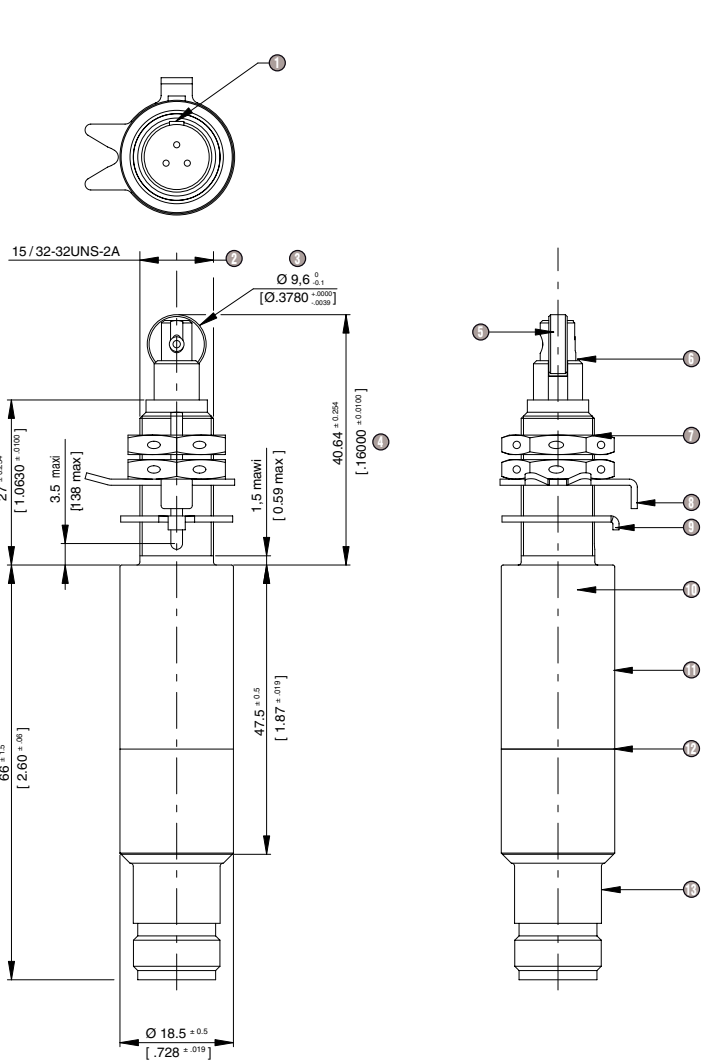
| Mechanical characteristics | |
|----------------------------|-------------------------|
| Plunger impact speed | 19 in/s (0,5 m/s) Max. |
| Impact angle | 6° Max. |
| Actuator speed | 150 in/s (4 m/s) Max. |
| Shock | < 100 G 11 ms |
| Weight | 0.3 lb (130 g) Max. |
| Mechanical lifetime | 120 000 Cycles TBC |
| Differential travel | 0.010 in (0.254mm) Max. |
| Over travel | 0.118 in (3 mm) Min. |
| Operating force | 6-12 lb (27-54 N) |
| Full over travel force | 20 lb (90 N) Max. |
| Release force | 3.4 lbs (15 N) Min. |

Principles

Electrical shematic (switch in free position)



Dimensions (mm)



- 1 Master keyway location to bushing keyway
- 2 15 / 32-32UNS-2A
- 3 Roller material: CuNi14Al2
- 4 Switching point
- 5 Roller orientation location to keyway slot: 90°±5°
- 6 Plunger stainless steel
- 7 (2x) steel nut MS21340-04
- 8 Lockwasher MS9582-14
- 9 Tabwasher MS25081-C4 or equivalent
- 10 Laser marking
- 11 Housing stainless steel AISI 303 (2 welding parts)
- 12 Watertight welding cordon
- 13 Connector per 8000 YE10803 PN-M108 stainless steel

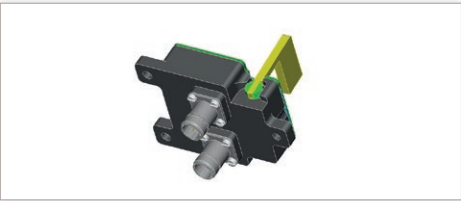
LIMIT SWITCH

FOR THRUST REVERSER DOOR STOW FUNCTION

Specifications

Part numbers **DDP990202**

| Summary of environmental conditions | | |
|--|--------------|--------------------------------------|
| Condition | RTCA/DO-160E | Requirement |
| Operating low temperature | Section 4 | Category F3 (-40 °F/-40 °C) |
| Operating high temperature | Section 4 | Category F3 (+225 °F/+108 °C) |
| Short-time operating temperature | Section 4 | Category F3 (+225 °F/+108 °C) |
| Ground survival low temperature | Section 4 | Category F3 (-67 °F/-55 °C) |
| Ground survival high temperature | Section 4 | Category F3 (+250 °F/+121 °C) |
| Altitude | Section 4 | Category F3 (-2 000 to +55 000 feet) |
| Temperature variation | Section 5 | Category A |
| Humidity | Section 6 | Category C |
| Operational shock | Section 7 | Category B |
| Crash shock | Section 7 | Category B |
| Vibration | Section 8 | Category R, Curve W |
| Explosion | Section 9 | Environment I Category A |
| Waterproofness | Section 10 | Category S |
| Fluid susceptibility | Section 11 | Category F |
| Sand and Dust | Section 12 | Category D |
| Fungus resistance | Section 13 | Category F |
| Salt spray | Section 14 | Category T |
| Magnetic effects | Section 15 | Category Z |
| Power input | Section 16 | Category A |
| Voltage spike | Section 17 | Category A |
| Audio frequency conducted susceptibility | Section 18 | Category Z |
| Induced signal susceptibility | Section 19 | Category Z |
| Radio frequency susceptibility | Section 20 | Category W |
| Emission of radio frequency energy | Section 21 | Category H |
| Lightning induced transient susceptibility | Section 22 | Category A4/C4 |
| Icing | Section 24 | Category A |
| ESD susceptibility | Section 25 | Category A |

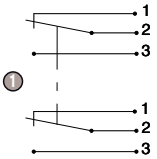


| Electrical characteristics | |
|---|---|
| Minimum operational voltage | 12 VDC |
| Nominal operational voltage | 28 VDC |
| Maximum operational voltage | 32 VDC |
| Close circuit current | 2 mA to 10 mA |
| Min. Open circuit resistance (dry) | 50 KΩ |
| Max. Closed circuit resistance | 30 Ω |
| Bonding resistance (connector housing to switch body) | 2.5 mΩ new 10 mΩ field service |
| Contacts | Gold, hermetically sealed |
| Insulation resistance | 100 MΩ min at 68 °F (20 °C) at 500 V DC for 60 sec. |
| Dielectrical withstanding | 1 060 V rms/50-60 Hz/60 s (II < 1 mA) |
| Sealing | Watertight: MIL PRF 8805 S3 |

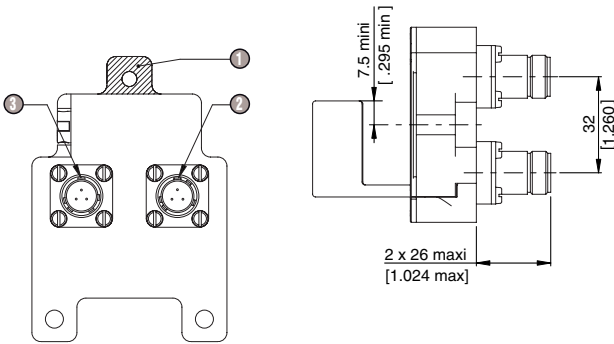
| Mechanical characteristics | |
|----------------------------|-------------------------|
| Weight | 0.670 lb (0.304 kg) max |
| Mechanical lifetime | 60 000 Cycles |
| Release force | 4.5 lb (21 N) max |
| Operating force | 6-12 lb (27-54 N) |
| Full over travel force | 20 lb (90 N) max |

Principles

Circuit diagram (switch show in free position)

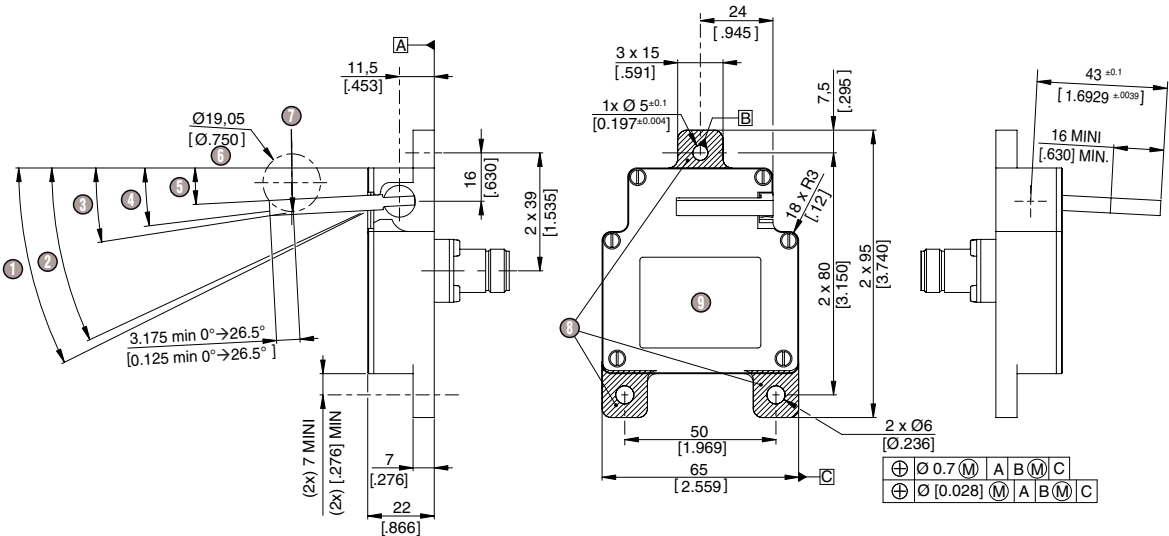


① Gold contacts



- ① Bonding surface optional
- ② Connectors EN2997-Y00803M6 Master key orientation ±10°
- ③ Connectors EN2997-Y00803MN Master key orientation ±10°

Dimensions (mm)



- ① 26.5° Min. Over travel
- ② 25° Max. Overstow position
- ③ 9° Max. Min. Stow position
- ④ 6.5^{+0.1}_{-0.1} s Switch point
- ⑤ 3.5^{+0.5}_{-0.5} / +1° Rest position
- ⑥ Roller
- ⑦ Force
- ⑧ Bonding surface (3x)
- ⑨ Electrochemically or Laser marking area

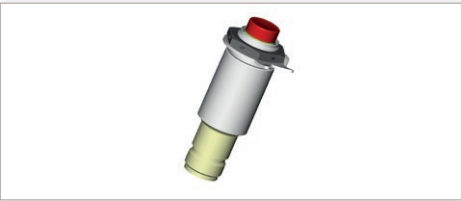
LIMIT SWITCH

FOR THRUST REVERSER MAINTENANCE TEST ENABLE FUNCTION

Specifications

Part numbers **DDP770384**

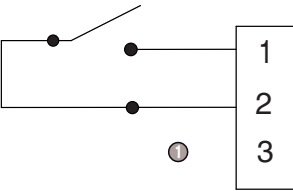
| Summary of environmental conditions | | |
|--|--------------|---|
| Condition | RTCA/DO-160E | Requirement |
| Operating low temperature | Section 4 | Category F3 (-40 °F / +40 °C) |
| Operating high temperature | Section 4 | Category F3 (+225 °F / +108 °C) |
| Short-time operating high temperature | Section 4 | Category F3 (+225 °F / +108 °C) |
| Ground survival low temperature | Section 4 | Category F3 (-67 °F / -55 °C) |
| Ground survival high temperature | Section 4 | Category F3 (+250 °F / +121 °C) |
| Altitude | Section 4 | Category F3 (-2 000 to +55 000 feet) |
| Temperature variation | Section 5 | Category A |
| Operational shock | Section 7 | Category B |
| Crash shock | Section 7 | Category B |
| Vibration | Section 8 | Category R, Curve W |
| Explosion proofness | Section 9 | Environment I Category A |
| Fluid susceptibility | Section 11 | Category F |
| Sand and Fog | Section 12 | Category D |
| Fungus resistance | Section 13 | Category F |
| Salt spray | Section 14 | Category T |
| Magnetic effects | Section 15 | Category Z |
| Power input | Section 16 | Category A |
| Voltage spike | Section 17 | Category A |
| Audio frequency conducted susceptibility | Section 18 | Category Z |
| Induced signal susceptibility | Section 19 | Category Z |
| Radio frequency susceptibility | Section 20 | Category W |
| Emission of radio frequency energy | Section 21 | Category H |
| Lightning-induced transient susceptibility | Section 22 | Category A4 / C4 |
| ESD susceptibility | Section 25 | Category A |
| Flammability | Section 26 | Category A |
| Thermal shock | / | Stab. 2h at -67 °F, 5 cycles within 1 min |
| Combined environment test | / | Method II |



| Electrical characteristics | |
|---|---|
| Min. Operational voltage | 12 VDC |
| Max. Operational voltage | 32 VDC |
| Close circuit current | 4 mA to 10 mA |
| Min. Open circuit resistance (Dry) | 50 kΩ |
| Max. Closed circuit resistance | 30 Ω |
| Bonding resistance (connector housing to switch body) | 2.5 mΩ new, 10 mΩ field service |
| Contacts | Gold, hermetically sealed |
| Insulation resistance | 100 MΩ min at 68 °F (20 °C) at 500 V DC for 60 sec. |
| Dielectrical withstanding | 1 060 V rms/ 60 Hz/ 60 s (II < 1 mA) |

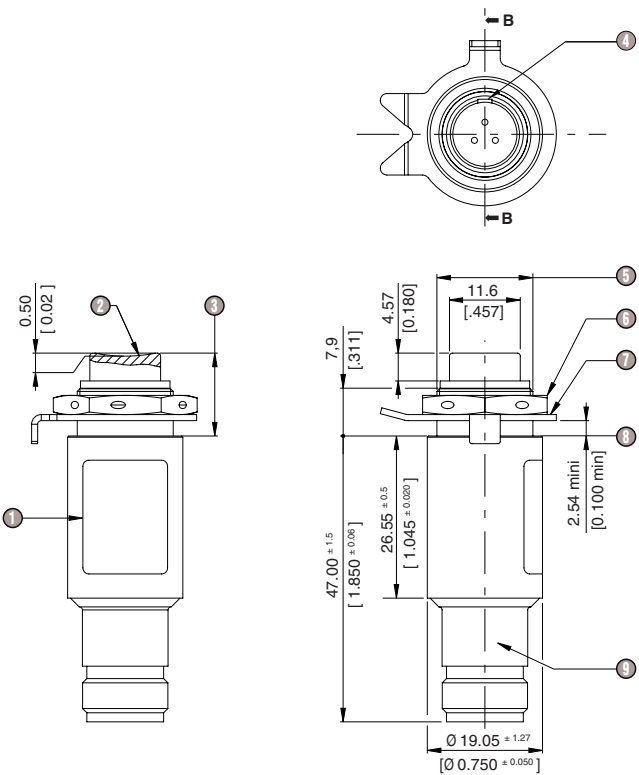
| Mechanical characteristics | |
|----------------------------|--|
| Impact speed | 19 in/s (0.5 m/s) max Operating: 4 in/s (0.1 m/s) |
| Weight | 0.221 lb (0.100 kg) max |
| Mechanical lifetime | 20 000 Cycles |
| Pre-travel | 0.05 in (1.27 mm) max |
| Differential travel | 0.010 in (0.25 mm) max |
| Over travel | 0.06 in (1.52 mm) min |
| Operating force | 3.15 lb (14 N) max |
| Release force | 0.68 lb (3 N) min |
| Full over travel force | 6.07 lb (27 N) max |

Principles



① Gold contacts

Dimensions (mm)



- ① Electrochemically or Laser marking
- ② SR 25.4 [1.00]
- ③ Rest position 13.70 [0.54]
- ④ Master keyway on connector ±10°
- ⑤ 0.625-24 UNEF-2A
- ⑥ Nut or equivalent: MS21340-05
- ⑦ Lockwasher or equivalent: MS9582-16
- ⑧ Bonding surface
- ⑨ Connector EN2997Y10803MN or equivalent

LIMIT SWITCH

FOR THRUST REVERSER ACTUATOR FUNCTION

Specifications

Part numbers **DDP771009**

| Summary of environmental conditions | | |
|--|----------------|--------------------------------------|
| Condition | RTCA / DO-160E | Requirement |
| Operating low temperature | Section 4 | Category F3 (-40 °F / -40 °C) |
| Operating high temperature | Section 4 | Category F3 (+225 °F / +108 °C) |
| Short-time operating temperature | Section 4 | Category F3 (+225 °F / +108 °C) |
| Ground survival low temperature | Section 4 | Category F3 (-67 °F / -55 °C) |
| Ground survival high temperature | Section 4 | Category F3 (+250 °F / +121 °C) |
| Altitude | Section 4 | Category F3 (-2 000 to +55 000 feet) |
| Temperature variation | Section 5 | Category A |
| Humidity | Section 6 | Category C |
| Operational shock | Section 7 | Category A |
| Crash shock | Section 7 | Category A |
| Vibration | Section 8 | Category R, Curve W |
| Explosion | Section 9 | As required by design |
| Waterproofness | Section 10 | Category S |
| Fluid susceptibility | Section 11 | Category F |
| Sand and Dust | Section 12 | Category D |
| Fungus resistance | Section 13 | Category F |
| Salt spray | Section 14 | Category T |
| Magnetic effects | Section 15 | Category Z |
| Power input | Section 16 | Category A |
| Voltage spike | Section 17 | Category A |
| Audio frequency conducted susceptibility | Section 18 | Category Z |
| Induced signal susceptibility | Section 19 | Category Z |
| Radio frequency susceptibility | Section 20 | Category W |
| Emission of radio frequency energy | Section 21 | Category H |
| Lightning-induced transient susceptibility | Section 22 | Category A4 / C4 |
| Icing | Section 24 | Category A |
| ESD susceptibility | Section 25 | Category A |
| Flammability | Section 26 | Category A |

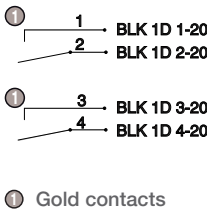


| Electrical characteristics | |
|------------------------------------|--|
| Min. Operational voltage | 14 VDC |
| Nominal operating voltage | 28 VDC |
| Max. Operational voltage | 32 VDC |
| Closed circuit current | 2 mA to 500 mA |
| Min. Open circuit resistance (Dry) | 500 000 Ω |
| Max. Closed circuit resistance | 10 Ω |
| Contacts | Gold, hermetically sealed |
| Insulation resistance | 100 MΩ Min. at 68 °F (20 °C) at 500 V DC for 60 sec. |
| Dielectrical withstanding | 1 060 V rms/60 Hz/60 s (II < 1 mA) |

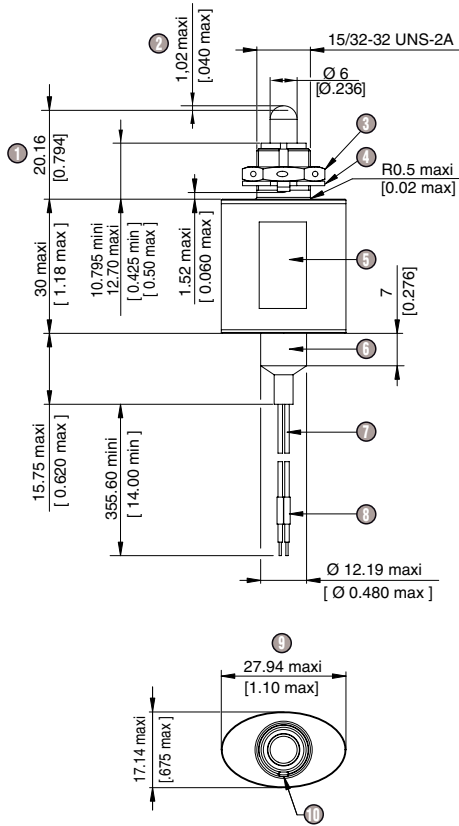
| Mechanical characteristics | |
|----------------------------|--------------------------|
| Impact speed | 1 in/s (25.4 mm/s) Max. |
| Shock | < 100 G 11 ms |
| Weight | 0.260 Lb (0.118 Kg) Max. |
| Mechanical lifetime | 20 000 Cycles |
| Differential travel | 0.020 in (0.5 mm) Max. |
| Over travel | 0.157 in (4 mm) Min. |
| Operating force | 6-14 Lb (27-62.5 N) |
| Full over travel force | 30 Lb (133 N) Max. |
| Release force | 3.4 Lb (15 N) Min. |

Principles

Circuit diagram (switch show in free position)



Dimensions (mm)



- ① Switch point
- ② Pre-travel
- ③ Hex nuts MS21340-04 or equivalent
- ④ Keying washer: MS25081-C4 or equivalent
- ⑤ Laser or electrochemically etch
- ⑥ Heat shrinkable boot per MIS-34867
- ⑦ Wire 24 AWG per NEMA HP3
- ⑧ Sleeves marks
- ⑨ View without nut and washer
- ⑩ Keyway: [.078 ±.003] wide, [.040 ±.002] deep

LIMIT SWITCH

FOR TRIMMABLE HORIZONTAL STABILIZER
ACTUATOR (THSA) FUNCTION



Specifications

Part numbers

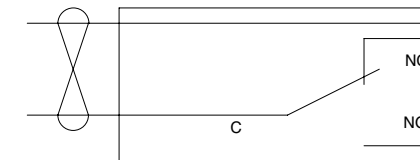
DDP770345

| Environment characteristics | |
|---|---------------------------|
| Operating temperature | -55 °C to +90 °C |
| Number of cycles head on | 200 |
| Max. Pre-travel | 0.5 mm |
| Max. Movement differential | 0.06 mm |
| Min. Overtravel | 3 mm |
| Operating force on all the range of temperature | 10 to 30 N |
| Min. Release force | 6 N |
| Max. Total travel force | 72 N |
| Speed of attack | 0.7 m/s Max. |
| Max. Coupling torque | 5 N.m |
| Traction on wires | 15 N Max. |
| Weight | 90 g Max. |
| Storage limit time | 10 Years See: NF L 17-103 |

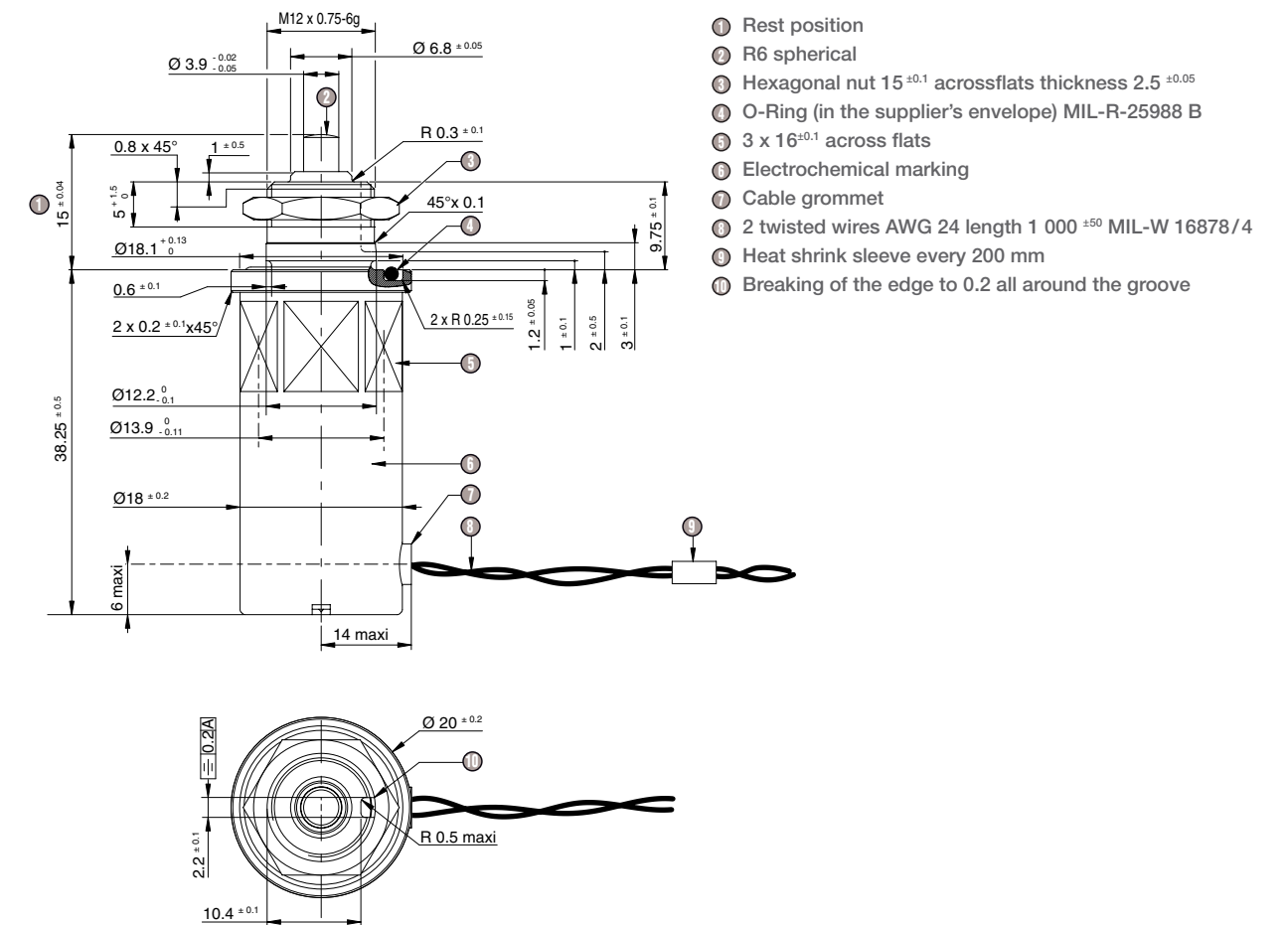
| CROUZET.COM

Principles

Electrical scheme released in free position



Dimensions (mm)



LIMIT SWITCH

FOR SLAT FUNCTION

Specifications

Part numbers **DDP770348**

Mechanical characteristics

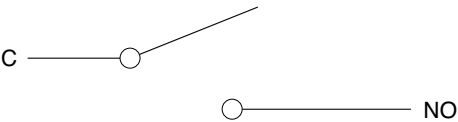
The characteristics are given for standard temperature (23°C) and atmospheric pressure at the sea level (760 mm Hg)

| | |
|---|----------------|
| Operating temperature | -55°C to +70°C |
| Exceptionnal operation during 5 minutes | +85°C |
| Storage temperature | -55°C to +85°C |
| Number of cycles head on | 100 000 |
| Max. Pre-travel | 1 mm |
| Max. Movement differential | 0.5 mm |
| Min. Overtravel | 3 mm |
| Operating force | 25 to 55 N |
| Max. total travel force | 90 N |
| Weight | 79 g Max. |

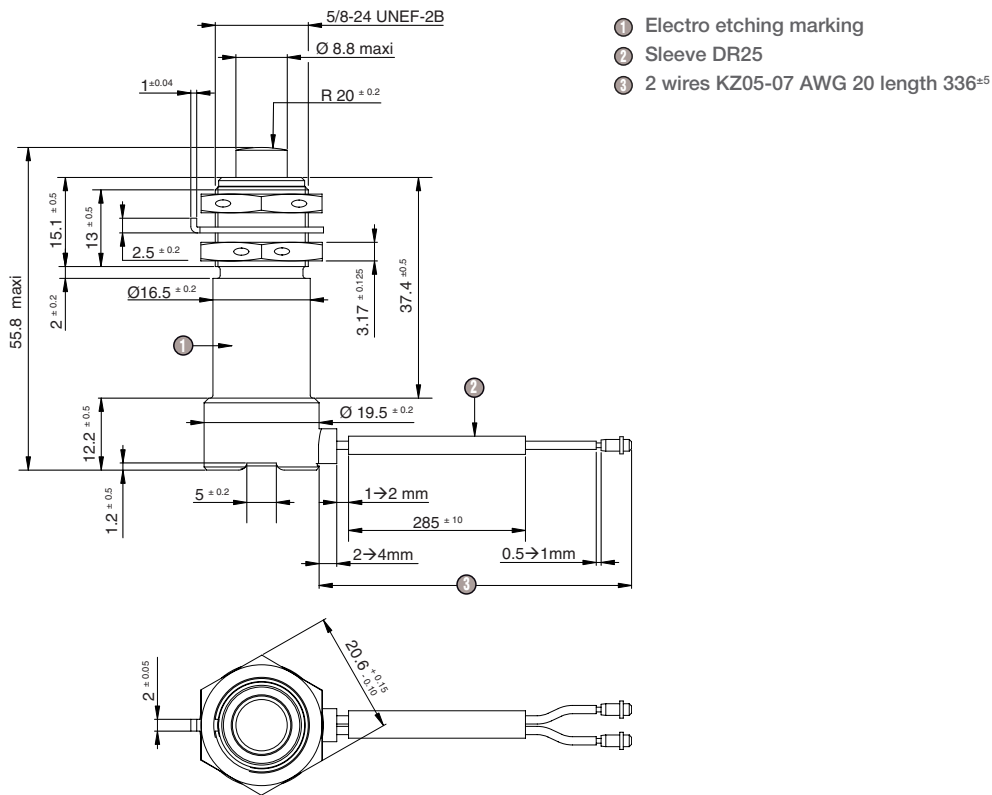


Principles

Circuit diagram rest position



Dimensions (mm)



LIMIT SWITCH

FOR THRUST REVERSER DOOR DEPLOY FUNCTION

Specifications

Part numbers **DDP771067**

| Environment characteristics | | |
|---|--------------|-----------------------|
| Conditions | RTCA/DO-160D | Requirements |
| Equipment intended for installation in powerpoint | Section 4.3 | Category D3 |
| Operating low temperature | Section 4 | Category D3 -40 °C |
| Operating high temperature | Section 4 | Category D3 +135 °C |
| Short time operating high temp. | Section 4 | Category D3 +135 °C |
| Ground survival low temperature | Section 4 | Category D3 -62 °C |
| Ground survival high temperature | Section 4 | Category D3 +85 °C |
| Altitude | Section 4 | Category D3 45000 ft |
| Temperature variation | Section 5 | Category A |
| Humidity | Section 6 | Category B |
| Operating shock | Section 7 | Category B |
| Crash shock | Section 7 | Category B |
| Vibrations | Section 8 | Category H2 |
| Explosion | Section 9 | Category E2 |
| Waterproofness | Section 10 | Category R |
| Fluid susceptibility | Section 11 | Category F Spray test |
| Sand and Dust | Section 12 | Category D |
| Fungus resistance | Section 13 | Category F |
| Salt spray | Section 14 | Category S |
| Lightning induced transient susceptibility | Section 22 | Category A4XX |
| Icing | Section 24 | Category B |

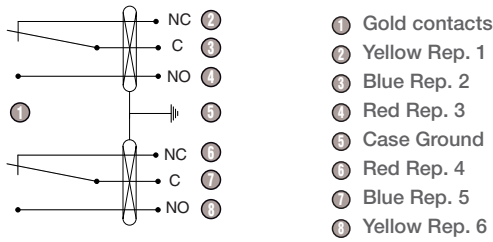


| Electrical characteristics | |
|--|--|
| Normal Operating voltage | 28 VDC |
| Max. Operating voltage | 32 VDC |
| Normal Operating current | 10 mA < I < 50 mA |
| Max. Operating current | 100 mA |
| Contact resistance | 125 mΩ Max. |
| Dielectric withstanding at atmospheric pressure | 1 000 VRMS - 1 mA |
| Electrical bonding | 2.5 mΩ between the bush and the beginning of the shield under the sleeve |
| Insulation resistance | 100 MΩ at 500 VDC |
| Electrical Lifetime | 100 000 Cycles |
| Contact bounce: (Checked during shocks and vibrations tests) | <5 ms |

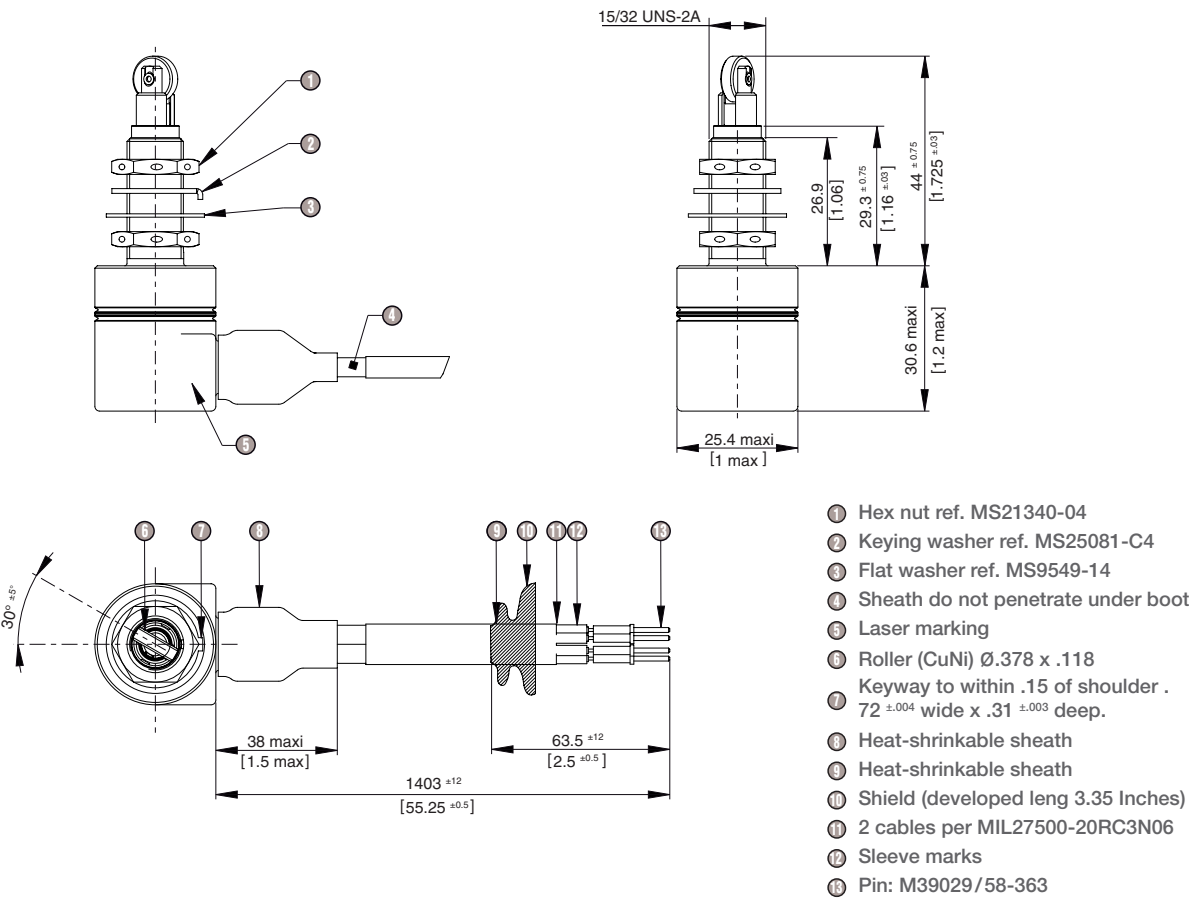
| Mechanical characteristics | |
|---|------------------------|
| The characteristics are given for standard temperature (23 °C) and atmospheric pressure at the sea level (760 mm Hg). Braided shield grounded to body of switch for 360°. | |
| Operating force | to be less than 12 lbs |
| Pretravel | 0.04 inch Max. |
| Differential travel | 0.02 inch Max. |
| Overtravel | 0.125 inch Min. |
| Mechanical lifetime | 100 000 Cycles |
| Weight | 300 g Max. |
| Operating attack speeds | 0.5 m/s Max. |
| Outstanded Max. attack speeds permitted | 0.7 m/s |
| Product sealing | Watertight |
| Cell sealing | Hermetic |

Principles

Circuit diagram (switch show in free position)



Dimensions (mm)



LIMIT SWITCH

FOR THRUST REVERSER ACTUATOR FUNCTION

Specifications

| | | |
|--|--|-----------|
| Part numbers | | DDP770350 |
| Environment characteristics | | |
| Temperature | RTCA DO-160C (SECT.4 CAT.D3) | |
| Temperature variation | MIL-STD-810E | |
| Altitude | RTCA DO-160C (SECT.4 CAT.D3) | |
| Humidity | RTCA DO-160C (SECT.6 CAT.B) | |
| Operational shock | RTCA DO-160C SECT.7 | |
| Crash safety | RTCA DO-160C SECT.7 | |
| Vibration | RTCA DO-160C SECT.8 CURVE W | |
| Explosion proofness | RTCA DO-160C SECT.9 CAT.E Environment II | |
| Waterproofness | RTCA DO-160C SECT.10 CAT.R | |
| Fluid susceptibility | RTCA DO-160C SECT.11 CAT.F SPRAY TEST | |
| Sand & Dust | RTCA DO-160C SECT.12 CAT.D | |
| Fungus resistance | RTCA DO-160C SECT.13 CAT.F | |
| Salt spray | RTCA DO-160C SECT.14 CAT.S | |
| Lightning induced transient susceptibility | RTCA DO-160D SECT.22 CAT. A4xx | |
| Icing | RTCA DO-160C SECT.24 CAT. B | |

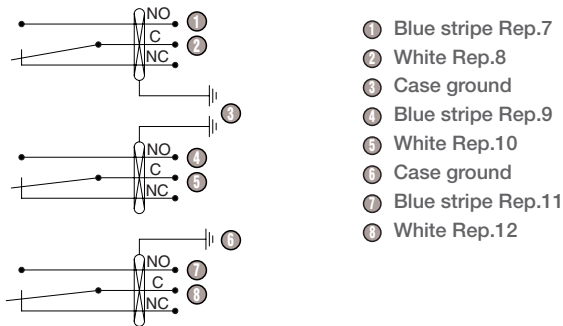


| | |
|---|---|
| Electrical characteristics | |
| Normal Operating voltage | 28 VDC |
| Max. Operating voltage | 32 VDC |
| Normal Operating current | 10 mA < I < 50 mA |
| Max. Operating current | 100 mA |
| Contact resistance | ≤ 260 mΩ |
| Dielectric strength at atmospheric pressure | 1 000 VRMS - 1 mA |
| Electrical bonding | 25 mΩ between the body and the beginning of the shield under the sleeve |
| Insulation resistance | 100 MΩ 500 VDC |
| Electrical Lifetime: (according to C.CT.DEF.00060.GB) | 100 000 Cycles |
| Contact bounce: (Checked during shocks and vibrations test) | < 5 ms |

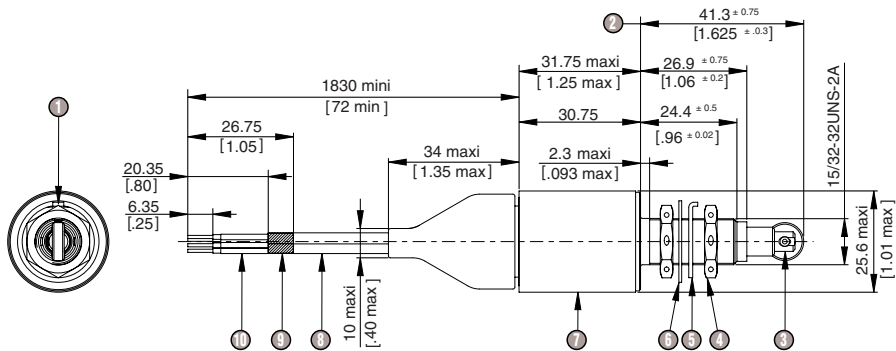
| | |
|---|-------------------|
| Mechanical characteristics | |
| The characteristics are given for standard temperature (23 °C) and atmospheric pressure at the sea level (760 mm Hg). Braided shield grounded to body of switch for 360°. | |
| Operating force | 6 to 12 lbs |
| Full overtravel force | 20 lbs Max. |
| Release force | 4 pound Min. |
| Pretravel | 0.040 inch Max. |
| Differential travel | 0.020 inch Max. |
| Overtravel | 0.125 inch Min. |
| Operating temperature | -55 °C to +150 °C |
| Operating attack speeds | 0.5 m/s Max. |
| Attack speeds permitted | 0.7 m/s Max. |
| Mechanical lifetime (according QTP: C.CT.DCO.00060.GB) | 100 000 cycles |
| Weight | 265 g Max. |

Principles

Circuit diagram (switch show in free position)



Dimensions (mm)



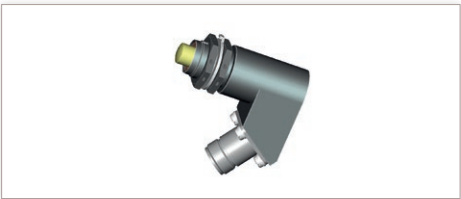
- ① Keyway to within .250 of shoulder .72 ±.004 wide x .031 ±.003 deep Roller is aligned with keyway: ±5°
- ② Free position
- ③ Corrosion resistant material (CuNi) Ø.378 / .374 x .118
- ④ 2 x Hex nut per MS21340-04
- ⑤ 1 x Keying washer per MS25081C4
- ⑥ 1 x Flat washer per MS9549-14
- ⑦ Laser marking
- ⑧ 3 cables per MIL27500-22 RC2N06
- ⑨ Shield
- ⑩ Sleeve marks at the end of wires

LIMIT SWITCH

FOR THRUST REVERSER ACTUATOR FUNCTION

Specifications

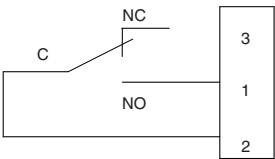
| Part numbers | | | DDP770364 |
|---|----------------------|--|-----------|
| Environment characteristics | | | |
| Condition | RTCA/DO-160D Section | Category | |
| Ground survival low temp. Operating low temperature | 4 | D3 at -67°F (-55°C) | |
| Ground survival high temp. Short time operating high temp. Operating high temperature | 4 | D3 at 257°F (125°C) | |
| Altitude | | -2 000 to 41 000 ft | |
| Temperature variation | 5 | A | |
| Humidity | 6 | C | |
| Operational shock | 7 | B | |
| Crash shock | 7 | B para 7.3.2 type 2 | |
| Vibration | 8 | R figure 8-2, curve W with 20 G to 3 000 Hz | |
| Explosion proof | 9 | E2 | |
| Waterproofness | 10 | S | |
| Fluid susceptibility | 11 | F (COMPATIBLE WITH SKYDROL) | |
| Sand & Dust | 12 | D | |
| Fungus | 13 | F | |
| Salt spray | 14 | S | |
| Power input | 16 | B | |
| EMI | 17 | A | |
| | 18 | A | |
| | 19 | Z | |
| | 20 | V | |
| | 21 | Z | |
| Lightning | 22 | Level 3 | |
| | 23 | 2A per FAA advisory circular, AC-20-136 | |
| Icing | 24 | B | |
| Electrostatic discharge | 25 | A | |



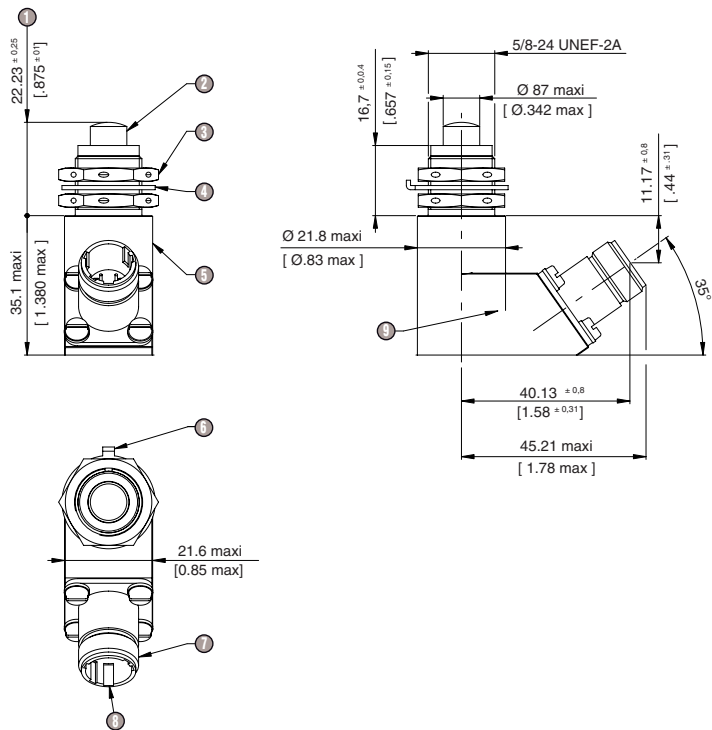
| Electrical characteristics | |
|---|----------------------------------|
| Open circuit voltage | 9 to 17 VDC |
| Closed circuit current | 2 to 20 mA |
| Open circuit resistance | 1 MΩ min |
| Closed circuit resistance | 10 Ω max |
| Bonding resistance: between connector and body contacts: gold, hermetically sealed | 2.5 mΩ max |
| Insulation resistance: between the connector pins connected together and the case | > 100 MΩ |
| Dielectric strength: between the connector pins connected together and the case | I < 1 mA 500 VRMS-60 Hz/1 min |

| Mechanical characteristics | |
|-----------------------------------|------------------|
| Number of total cycles head on | 80 000 |
| Contact speed | 20 in/s Max. |
| Release speed | 20 in/s Max. |
| Pre-travel | 0.040 in Max. |
| Differential travel | 0.020 in Max. |
| Overtravel | 0.125 in Min. |
| Operating force | 6-12 lbs |
| Overtravel force | 20 lbs Max. |
| Weight | 0.38 pounds Max. |

Principles



Dimensions (mm)



- ① Free position: 22.23 ±0.25 [0.875 ±0.01]
- ② Stainless steel plunger
- ③ Nut Qty 2 MS21340-05 or equivalent
- ④ Locking washer MS25081 C5 or equivalent
- ⑤ Stainless steel body
- ⑥ Lug angular position: ±10°
- ⑦ Connector: EN2997-Y00803M6
- ⑧ Master keyway angular position: ±15°
- ⑨ Marking area

LIMIT SWITCH

FOR HELICOPTER FOLDING TAIL FUNCTION

Specifications

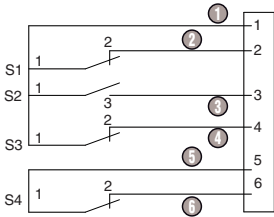
| Part numbers | | | |
|-------------------------------|------------------------------|----------------|--------------|
| | | | DDP990196 |
| Environment characteristics | | | |
| Condition | Normes | Method | Procedure |
| Temperature | MIL STD810E | 501-3 502-3 | I & II |
| Sand and Dust | MIL STD810E | 510-3 | |
| Salt fog | MIL STD810E | 509-3 | I |
| Humidity | MIL STD810E | 507-3 | I |
| Altitude | MIL STD810E | 500-3 | I & II |
| Acceleration | MIL STD810E | 513-4 | 3.5 G/3 axis |
| Shocks | MIL STD810E | 516-4 | I |
| Fluid susceptibility | RS S623 A5901 E01 ISSUE A | §3332 | |
| Vibrations | MIL STD810E | 514-4 | |
| Rain | MIL STD810E | 506-3 | III |
| E M C | N/A | | |
| Indirect lightning | N/A | | |
| Induced signal susceptibility | N/A | | |
| Solar radiation | MIL STD810E | 505-3 | I & II |



| Electrical characteristics | |
|----------------------------|----------|
| Rated voltage | 28 VDC |
| Max. current (Resistive) | 4 A |
| Max. current (Inductive) | 2 A |
| Insulation resistance | ≥ 100 MΩ |

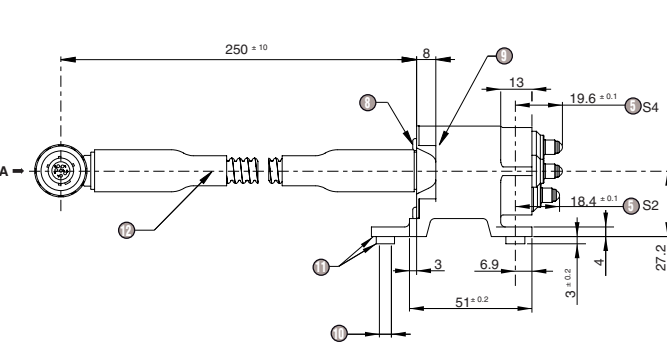
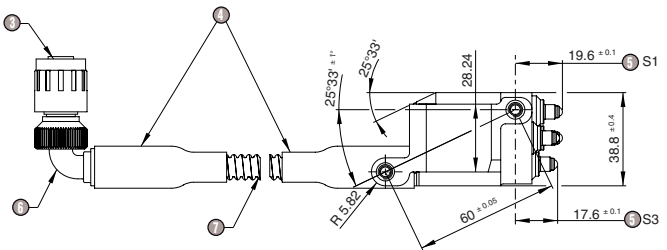
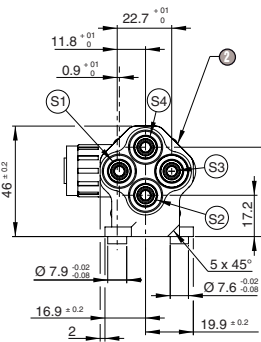
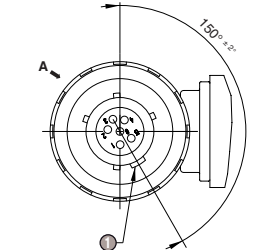
| Mechanical characteristics | |
|---|----------------|
| Forces and travels for altitude from -150m to 4000m and for operating temperature | |
| Max. Operating force | 25 N |
| Min. Release force | 5 N |
| Max. Pre-travel | 0.5 mm |
| Max. Differential travel | 0.05 mm |
| Min. Overtravel | 3 mm |
| Operating temperature | -55°C to +90°C |
| Weight | 245 g max |
| Attack angles | 25° max |
| MTBF | 5000 Fh |

Principles



- 1 Common
- 2 NC Folded/Unfolded position
- 3 NO Tail in position
- 4 NC Tail out position
- 5 Common
- 6 NC Unfolded position

Dimensions (mm)



- 1 Master keyway
- 2 Body and cap 6061 ASN
- 3 Connector E0545J09-35XC
- 4 Boot VG95343T18A001A (202K132-25/225-0)
- 5 Si tripping point
- 6 90° elbow union E0762W09-05BS
- 7 Flexible helicol ETFE tubing ASNE0637A08
- 8 4 CBL «TORX» screws (bichromate steel)
- 9 Marking location
- 10 Heli-coil type screw lock M5
- 11 1 face and 1 ø protection Alodine 1200
- 12 6 AIR 1710-04 AWG 22 wires

LIMIT SWITCH

FOR THRUST REVERSER DOOR UPPER SECONDARY LOCK FUNCTION

Specifications

Part numbers **DDP770353**

| Environment characteristics | | |
|---|--------------|-----------------------|
| Condition | RTCA/DO-160D | Requirements |
| Equipment intended for installation in powerplant | Section 4.3 | Category D3 |
| Operating low temperature | Section 4 | Category D3 -40 °C |
| Operating high temperature | Section 4 | Category D3 +135 °C |
| Short time operating high temperature | Section 4 | Category D3 +135 °C |
| Ground survival low temperature | Section 4 | Category D3 -62 °C |
| Ground survival high temperature | Section 4 | Category D3 +85 °C |
| Altitude | Section 4 | Category D3 45000 ft |
| Temperature variation | Section 5 | Category A |
| Humidity | Section 6 | Category B |
| Operating shock | Section 7 | Category B |
| Crash shock | Section 7 | Category B |
| Vibrations | Section 8 | Category H2 |
| Explosion | Section 9 | Category E2 |
| Waterproofness | Section 10 | Category R |
| Fluid susceptibility | Section 11 | Category F spray test |
| Sand and Dust | Section 12 | Category D |
| Fungus resistance | Section 13 | Category F |
| Salt spray | Section 14 | Category S |
| Lightning induced transient susceptibility | Section 22 | Category A4XX |
| Icing | Section 24 | Category B |

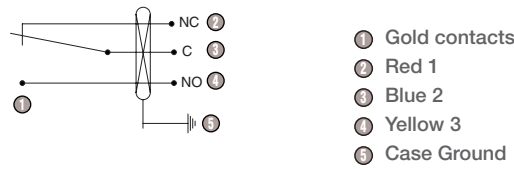


| Electrical characteristics | |
|---|--|
| Normal operating voltage | 28 VDC |
| Maximum operating voltage | 32 VDC |
| Normal operating current | 10 mA < I < 50 mA |
| Maximum operating current | 100 mA |
| Resistance of contact | 85 mΩ Max. |
| Dielectric withstanding at atmospheric pressure | 1 000 V rms 1 mA |
| Electrical bonding | 2.5 mΩ between the bush and the beginning of the shield under the sleeve |
| Insulation resistance | 100 MΩ 500 VDC |
| Electrical lifetime | 100 000 cycles |
| Contact bounce (checked during shocks and vibrations tests) | < 5 ms |

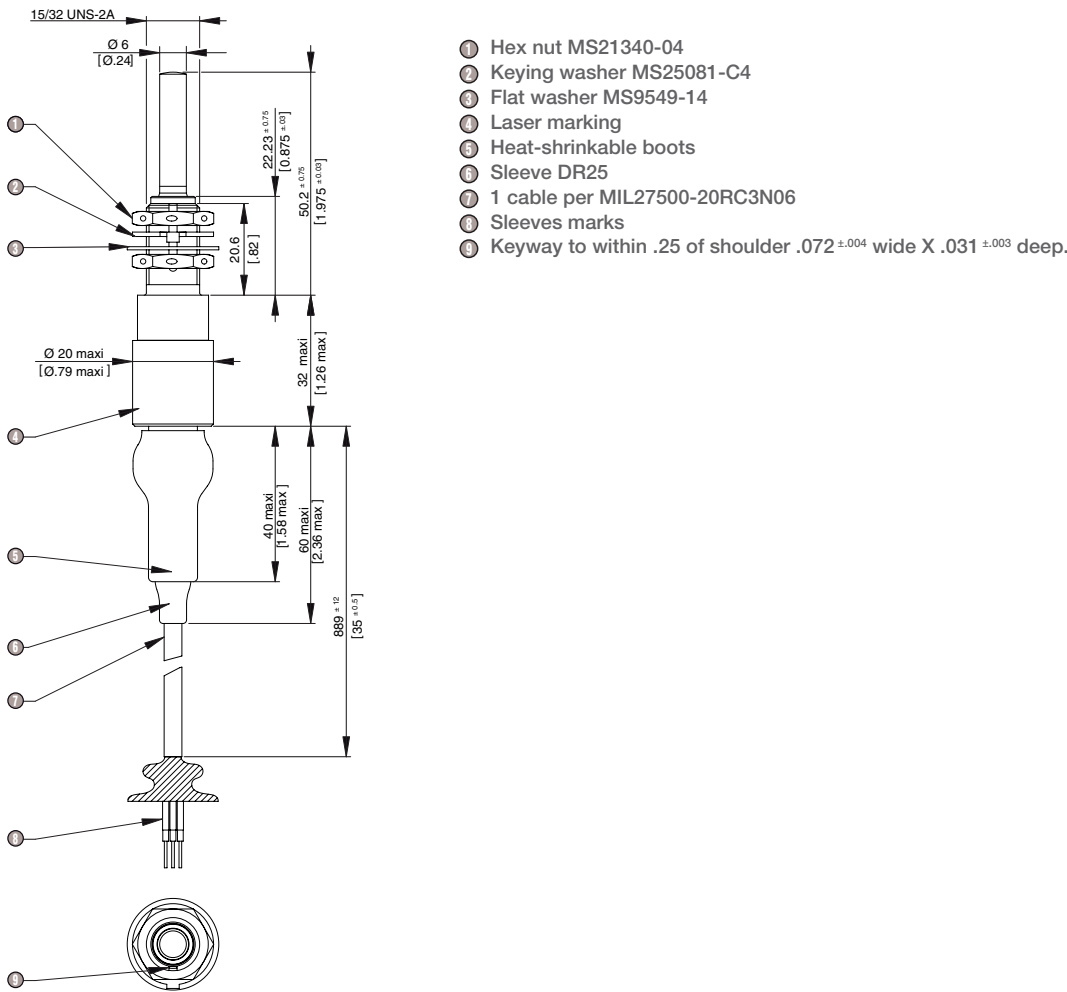
| Mechanical characteristics | |
|---|------------------------|
| The characteristics are given for standard temperature (23 °C) and atmospheric pressure at the sea level (760 mm hg). Braided shield grounded to body of switch for 360°. | |
| Operating force | to be less than 12 lbs |
| Pre-travel | 0.04 inch max |
| Differential travel | 0.02 inch max |
| Overtravel | 0.125 inch min |
| Mechanical lifetime | 100 000 cycles |
| Weight | 120 g Max. |
| Operating attack speeds | 0.5 m/s Max. |
| Outstanded max. attack speeds permitted | 0.7 m/s |
| Product sealing | Watertight |
| Cell sealing | Hermetic |

Principles

Circuit diagram (switch show in free position)



Dimensions (mm)

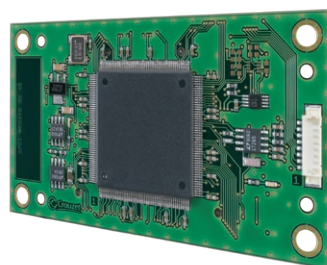


ELECTRONIC POSITION DETECTORS

2 parts proximity sensor



Proximity sensor without electronic



Remote electronic

IN ALL CASES, CROUZET WILL FIND A WAY!

with Crouzet's expertise in mechanical position detectors, Crouzet offers a range of standards product, but has the ability and capacity to develop specific components, entirely adapted to the application into its environment.

Today, Crouzet is a market leader in this technology.

PROXIMITY SWITCHES:

- › Contactless detection with integrated electronics
- › 2, 3 wires or connector output
- › Full hermetic stainless steel housing
- › Possibility of multiple output, BIT, high pressure, extended temperature range...

We create the product fully customisable dedicated to your need.

1 piece proximity switches



Proximity switches with integrated electronic

4 FLIGHT CONTROL

- › Trimable Horizontal Stabilizer Actuator
- › Spoilers
- › Flap & slat

3 THRUST REVERSER

- › Stowed or deployed status

2 DOORS AND ACTUATORS

- › Open or closed position and locked status

5 LANDING GEAR

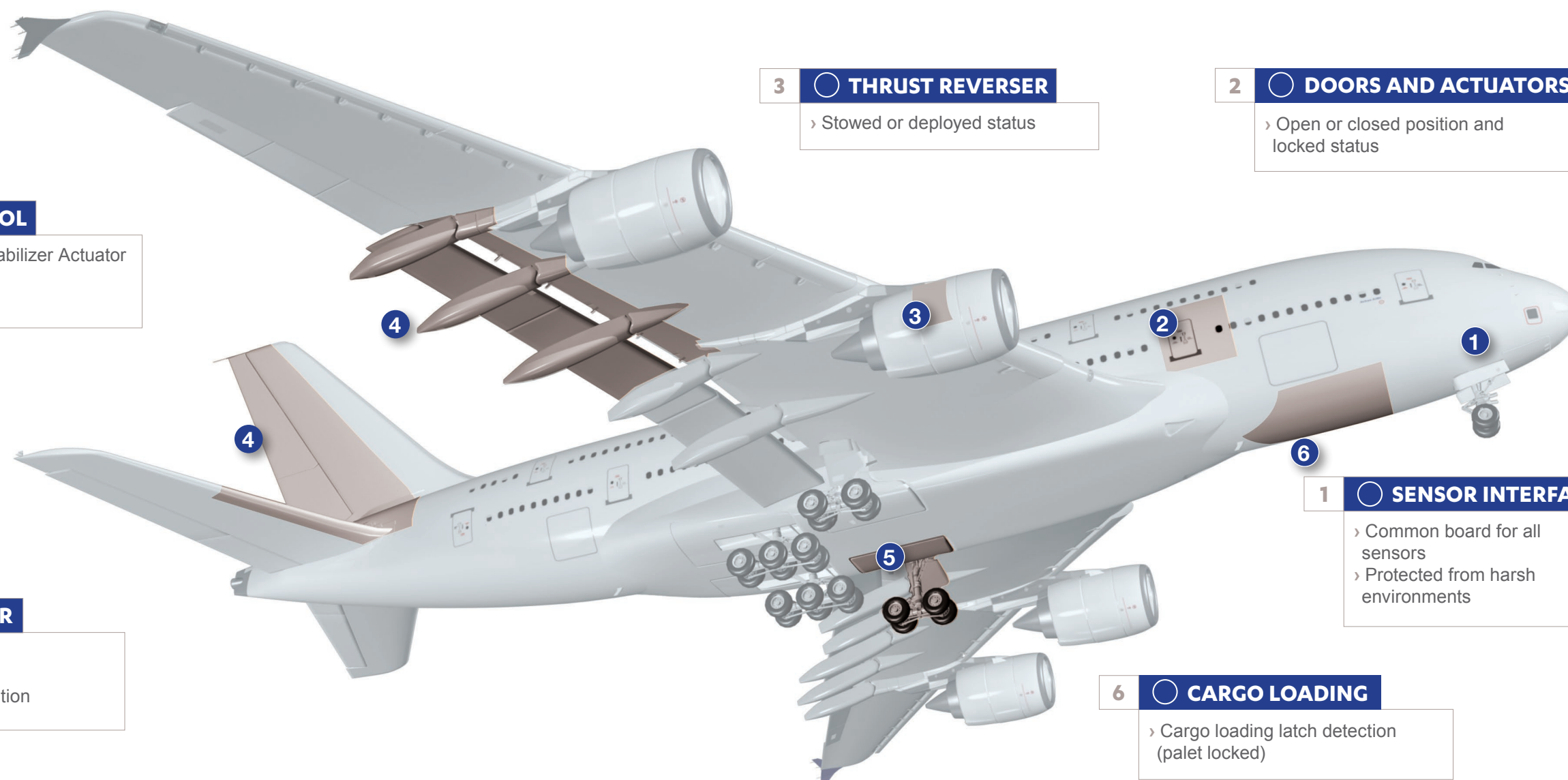
- › Weight on wheels
- › Up position
- › Down and locked position

1 SENSOR INTERFACE MODULE SIM

- › Common board for all sensors
- › Protected from harsh environments

6 CARGO LOADING

- › Cargo loading latch detection (palet locked)



DETECTION PRINCIPLE

FOR PROXIMITY SWITCHES AND TWO PARTS SENSORS

A proximity switch is a device detecting, without any physical link, a metallic part that enters a predefined space in front of it.

The sensing chain is composed of a sensing element, an electronic board and a moving part, called a target. The electronics applies a variable current in the sensing element, what creates a magnetic field around the sensing element. When the target enter the magnetic field, it changes the electromagnetic properties of the sensor which will lead to the change of one or several parameters of the current or the voltage of the coil (amplitude, frequency, phase lag, response time ...). Any variation over a threshold will set a binary signal which indicates that the target has entered a predefined space.

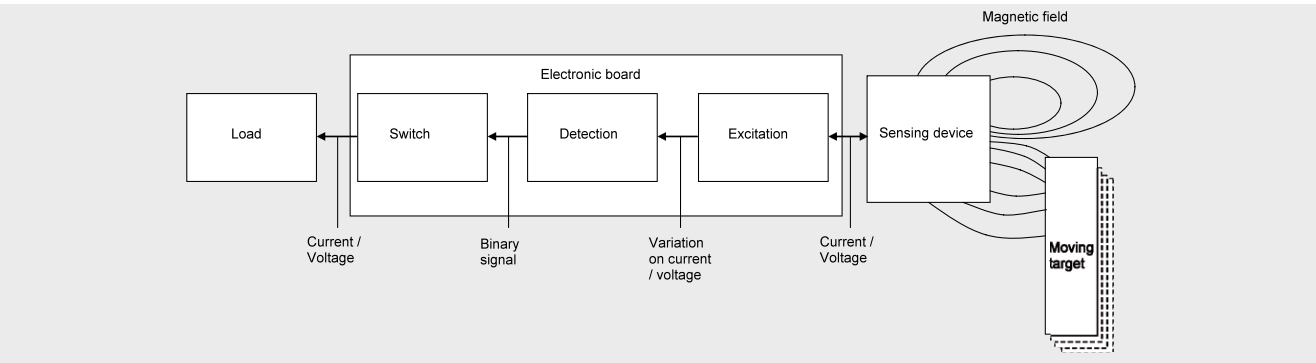


Figure 1 Measurement chain

PRODUCT INTEGRATION

The sensing device and electronic board can be integrated into one product called an active one-piece proximity switch. Such a product can be used in place of mechanical switches to detect parts that have short displacements or when there is little room to install a sensor.

When the usage conditions are harsh and when a very high MTBF is critical, sensing device and electronic board should be separated. The electronic board will be put in a protected area, typically inside a control box within the aircraft fuselage, and linked to the sensing device with two wires. In this case, the product is called two-piece proximity sensor.

KEEP OFF ZONE

Ferromagnetic and/or conductive metallic parts are forbidden between target and sensing face when target is near. More than 25 mm (1 ") of free space must also be left on proximity switch sides and more than 15 mm (0.60 ") behind the sensing face, for nominal detection characteristics.

When target is far away from the sensing face, there is a minimum space in front of the sensing face that has to be kept free from any metallic part to prevent from any change of the detection performance of the switch. The limit of this keep off zone in front of the sensing face is defined by a half-circle of minimum 25 mm (1 ") of radius.

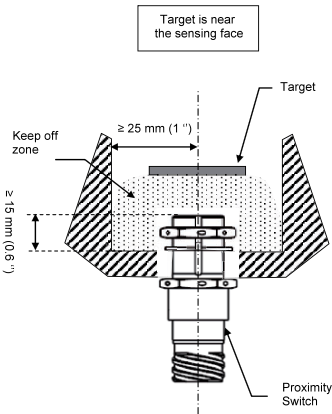


Figure 3 Keep off zone for embeddable switches

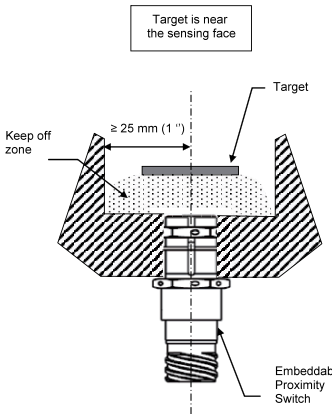


Figure 2 Keep off zone

DETECTION CURVES PRINCIPLE

Detection curves given on Crouzet datasheets are generally plotted according to the X and Z coordinates, i.e. target slide-by movement is along X axis, and gap between sensing face and target is along Z axis, assuming that proximity switch and target centres are aligned according to X-Y axis. for X-Y-Z axis definition, see figure 3. Curves are valid for a specified target, i.e. target material and dimensions.

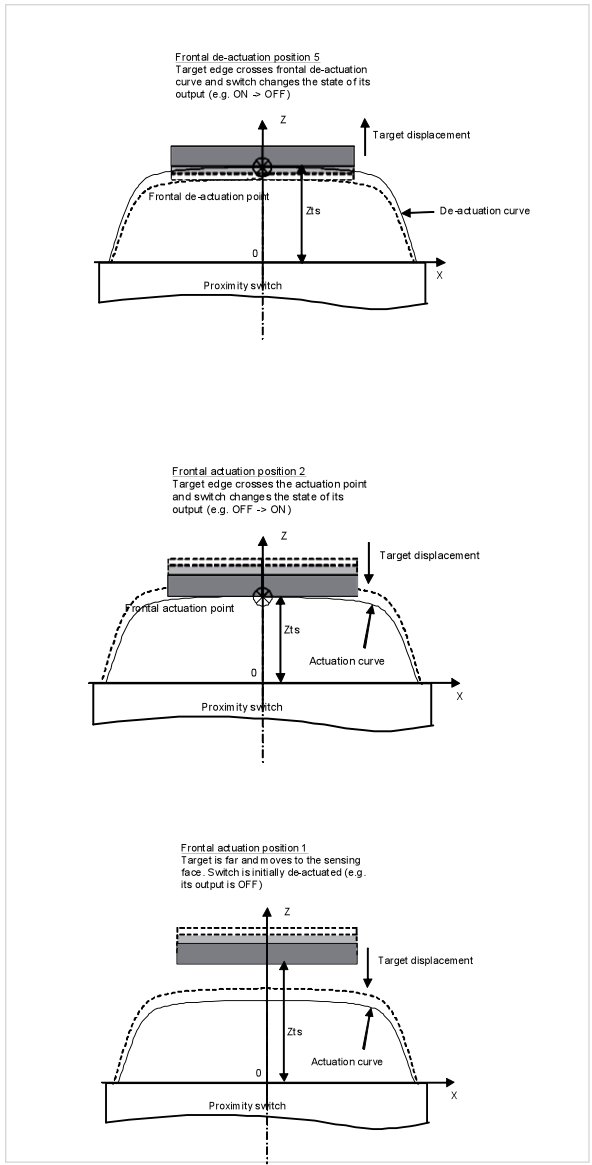


Figure 3 Target head-on actuation – deactuation point

The following sections describe the typical operating of a proximity switch according to simple target movement (slide-by and rotate-by movements), conditions on target positioning and definition, the definition of guaranteed detection curves and working zones, the constraints for target mounting, the electrical connections.

Target head-on approach

For the first “standard” movement, the head-on displacement, target and switch are centred. Target will move along the Z axis. Gap Zts is measured between sensing face of the switch and target side facing the switch.

Let target be FAR away from the sensing face and, in that case, switch de-actuated, e.g. its output being OFF if the switch is Normally Open (NO) and ON if the switch is Normally Closed (NC). When target approaches the sensing face, the switch output turns from OFF to ON (resp. ON to OFF if NC) when the gap is equal to the head-on actuation point. When target continues to approach the sensing face, the switch output remains ON (resp. OFF if NC).

Let target be NEAR to the sensing face and, in that case, switch actuated, e.g. its output state being ON (resp OFF if NC). When target moves away from the sensing face, the switch output turns from ON to OFF (resp OFF to ON if NC) when the gap is equal the head-on deactuation point. When target continues to move away from the sensing face, the switch output remains OFF (resp ON if NC).

There is a slight distance between actuation and deactuation points (for head-on or slide-by movement) which is called hysteresis. This characteristic is, generally, realised intentionally on the electronic board because it prevents random switching of the output of the sensor when target is on the detection curve and submitted to vibrations. This function can also be realised on the remote electronic board of a two piece sensor.

Hysteresis must not be confused with the grey zone. The grey zone is an area delimited by the guaranteed actuation and deactuation curves which take into account the tolerance ranges on the parts and the temperature drift of physical characteristics.

DETECTION PRINCIPLE

FOR PROXIMITY SENSORS AND PROXIMITY SWITCHES

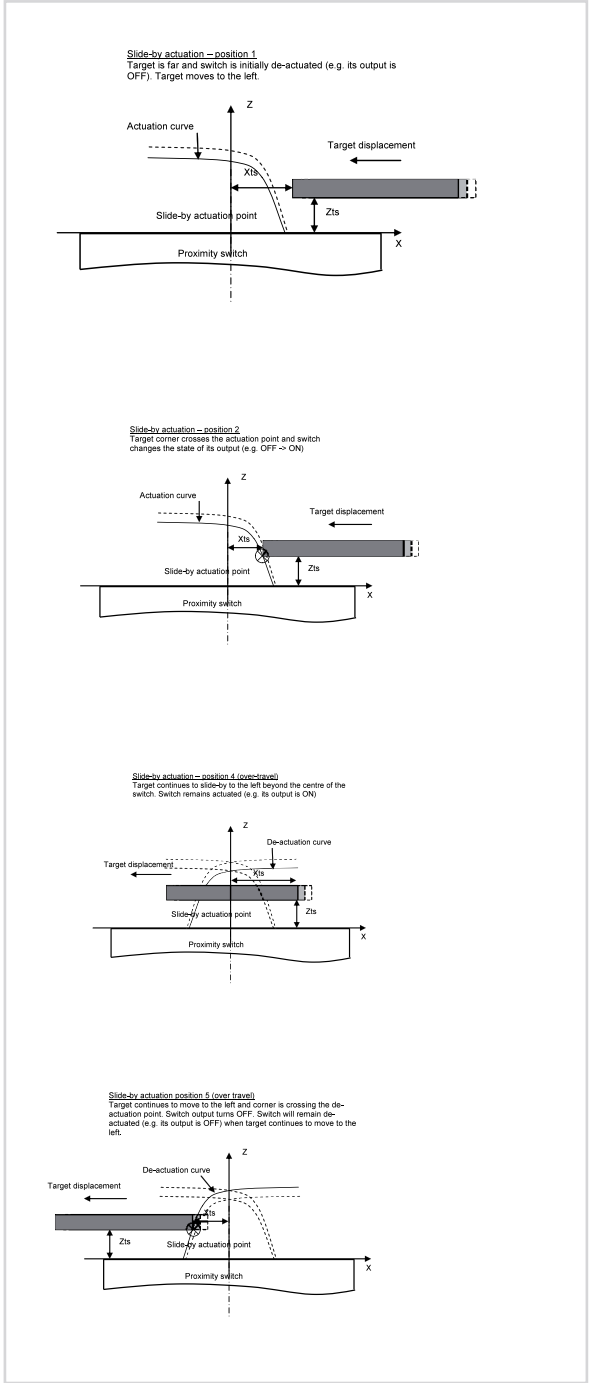


Figure 4 Slide by actuation – deactuation

Target slide-by movement

For the second “standard” movement, the slide-by displacement, target and switch Y axis are aligned, gap Z is predefined and target moves along X axis.

Let target be FAR away from the sensing face and, in that case, switch output state being OFF if switch is Normally Open (resp ON if NC). When target approaches the Z axis, the switch output turns from OFF to ON (resp ON to OFF if NC) when the lateral position is equal to the slide-by actuation point. When target continues to approach the Z axis, the switch output remains ON (resp OFF if NC).

In case of over travel (target centre crosses switch centre and continues to move), new Xts coordinate have to be considered. New Xts is measured between the centre of the switch and the other corner of the target.

Let target be NEAR to the Z axis and, in that case, switch output state being ON (resp OFF if NC). When target moves away from the Z axis, the switch output turns from ON to OFF (resp OFF to ON if NC) when the lateral position is equal the slide-by deactuation point. When target continues to move away from the Z axis, the switch output remains OFF (resp ON if NC).

Notice that, for a circular proximity switch and target, as long as switch front face and target face are parallel and their centres aligned, a target slide-by movement will always generate the same detection curves.

TARGET DEFINITION

In every case, target material and size are predefined on the datasheet.

The target is quite often a thin cylinder. Its diameter has to be sufficient so it will cover all the sensing face at a head-on position. Its thickness should be greater than 1 mm.

The material is generally a ferromagnetic metal. Typically it can be 17-4 PH or 15-5 PH stainless steel.

Other metals can be used, some of them as anti-target.

Target might also be rectangular, square, cylindrical, narrow or tall. It could rotate-by or have a complex movement. Shape and movement of the target will change detection curves. for any particular case, Crouzet can calculate and provide the relative detection curves.

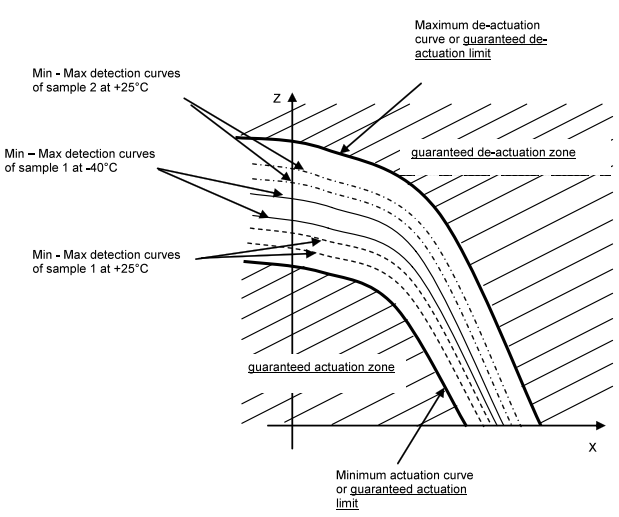


Figure 5 Definition of guaranteed detection curve and zones

GUARANTEED DETECTION CURVES

A proximity switch is a Line Replaceable Unit. to be sure to have the same sensing performance when a switch is replaced by another, a statistic study is made to determine the guaranteed detection curves applicable to any product. Typical actuation and deactuation curves deviate according to parameters of influence such as the tolerance on parts of the product, the temperature drift of the detection characteristics, the performance of the manufacturing process. As shown on the following figure, the cumulating of uncertainties induces larger distances between guaranteed actuation and deactuation points than for the typical curves. However the detection curves of a switch will always be inside the guaranteed curves.

ELECTRICAL OUTPUT CONNECTIONS FOR ONE PIECE SWITCH

Connection of Crouzet one-piece proximity switches can be shielded and twisted 3 wires (supply, ground and output) or 2 wires (“hot” input, ground) cable.

For an efficient EMI protection, back-shell termination must be shielded over 360 °. Pigtail termination should be avoided. Also available are proximity switches which have two or three electrically isolated outputs.

Three wires connections

For the 3 wires configuration, the load can be connected between supply and output (sinking) or between output and ground (sourcing).

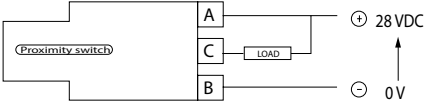


Figure 7 Load sinking (NPN)

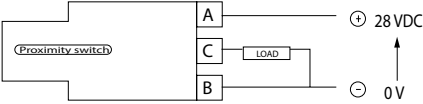


Figure 8 Load sourcing (PNP)

Two wires connection

For the 2 wires configuration, the “hot” input has two functions: first it provides the power supply to the PCB and second it controls the current through the load connected in series between the network and the “hot” input.

ELECTRICAL OUTPUT CONNECTIONS FOR A TWO PIECES SENSOR

Connection between sensing device and electronic board has to be done with a twisted pair cable. for harsh EMI environment, the cable should be shielded.

For an efficient EMI protection, back-shell termination must be shielded over 360 °. Pigtail termination should be avoided.

PROXIMITY SENSOR

RECTANGULAR PASSIVE SENSOR FOR DOORS FUNCTION

Specifications

Part numbers

DPI798016

Environment characteristics

Full metal hermetically sealed housing

| | |
|-----------------------|----------|
| Housing body material | AISI316L |
|-----------------------|----------|

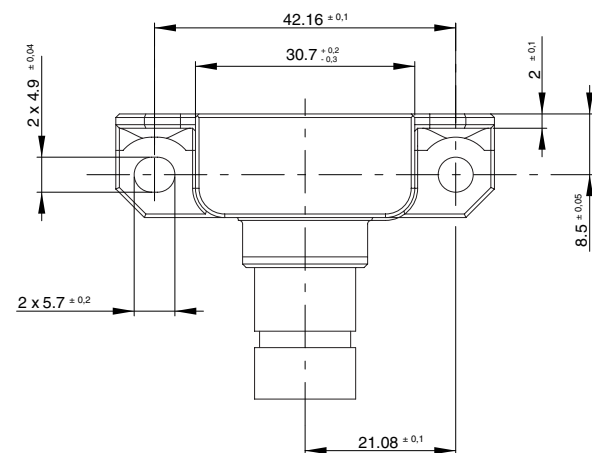
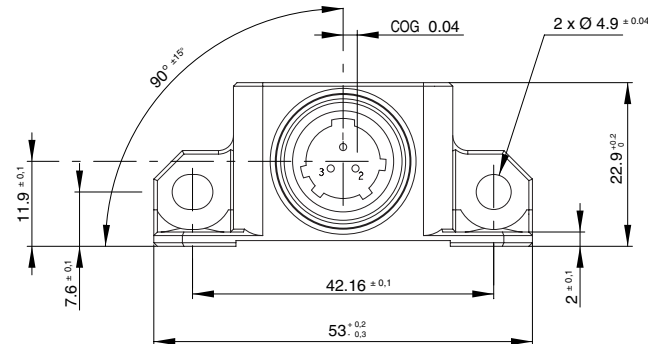
Connector EN2997-Y1 08 03 PN

| | |
|--------------------------------|------------------|
| Operational temperature domain | -55 °C to +85 °C |
|--------------------------------|------------------|

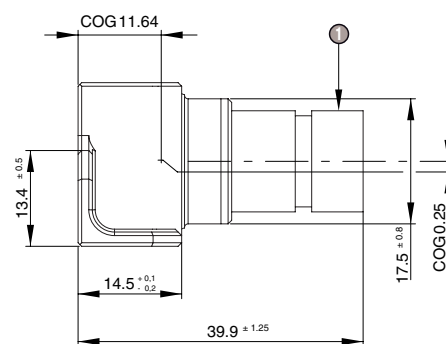
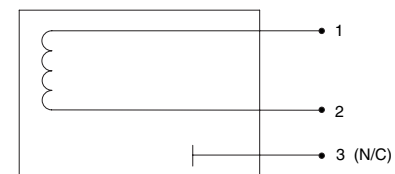
| | |
|---------------------|----------------------|
| Dielectric strength | < 1 mA @ 1 500 V rms |
|---------------------|----------------------|

| | |
|------|---------------------|
| Mass | $\leq 65 \text{ g}$ |
|------|---------------------|

Dimensions (mm)



Principles



① 3 pin connector

NOTES

PROXIMITY SENSOR

ROUND PASSIVE SENSOR FOR LANDING GEAR FUNCTION



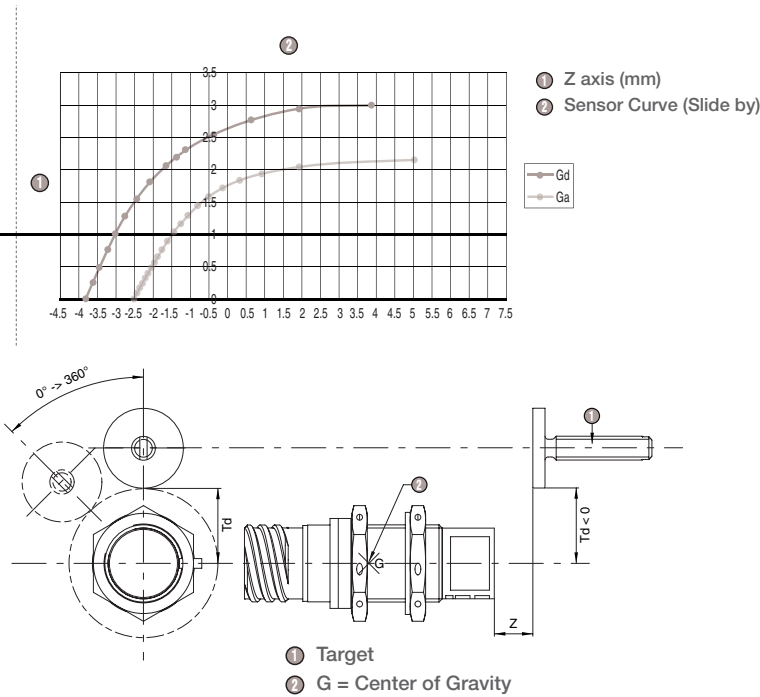
Specifications

| | | |
|--|---|-----------|
| Part numbers | | DPI798015 |
| Environment characteristics | | |
| Operational explanations and conditions of use | C.CT.SAV.00056.GB | |
| Environmental condition according to | DR72694 | |
| Proximity sensor mass | ≤ 50 g | |
| Housing body material | ASTM A838 alloy 2 ferritic stainless steel | |
| Housing front face material | AISI 316L | |
| Connector | D38999/25YA98PN matches with plug D38999/26KA98SN | |
| Operational temperature | -55 °C to +70 °C | |
| Survival temperature | -55 °C to +85 °C | |
| Inductances defined @ 1 000 ±10 Hz 20 mA ±0.2 mA | | |
| Inductance for target near | > 24.53 mH @ Ga = 0.085 in (2.159 mm) at room temperature (25 °C) | |
| Inductance for target far | < 23.64 mH @ Gd = 0.12 in (3.048 mm) at room temperature (25 °C) | |
| Inductance for target near | > 24.23 mH @ Ga = 0.085 in, within operational temperature limit | |
| Inductance for target far | < 23.84 mH @ Gd = 0.12 in, within operational temperature limit | |
| DC coil resistance at room temperature | 70 Ω < R < 90 Ω | |
| DC coil resistance within operational temperature limits | 40 Ω < R < 120 Ω | |
| ATP reference | C.CT.DCO.05761.GB | |
| Insulation resistance | > 100 MΩ @ 500 VDC | |
| Dielectric strength | 1 500 V rms , 1 mA | |
| Bonding | 2.5 mΩ | |

Principles

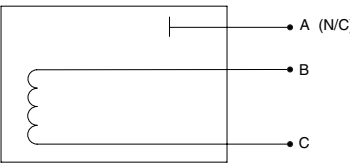
Actuation curves

Curves are guaranted when «keep off» requirement is met.
Other cases with metal in vicinity are to be specifically studied and validated by Crouzet.



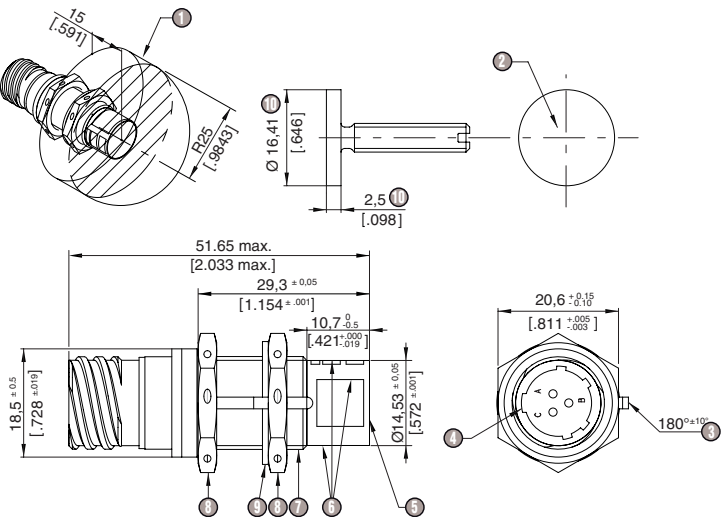
Cables and wiring

Shielded twisted pair AWG 22
Wiring external to fuselage must have 360° shield bond



| Td axis (mm) | | |
|--------------|------------------------------|------------------|
| | Guaranted actuation gap (Ga) | Actuation curves |
| Z mm | Td (mm) | Td (mm) |
| 0 | -2.49 | -3.81 |
| 0.508 | -2.06 | -3.48 |
| 1.016 | -1.47 | -3.02 |
| 1.524 | -0.48 | -2.44 |
| 1.651 | -0.13 | |
| 1.778 | 0.33 | -2.08 |
| 1.905 | 0.91 | |
| 2.032 | 1.93 | -1.65 |
| 2.159 | 5.08 | -1.37 |
| 2.159 | 6.35 | |
| 2.286 | | -1.12 |
| 2.54 | | -0.43 |
| 2.794 | | 0.64 |
| 2.921 | | 1.91 |
| 3.048 | | 3.81 |
| 3.048 | | 6.35 |

Dimensions (mm)



- ① Room free of metal exclusively target
- ② Laser marking
- ③ Washer nose aligned with master keyway 180°±10°
- ④ Master keyway
- ⑤ Sensing surface
- ⑥ Marking according to drawing: MA84798015
- ⑦ Thread 0.625-24 UNEF-2A
Nut MS21340-05 or Crouzet nut 79238608
- ⑧ tightening torque 70.8 Lb in/8 Nm Max.
- ⑨ Washer key MS25081-C6 or Crouzet washer 70515367
- ⑩ Dimension critical for actuation/deactuation curves

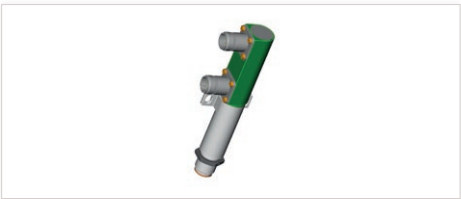
PROXIMITY SWITCH

FOR THRUST REVERSER ACTUATOR FUNCTION

Specifications

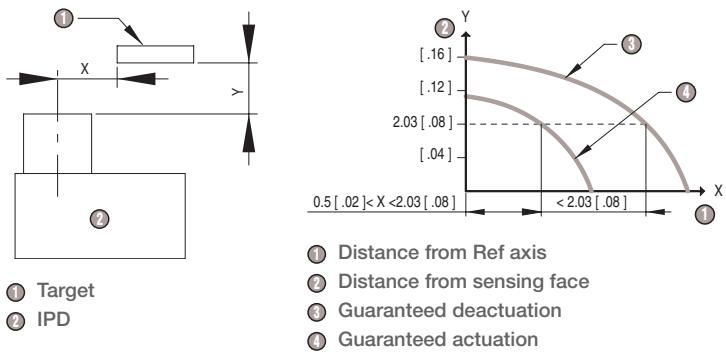
Part numbers **DPI799121**

| Environment characteristics | | | |
|-----------------------------|------------------------------------|--------------|---|
| Conditions | | RTCA/DO-160D | |
| | | Section | Category |
| Temperature | -55 °C to +125 °C | 4 | F3 |
| Temperature variation | | 5 | A |
| Altitude | -2 000 to 41 000 feet | 4 | D3 |
| Humidity | | 6 | C |
| Waterproofness | | 10 | R |
| Salt spray | | 14.0 | S |
| Sand & Dust | | 12 | D |
| Vibration | | 8 | Curve W/3000 Hz |
| Shocks | | 7 | A Except with 3 shocks of 6 G in each direction on each axis |
| Hermeticity | MILPRF8805E Watertight | | |
| Supply voltage | | 16 | A |
| Voltage spike | | 17 | A |
| EMI | Conducted susceptibility | 18 | A |
| | Induced signal susceptibility | 19 | Z |
| | HIRF | 20/20-5 | Cat V |
| | Emission of radio frequency energy | 21 | H |
| Explosion proof | | 9.0 | Environment 11 |
| Fluids susceptibility | SKYDROL | 11.0 | F |
| Fungus | | 13.0 | F |
| Magnetic effects | | - | N/A |
| Lightning indirect effect | Pin injection | 22 | Power: L4 waveform 5A Signal: L3 waveform 4 |
| Sustained acceleration | | 7 | Procedure type R |
| Electrostatic discharge | | 25 | H |

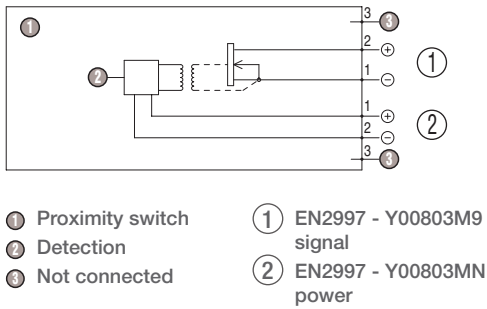


| Electrical characteristics | |
|--------------------------------------|--|
| Function | Normally open |
| | When target is far, the output is not conductive |
| | When target is near, the output is conductive |
| Temperature | Operating: -55 °C, +125 °C |
| | Storage: -65 °C, +125 °C |
| Detection | Target: 19.05mm (0.75 IN) diameter 1.78mm (0.07 IN) thickness material 15-5 PH |
| | Slide by detection for a gap = 2.03 mm (0.08 IN) |
| | Differential travel: 1.02 mm max (0.04 IN) |
| | Shift actuation and deactuation point (temperature and supply variations): 0.51 mm (0.02 IN) |
| Supply voltage | 16 V Min., 32.5 V Max., 28 VDC per MIL-STD-704 |
| Max. Consumption current | 10 mA Max. under 32.5 V |
| Output voltage | 8 VDC Min., 32.5 VDC Max. |
| Output leakage voltage (target near) | 1.5 V Max. under 25 mA |
| Output leakage current (target far) | 100 µA Max. |
| Output current max. 25 mA | Resistive or Inductive Maximum switching frequency: 50 Hz |
| Protections | Against inversion supply polarity and output polarity with load |
| | Against permanent short circuit of the load |
| Dielectric test | ISO 2678 Category C |
| | Dielectric strenght: 750 VAC/50 Hz - 1 min - 1 000 µA |
| | Insulation resistance: 100 MΩ/45 VDC |
| | Bonding resistance between connector and housing: 2.5 mΩ max |
| Mtbf | 100 000 flight hours |
| Endurance | 80 000 cycles at max load (50 mA) |
| Weight | 250 g max (0.55 pounds) |

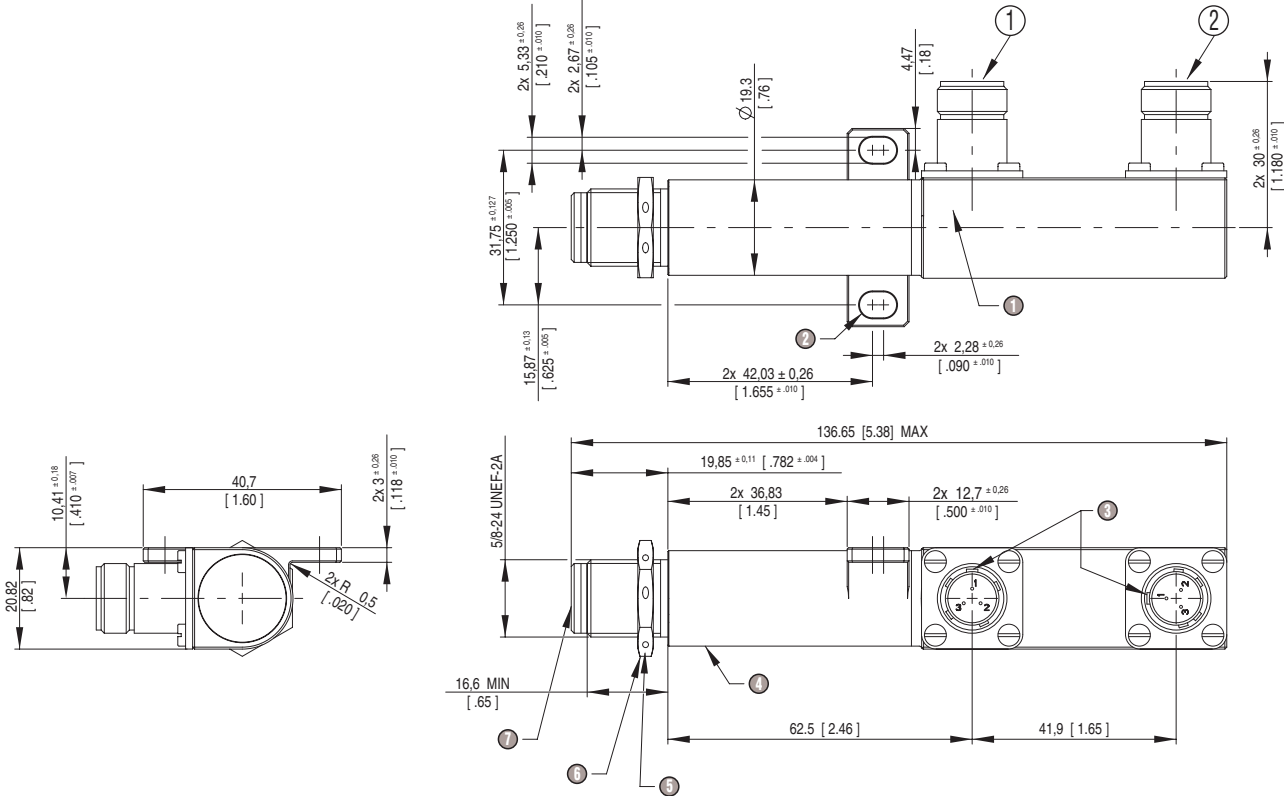
Principles



Connection



Dimensions (mm)



PROXIMITY SWITCH

ALL METAL FOR THRUST REVERSER

ACTUATOR FUNCTION

Specifications

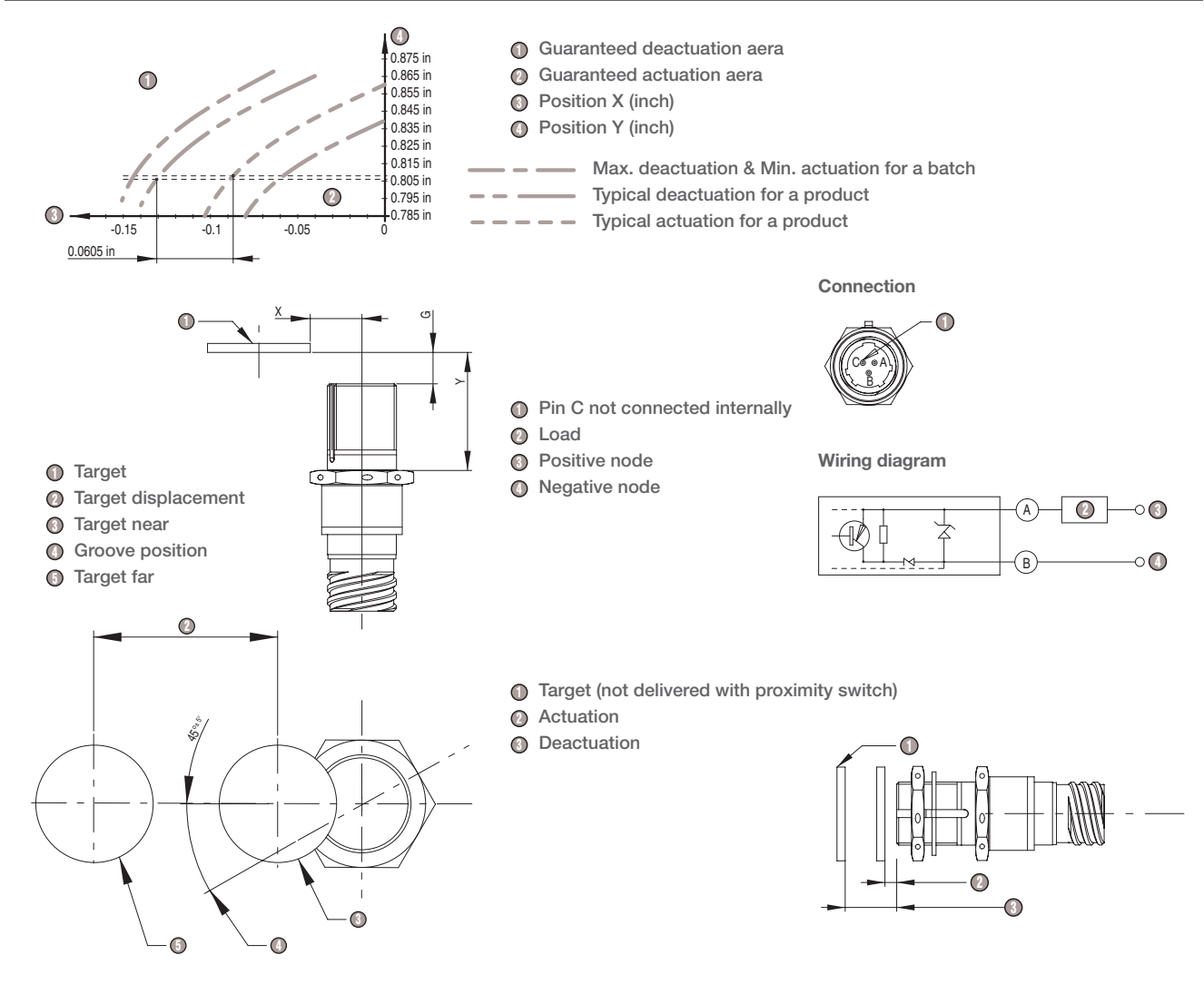
Part numbers **DPI799184**

| Environment characteristics | |
|----------------------------------|--|
| Operating temperature | -65°F to +185°F (-55°C to +85°C) |
| Storage temperature | -65°F to +160°F (-55°C to +71°C) |
| Short time operating temperature | +240°F (+116°C)/10 mn |
| Altitude | RTCA DO-160D Section 4.6.1 Category D3 |
| Humidity | RTCA DO-160D Section 6 Category C |
| Vibration | Section 2.1 per Figure 6-1 and Figure 7-17 |
| Acceleration | Section 4.1 Zone 9 except with 8 G's in any axis |
| Explosive atmosphere | RTCA DO-160D Section 9 Category H |
| Waterproofness | RTCA DO-160D Section 10 Category S |
| Fluid susceptibility | Resistant to MIL-L-7808 & MIL-L-23699 |
| Sand & Dust | RTCA DO-160D Section 12 Category D |
| Fungus | RTCA DO-160D Section 13 Category F |
| Salt spray | RTCA DO-160D Section 14 Category S |
| Icing | RTCA DO-160D Section 24 Category A |
| Material | Stainless steel including front face |
| Tightening torque | 88 in.Lb (10 Nm) Max. |
| Weight | 3 oz (85 g) Max. |
| Mtbf | 400 000 Fh |

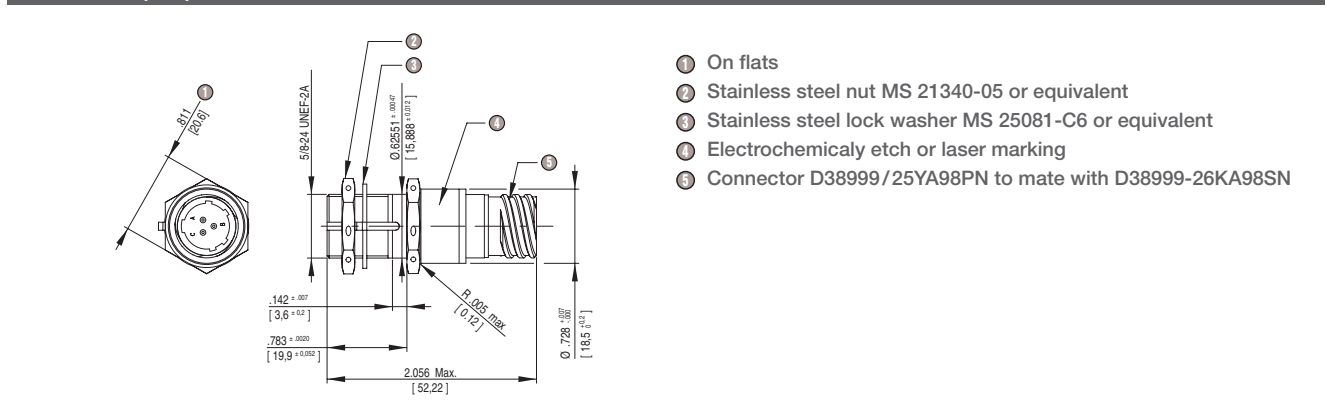


| Electrical characteristics | |
|--------------------------------------|---|
| Supply | 15 VDC ±10% |
| Maximum voltage | 16.5 VDC |
| Magnetic effect | RTCA DO-160D Section 15 Category A |
| Voltage spike | RTCA DO-160D Section 17 Category A |
| Electromagnetic emissions | Section 8 Category 4 |
| Electromagnetic susceptibility | Section 7 Category 4 |
| HIRF | RTCA DO-160D Category R |
| Lightning effects | Section 7.4 Level L2 |
| Electrical continuity | 2.5 mΩ Max. between case and connector |
| Leakage current | 50 µA Max. at 16.5 VDC |
| Switching response time (Ton & Toff) | 5 ms Max. |
| Switching frequency | 100 Hz Max. |
| Insulation resistance | 100 MΩ/500 VDC |
| Dielectric strength | 1 000 VAC/50 Hz/1 mA |
| Protection against | Polarity inversion and load short circuit |

Principles



Dimensions (mm)



PROXIMITY SWITCH

FOR LANDING GEAR FUNCTION

Specifications

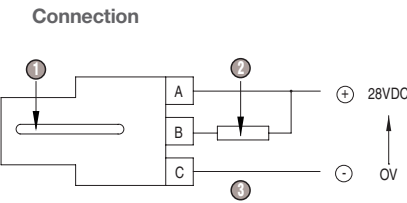
Part numbers **DPI799153**

| Environment characteristics | | |
|--|---------------------------|---------------------------|
| Condition | RTCA / DO-160E Section | Category |
| Temperature & altitude | 4 | D2 & 4.6.1 |
| Temperature variation | 5 | A |
| Humidity | 6 | C |
| Waterproofness | 10 | S |
| Icing | 24 | B |
| Salt spray | 14 | T & 14.3.6.7 |
| Sand & Dust | 12 | S 12.4 & 12.5 |
| Vibration | 8 | R & H Curves E, E1 & P |
| Shocks | 7 | 7.2 |
| Fungus | 13 | F |
| Fluids susceptibility | 11 | F |
| Power input supply DC | 16 | B |
| Voltage spikes | 17 | A |
| Magnetic effects | 15 | A |
| Radio frequency susceptibility | 20 | A & F |
| Lightning induced transient susceptibility | 22 | A4G44 |
| Conduced susceptibility audio frequency | 18 | Z |
| Induced signal susceptibility | 19 | ZC |
| Emission of radio frequency energy | 21 | H |
| Electrostatic discharge | 25 | A |
| Crash safety shock | 7 | 7.3.1 & 7.3.3 |



| Electrical characteristics | |
|---|--|
| Temperature operating | -55°C to +95°C |
| Temperature survival | -61°C to +95°C |
| Supply Min. | 16 V |
| Supply Max. | 32.5 V |
| Current consumption | 10 mA Max. under 32.5 V |
| Leak voltage | 1 VDC under 250 mA |
| Leakage current | 50 mA Max. |
| Max. Load | 250 mA Resistive, 125 mA Inductive, 40 mA Lamp |
| Electrical continuity | < 2.5 mΩ |
| Dielectric strenght | 1 000 VDC / 1 mA |
| Insulation resistance | 100 MΩ / 45 VDC |
| Protections | Against inversion of polarity Against permanent short circuit of the load |
| Switching frequency | 50 Hz Max. |
| Power on reset time | Tp ≤ 15 ms |
| Weight | 45 g Max. without nuts & washer |
| Tightening torque | 20 Nm Max. (176 in.Lb) |
| Connector to wrenching flats torsional load | 5 Nm Max. (44 in.Lb) |

Principles

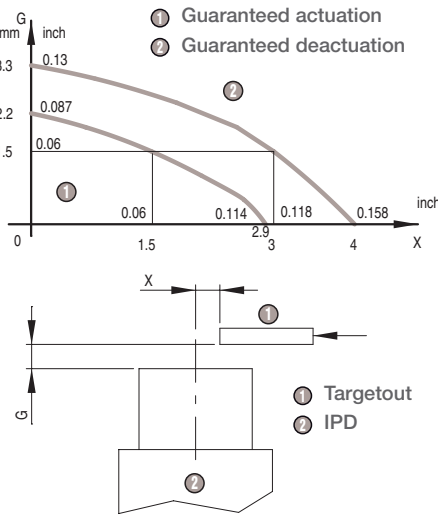


- ① Proximity Switch
- ② Load
- ③ Output: NPN type

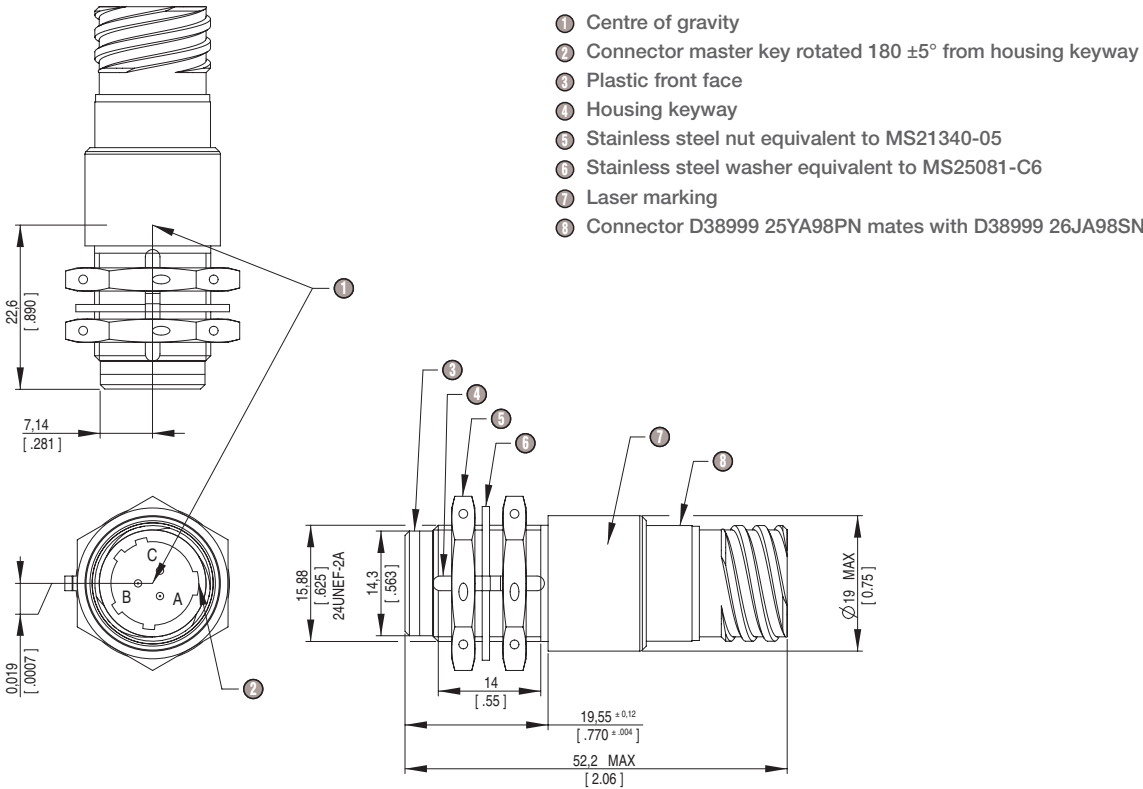
Detection characteristics

Target: ferro magnetic material
(ex: 17.4 PH annealed)
Ø 0.625 in (15.87 mm) thickness ≥ 1 mm

| Frontal approach | Operating-Temperature | -55°C to +95°C |
|--------------------|-----------------------|-----------------|
| Target approaching | Minimum actuation | 0.12 (3.05 mm) |
| Target receding | Maximum actuation | 0.16 (4.06 mm) |
| | Maximum Hysteresis | 0.015 (0.38 mm) |



Dimensions (mm)



PROXIMITY SWITCH

ALL METAL FOR LANDING GEAR FUNCTION

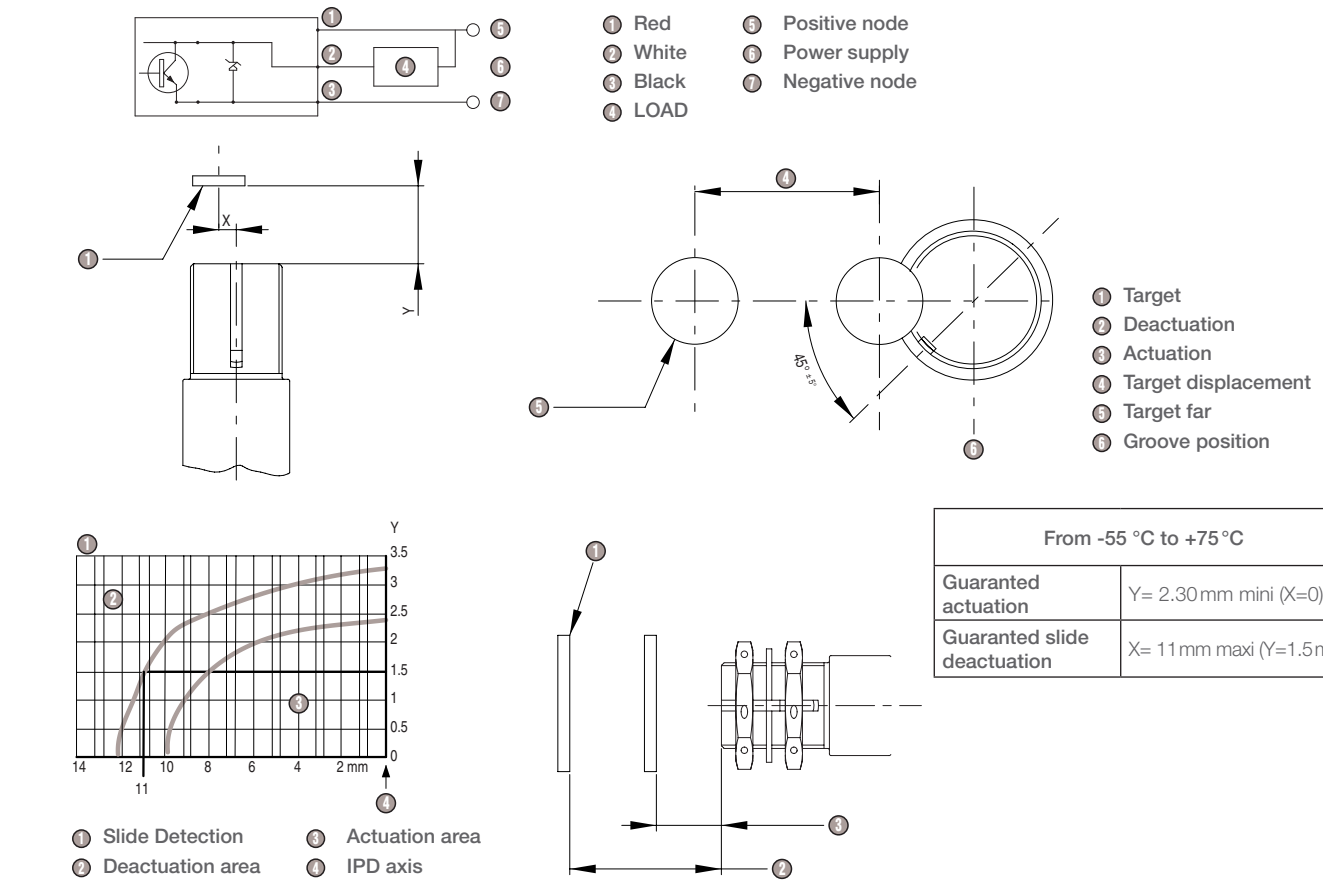
Specifications

| | | |
|-----------------------------|--|-----------|
| Part numbers | | DPI799118 |
| Environment characteristics | | |
| Operating temperature | -55°C to +75 °C | |
| Survival temperature | -55°C to +85 °C | |
| Altitude | RTCA DO 160D Section 4 Category F2 (Max. Operating altitude 51 000 ft) | |
| Overpressure | RTCA DO 160D Section 4 (absolute pressure 180 Kpa) | |
| Temperature variation | RTCA DO 160D Section 5 Category B | |
| Shocks & Crash safety | RTCA DO 160D Section 7 § 7.2 & § 7.3 | |
| Humidity | RTCA DO 160D Section 6 Category B | |
| Sand and Dust | RTCA DO 160D Section 12 Category D | |
| Fungus | RTCA DO 160D Section 13 Category F | |
| Salt spray | RTCA DO 160D Section 14 Category S | |
| Waterproofness | RTCA DO 160D Section 10 Category W | |
| Vibrations | RTCA DO 160D Section 8 Category S (Curve E) | |
| Material | Stainless steel including front face | |
| Weight | 70 g Max. (2.5 Oz) | |
| M T B F | 400 000 H | |

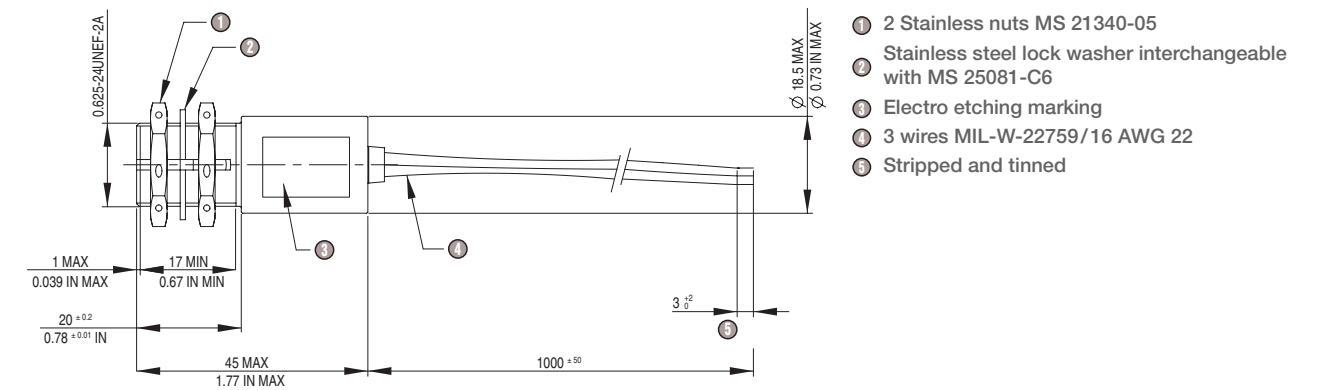


| | |
|---|---|
| Electrical characteristics | |
| Supply | +28 VDC |
| Minimum voltage | 17 VDC |
| Maximum voltage | 32.5 VDC |
| Power input test | RTCA DO 160D Section 16 Category Z |
| Magnetic effect | RTCA DO 160D Section 15 Category A |
| Voltage spike | RTCA DO 160C Section 17 Category A |
| Audio frequency conducted susceptibility | RTCA DO 160D Section 18 Category Z |
| Audio frequency conducted audio frequency conducted | RTCA DO 160D Section 19 Category A |
| Radio frequency susceptibility (conducted & radiated) | RTCA DO 160D Section. 20 Category R |
| Emission of radio frequency energy | RTCA DO 160D Section. 21 Category M |
| Induced lightning strike protection | RTCA DO 160D Section. 22 Level 2 |
| Current consumption | 10 mA Maximum under 32.5 VDC |
| Leak voltage | 1.5 VDC Maximum under 100 mA |
| Load current | 100 mA Maximum |
| Switching response time (Ton and Toff) | 2 ms Maximum |
| Switching frequency | 100 Hz Maximum |
| Insulation resistance | 100 MΩ / 50 VDC |
| Dielectric strength | 500 VDC/1 mn/ 1 mA |
| Protection against | Polarity inversion and load short circuit |

Principles



Dimensions (mm)



PROXIMITY SWITCH

HIGH PRESSURE FOR WIND TURBINE FUNCTION

Specifications

Part numbers **DPI799061**

| Environment characteristics | | | | |
|-----------------------------|--------------------------|------------------------|-------------------------|----------|
| Condition | A BD 0007 Section | Category | RTCA/DO-160C Section | Category |
| Temperature | 3.2 | A2 | 4 | A2 |
| Altitude | 3.3 | 43.100 ft -1 000 ft | 4 | D2 |
| Humidity | 3.4 | B | 6 | B |
| Waterproofness | 3.5 | R | 10 | R |
| Icing | 3.6 | | | |
| Salt spray | 3.7 | S | 14.3.6.6 | S |
| Sand and Dust | 3.8 | D | 12.3 | D |
| Vibration | 3.9 | 3J/C | 8 | J/C |
| Shock | 3.11.1 | | 7.1/7.2 | |
| Accelerations | 3.12 | Flight max. Values | | |
| Moisture | 3.13 | X | 13 | X |
| Pollution | 3.14 | X | 11 | X A/H |
| Dielectric strenght | 2-3.7 | | | |
| Power input supply DC | 2-3.5 | | 16 | |
| EMI | | | 19 | A |
| Fluids susceptibility | 2.3.11.3 to 2.3.11.10 | | | |



| Electrical characteristics | |
|--|---|
| Temperature Operating | -55 °C to +90 °C |
| Supply Min. | 14 V |
| Supply Max. | 32.5 V |
| Maximum voltage drop | 2 V under 150 mA 3 V under 500 mA |
| Maximun current | 500 mA Resistive or Inductive 50 mA Lamp nominal current |
| Electrical continuity | Between case and connector < 8 mΩ |
| Dielectric test | Dielectric strenght 500 VDC Insulation resistance: 400 MΩ / 50 Volts |
| Current consumption | 10 mA Max. under 32.5 V |
| Protections | Against inversion of polarity Against permanent short circuit of the load |
| Hermeticity | NFC 20631 Test QC Method 2 |
| Pressure on the detection face Hydraulic fluid NSA 307 110 | Normal working pressure: 206 +3 Bar Test pressure: 313 Bar |

Principles

Function: normally open

Frontal approach

Target: 9 mm square ; 1 mm thickness
Mat 1. 4104 (AFNOR Z10CF17)
For other target material / dimension, Ga/Gd
may vary.

| | | |
|----------------------|----------------|------------|
| Temperature | -55°C to +90°C | 20 °C |
| Actuation distance | ≥ 21.7 mm | ≥ 21.87 mm |
| Deactuation distance | ≤ 22.55 mm | ≤ 22.3 mm |

① Proximity Switch
② Output: PNP Type
③ Load

① Target
② Actuation
③ Deactuation

Dimensions (mm)

① Flats
② Connector type ASN-E0053N8B3PN

PROXIMITY SWITCH

HIGH PRESSURE FOR LANDING GEAR FUNCTION

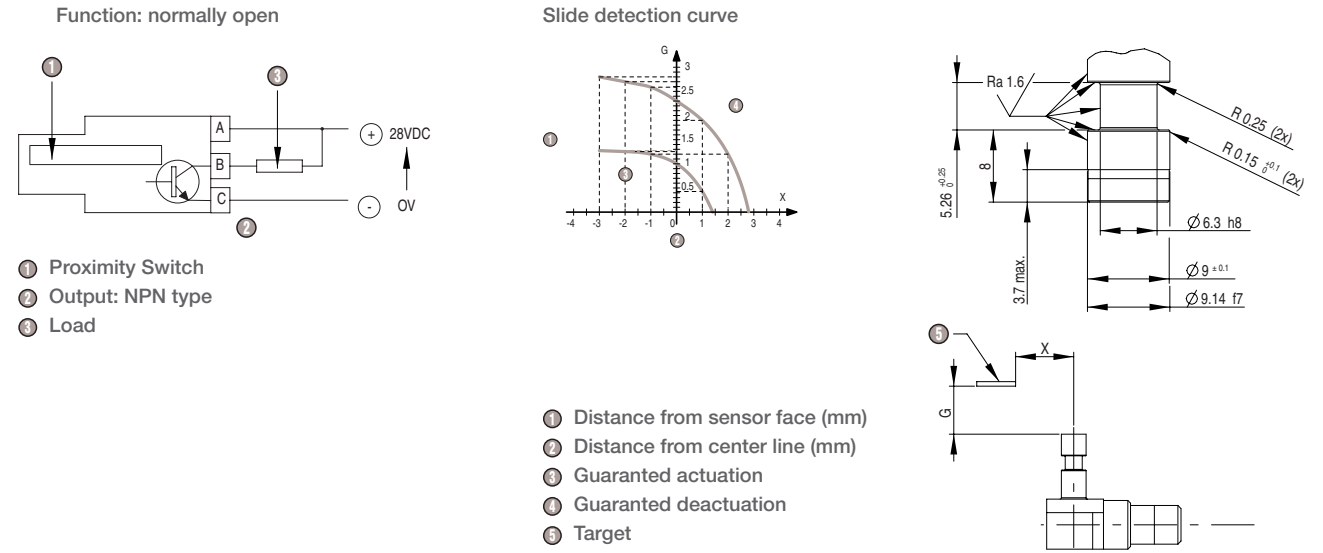
Specifications

| Part numbers | | DPI799059 | | |
|-------------------------------|-----------------|----------------|-------------------|--|
| | Norme MIL STD | Section Method | Procedure | |
| Temperature | 810E | 501-3&502-3 | 1 and 2 | |
| Altitude-Pressure | 810E | 500-3 | 1 and 2 | |
| Solar radiation | 810E | 505-3 | 1 and 2 | |
| Rain | 810E | 506-3 | 1 and 3 | |
| Ice and Icing rain | 810E | 521-1 | 1 | |
| Sand and Dust | 810E | 510-3 | 1 and 2 | |
| Direct effects of lightning | 1757A | ZONE 1B | Stationary impact | |
| Vibrations | 810E | 514-4 | 1-4-2-2 | |
| Accelerations | 810E | 516-4 | 4 | |
| Load factors | 810E | 513-4 | 2 | |
| Shocks | 810E | 516-4 | 1 | |
| Crashes | 810E | 516-4 | 5 | |
| Fungus | 810E | 508-4 | Cat.1 | |
| Conduced susceptibility | MIL STD 461-462 | CS01/02/06/07 | | |
| Radiated susceptibility | MIL STD 461-462 | RS01/02/03 | | |
| Conducted emissions | MIL STD 461-462 | CE01/02/03/04 | | |
| Emitted spikes on power lines | Pr EN2282 | | | |
| Radiated emission | RTCA DO 160C | 15 | Cat.Z | |
| | MIL STD 461C | RE01-RE02 | | |
| HIRF Radiated susceptibility | MIL STD 462 | RS03 | | |
| HIRF Conducted susceptibility | RTCA DO 160C | Section 20 | Cat.Y | |
| Electrostatic protection | RTCA DO 160D | 25 | A | |
| Humidity test | 810E | 507-3 | 1 | |
| Salt atmosphere | 810E | 509-3 | 1 | |

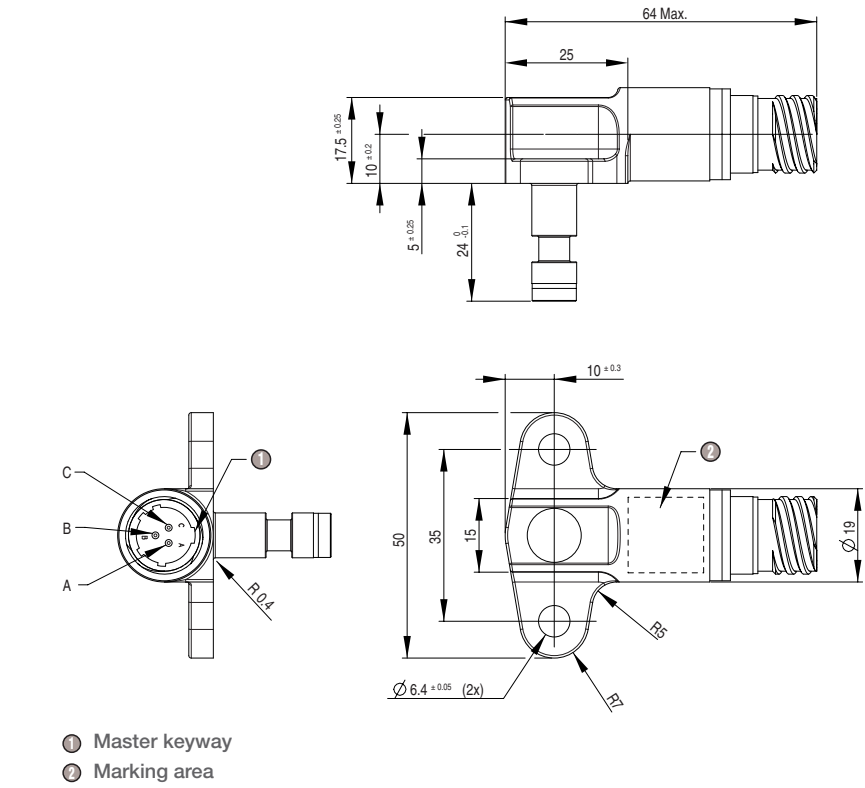
| Electrical characteristics | |
|--------------------------------|---|
| Operating temperature | -54 °C to +120 °C |
| Operating oil temperature | -54 °C to +135 °C during 4 hours Max. |
| Supply | 14 V Min., 38 V Max. |
| Leak voltage | 2 V under 100 mA |
| Current Max. 100 mA | Resistive or Inductive |
| Electrical continuity | Between case and connector < 2.5 mΩ |
| Dielectric test | Dielectric strenght 500 VDC - 1 mA |
| | Insulation resistance: 100 MΩ/500 V |
| Current consumption | 15 mA Max. under 14 V |
| | 15 mA Max. under 32.5 V |
| | 15 mA Max. under 38 V |
| Protections | Against inversion of polarity |
| | Against permanent short circuit of the load |
| Pressure on the detection face | Hydraulic fluid MIL H 5606F and MILH 83282C |
| | Burst pressure: 518 Bar |
| | Proof pressure: 310 Bar |
| Connector | Type D38999 25Y A98PN |
| Box material | Stainless steel |
| Weight | 120 g Max. |



Principles



Dimensions (mm)



PROXIMITY SWITCH

FOR CARGO LOADING SYSTEM FUNCTION

Specifications

Part numbers **DPI799074**

| Environment characteristics | | | | |
|---|--------------------|------------------------|---------------------------|----------------|
| Condition | ABD 100 Section | Category | RTCA / DO-160D Section | Category |
| Temperature | 1.2.1.1 | A2 | 4 | A2 |
| Altitude | 1.2.1.2 | 43 100 ft -1 000 ft | 4 | A2 |
| Humidity | 1.2.1.4 | A | 6 | A |
| Waterproofness | 1.8 | | 10 | R |
| Icing | 1.2.1.15 | | 24 | A |
| Salt spray | 1.2.1.12 | | 14 | S |
| Sand and Dust | 1.2.1.10 | | 12 | D |
| Vibration | 1.2.1.6 | | 8 | S |
| Shocks | 1.2.1.5 | operational shocks | 7 | A 6 G/11 ms |
| Accelerations | 1.2.1.20 | Flight max. values | | |
| Fungus | 1.2.1.11 | | 13 | F |
| Fire class | 1.2.1.17 | N/A | | |
| Fluids susceptibility | 1.2.1.9 | | 11 | F |
| Power input supply DC | 1.9 | | 16.5 | A |
| Voltage spikes | 1.6 | | 17 | A |
| Magnetic effects | 1.2.1.14 | | 15 | A |
| Radio frequency susceptibility | 1.2.3.3 | | 20 | U |
| Lightning induced transient susceptibility | 1.2 | | 22 | C |
| Conducted susceptibility audio frequency | 1.2.3.4.2 | | 18 | A |
| Induced signal susceptibility | 1.2.3.4.3 | | 19 | Z |
| Emission of radio frequency energie | 1.2.3.4.4 | | 21 | L |



| Electrical characteristics | |
|----------------------------|--|
| Temperature | Operating: -40 °C to +70 °C |
| | Survival: -55 °C to +85 °C |
| Supply | Min.: 17 V, Max.: 32.5 V |
| Leak voltage (target near) | 0.25 V under 250 mA |
| Current Max. 250 mA | Resistive or Inductive |
| Electrical continuity | Between case and connector < 20 mΩ |
| | Leakage current (target far) ≤ 500 µA under 28 V |
| Current consumption | 8 mA Max. under 28 V |
| | Switching frequency ≤ 100 Hz |
| | Insulation resistance ≥ 100 MΩ at 45 VDC |
| | Dielectric strenght >500 VDC |
| | Momentary power interruption: <1 ms |
| Protections | Power on reset: ≤ 5 ms |
| | Against inversion of polarity |
| Protections | Against permanent short circuit of the load |
| | |
| Vibration test | IPD is fixed by 2 screws |

Principles

Function: normally open

Detection characteristics

Dimensions (mm)

PROXIMITY SWITCH

FOR CARGO LOADING SYSTEM FUNCTION

Specifications

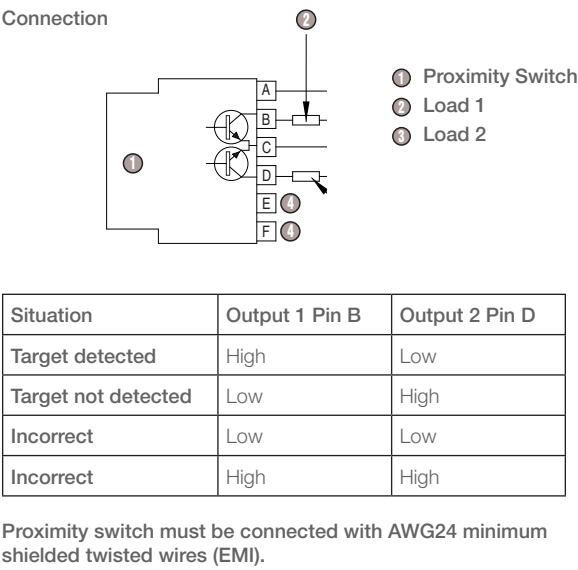
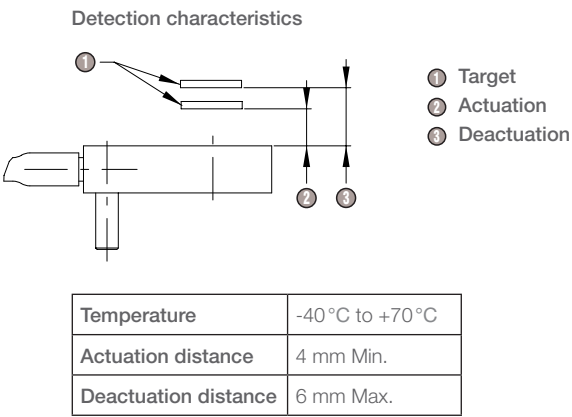
Part numbers DPI799116

| Environment characteristics | | | | |
|--|-----------------|-------------------------|------------------------|----------------|
| Condition | ABD 100 Section | Category | RTCA / DO-160D Section | Category |
| Temperature | 1.2.1.1 | A2 | 4 | A2 |
| Altitude | 1.2.1.2 | -1 000 ft +43 100 ft | 4 | A2 |
| Humidity | 1.2.1.4 | A | 6 | A |
| Waterproofness | 1.8 | | 10 | R |
| Icing | 1.2.1.15 | | 24 | A |
| Salt spray | 1.2.1.12 | | 14 | S |
| Sand and Dust | 1.2.1.10 | | 12 | D |
| Vibration | 1.2.1.6 | | 8 | S |
| Shocks | 1.2.1.5 | Operational shocks | 7 | A 6 G/11 ms |
| Accelerations | 1.2.1.20 | Flight max. values | | |
| Fungus | 1.2.1.11 | | 13 | F |
| Fire class | 1.2.1.17 | N/A | | |
| Fluids susceptibility | 1.2.1.9 | | 11 | F |
| Power input supply DC | 1.9 | | 16.5 | A |
| Voltage spikes | 1.6 | | 17 | A |
| Magnetic effects | 1.2.1.14 | | 15 | A |
| Radio frequency susceptibility | 1.2.3.3 | | 20 | U |
| Lightning induced transient susceptibility | 1.2 | | 22 | C |
| Conducted susceptibility audio frequency | 1.2.3.4.2 | | 18 | A |
| Induced signal susceptibility | 1.2.3.4.3 | | 19 | Z |
| Emission of radio frequency energie | 1.2.3.4.4 | | 21 | L |

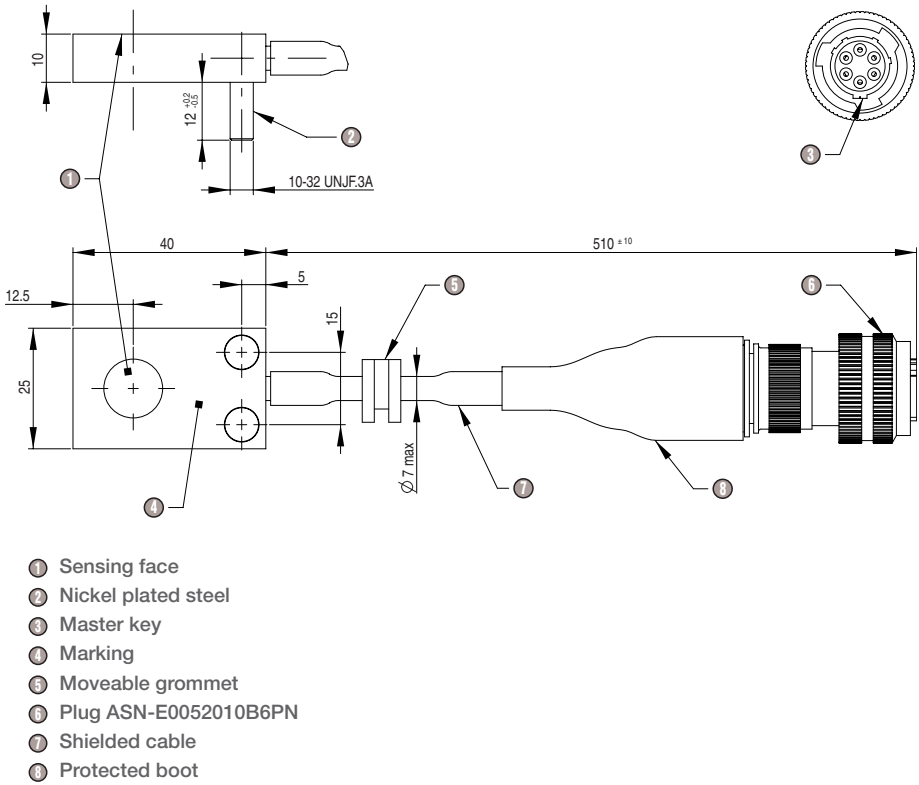


| Electrical characteristics | |
|------------------------------|---|
| Temperature | Operating: -40 °C to +70 °C |
| | Survival: -55 °C to +85 °C |
| Supply | Min.: 17 V, Max.: 32.5 V |
| Leak voltage (target near) | 1 VDC Max. under 25 mA |
| Output max current | 25 mA resistive or inductive load |
| Maximum Capacitor load | 22 nF |
| Electrical continuity | Between case and connector 20 mΩ Max. |
| Leakage current | 500 µA Max. under 28 VDC |
| Current consumption | 10 mA Max. under 32.5 VDC |
| Switching frequency | 100 Hz Max. |
| Insulation resistance | 100 MΩ Min. at 45 VDC |
| Dielectric strenght | > 500 VDC |
| Momentary power interruption | 1 ms Max. |
| Power and reset | 5 ms Max. |
| Protections | Against inversion of polarity |
| | Against permanent short circuit of the load |
| Weight | 100 g Max. |
| Material case | Aluminium protected |

Principles



Dimensions (mm)



PROXIMITY SWITCH FOR LANDING GEAR FUNCTION

Specifications

Part numbers

DPI799238

Mechanical characteristics

| | |
|--------|-----------|
| Weight | 145 ±10 g |
|--------|-----------|

| | |
|---------|--|
| Housing | Stainless steel Front face: peek (Arlon 1000) |
|---------|--|



Electrical characteristics

Hysteresis
≤ 1.5 mm

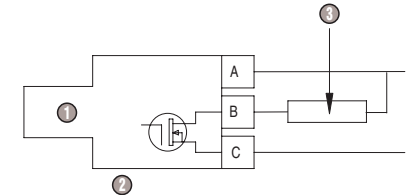
for $D \leq 1.6$ mm:
the detector will always
be in detection mode

for $D \geq 3.1$ mm:
the detector will always
be in non detection mode

| CROUZET.COM

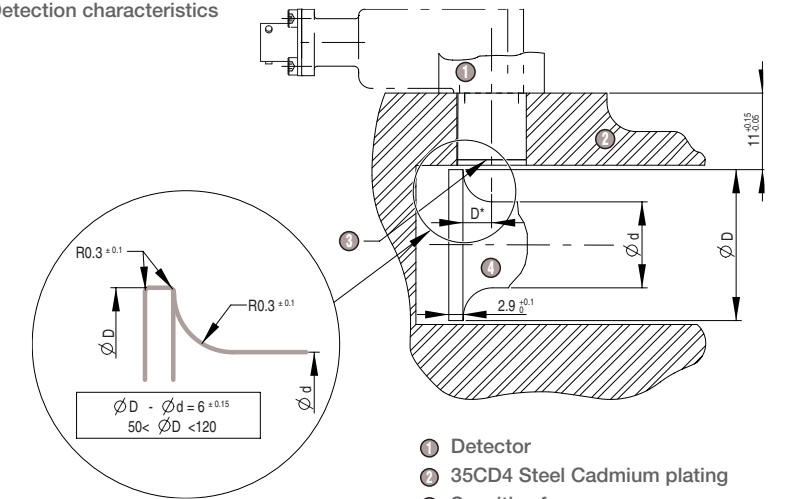
Principles

Detection characteristics



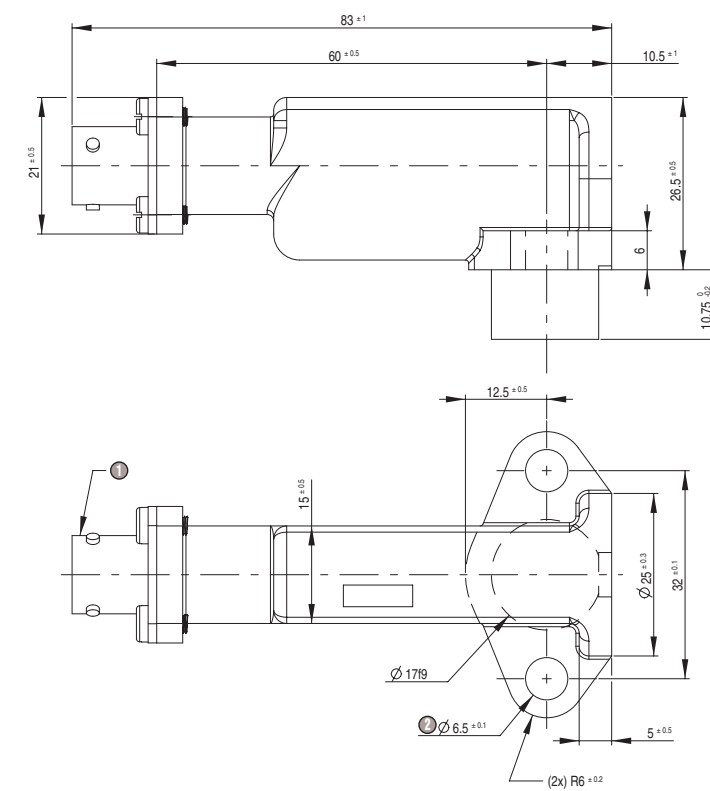
- 1 Detector
- 2 Output type: NPN
- 3 Load

Detection characteristics



* Please refer to Electrical characteristics & Hysteresis P.76

Dimensions (mm)



- ① Connector MS3112E 8-33P following MIL-C-26482 I Serie
- ② 2 holes

PROXIMITY SWITCH

FOR THRUST REVERSER ACTUATOR FUNCTION

Specifications

Part numbers **DPI799079**

| Environment characteristics | | | |
|----------------------------------|------------------------------------|------------|------------------------|
| Condition | RTCA / DO-160D | | Category |
| | Section | | |
| Temperature | 4 | | F3 |
| Temperature variation | 5 | | A |
| Altitude | 4 | | F3 |
| Humidity | 6 | | B |
| Waterproofness | 10 | | R |
| Salt spray | 14.0 | | S |
| Sand and Dust | | | N/A |
| Vibration | 8 | | H2 Curve D and P |
| Operation shock and Crash safety | 7.2 / 7.3 | | B |
| Hermeticity | MILPRF8805E | watertight | |
| Supply voltage | 16 | | A |
| Voltage spike | 17 | | A |
| EMI | Conducted susceptibility | 18 | Z |
| | Induced signal susceptibility | 19 | Z |
| | Radio frequency susceptibility | 20 | Conducted W |
| | Emission of radio frequency energy | 21 | H |
| Explosion proof | 9.0 | | E1 |
| Fluid susceptibility | 11.0 | | F |
| Fungus | 13.0 | | F |
| Magnetic effects | | | N/A |
| Lighting indirect effect | 22 | | Waveform Set A Level 4 |
| Icing | 24 | | C |
| Lighting direct effect | | | N/A |
| Electrostatic discharge | 25 | | 15 kV |



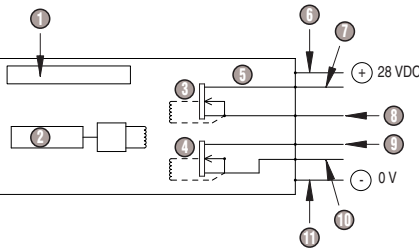
| Electrical characteristics | |
|--------------------------------------|---|
| Temperature | Operating storage and survival: -55°C to +121 °C |
| Supply voltage | 16 V Min., 32.5 V Max. |
| Max. Consumption current | 15 mA Max. under 32.5 V |
| Output voltage | 8 VDC Min., 32.5 VDC Max. |
| Output leakage voltage (On) | 1 V Max. under 50 mA |
| Output leakage current (Off) | 100 µA Max. |
| Output current Max. 100 mA | Resistive or Inductive |
| Maximum switching frequency | 50 Hz |
| Protections | Against inversion supply polarity and output polarity with load |
| | Against permanent short circuit of the load |
| Shock resistance | 100 G/11 ms |
| Dielectric test ISO 2678 Catégorie C | Dielectric strenght: 1 000 VAC - 1 Min. - 500 µA |
| | Insulation resistance: 100 MΩ/500 VDC |
| MTBF | = 115 000 flight hours |

Principles

- Function: normally open**

 - when target is far , the output is not conductive
 - when target is near , the output is conductive
- Detection characteristics**

 - From -55 °C to +121 °C (-65 °F to +250 °F)
 - Frontal approach
 - Target: 15.87 mm (0.625 in) square; 1 mm (0.04 in) thickness material 15-5 PH
 - Actuation distance 0.1 <Ad<0.14 in or 2.5 <Ad<3.55 mm
 - Deactuation distance 0.145 <Dad<0.18 in or 3.68 <Dad<4.57 mm



- ① Proximity switch

② Detection

③ Out 1

④ Out 2

⑤ MOS N

⑥ White
- ⑦ Orange

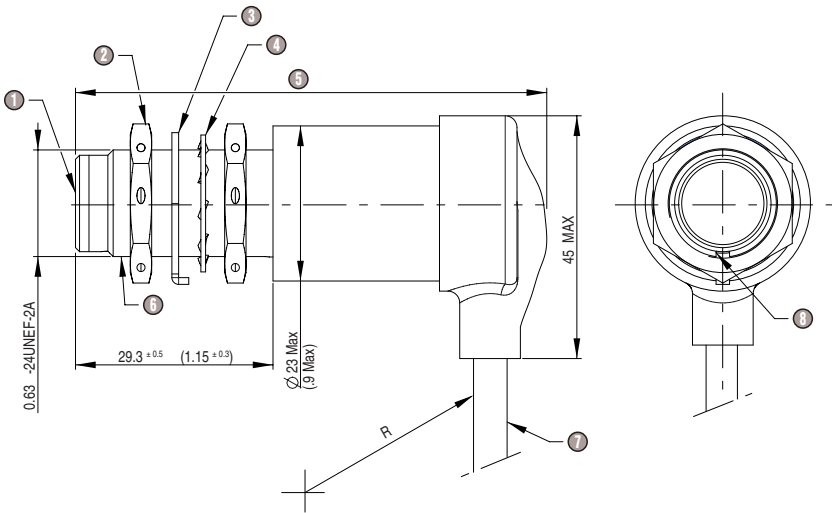
⑧ Green

⑨ Red

⑩ Black

⑪ Blue

Dimensions (mm)



- ① Sensing face material flush and plastic

② Nut MS21340-05

③ Lock washer MS25081-C5

④ Lock washer MS35333-138

⑤ 80 Max. in the Proximity Switch axis

⑥ Keyway

⑦ Shielded cable

⑧ Keyway

PROXIMITY SWITCH

FOR THRUST REVERSER ACTUATOR FUNCTION

Specifications

Part numbers **DPI799339**

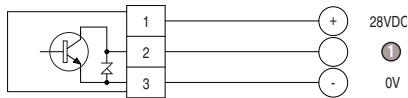
| Environment characteristics | |
|---|---|
| Temperature | RTCA DO 160C |
| Operating temperature | -65°F to +250°F |
| Survival temperature | -80°F to +250°F |
| Materials | AISI 303 (Z10 CNF 18 09) |
| Humidity and Ice | MIL std 810E Method 507-2 procedure III |
| Salt spray | MIL std 810E Method 509-2 |
| Fungus | MIL Std 810E Method 508-3 |
| Sand and Dust | MIL Std 810E Method 510-2 Procedure I |
| Structural vibration | 0.036 in D.A. 10-52 Hz |
| | 10 G Constant 52-1 400 Hz |
| | 20 G Constant 1 400-2 000 Hz |
| Shocks | MIL Std 810E Method 516-4 Procedure I 20 G/10 ms |
| Weight | 0.19 Lb Max. (85 g Max. without nut) |
| Tightening torque | 22.7 Nm Max. (200 inch/Pd) |
| Connector to wrenching flats torsional load | 13 Nm Max. (115 inch/Pd) |



| Electrical characteristics | |
|---|---|
| Supply | MIL Std 704D |
| Minimum voltage | 16 V DC |
| Maximum voltage | 32.5 V DC |
| Voltage transients | MIL Std 704D |
| Anti interference | MIL Std 704D |
| Max. Short circuit resistance (Output On) | 40 Ω under 10 mA |
| Switching current | 20 mA Max. |
| Open circuit voltage | 6 V Max. |
| Open circuit leakage current | < 25 μA under 5 V DC |
| Electrical continuity | < 10 mΩ between case and connector |
| Consumption | < 10 mA without load under 32 V |
| | < 5 mA without load under 16 V |
| Switching frequency | ≤ 250 Hz |
| Insulation resistance | ≥ 40 MΩ at 500 V DC |
| Insulation voltage | > 1 500 V AC/1 min. |
| Lightning protection | PS 966903 Fig. 4-3-12 V Peak 600 V/6 Ω |
| Protections | Overload and load short circuit |

Principles

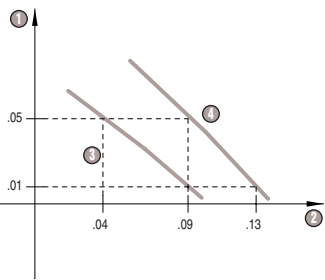
Function: normally open



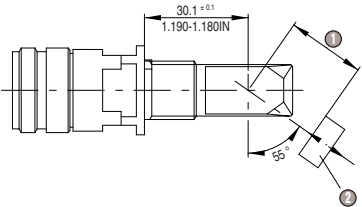
① Out

Slide detection curve

For a gap between target and front face (metal body) = 0.01 to 0.05 inch

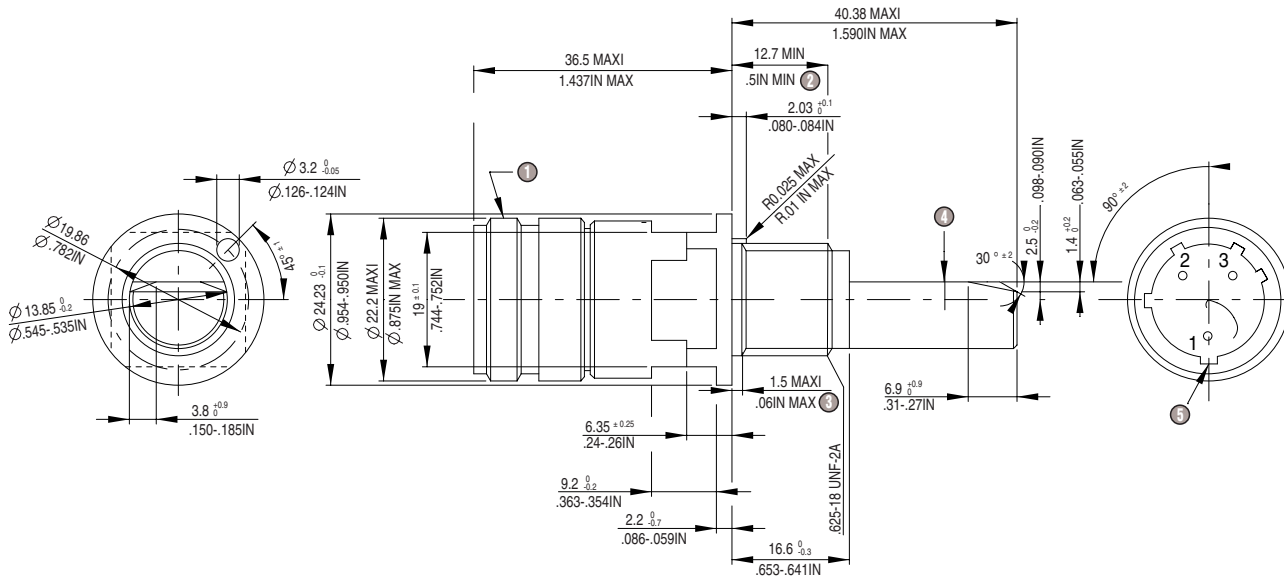


Hysteresis: < 0.015 in (0.381 mm)
Derating: ≤ 0.025 in (0.63 mm)



- ① Gap (inch)
- ② SDD (inch)
- ③ Guaranteed deactuation
- ④ Guaranteed actuation

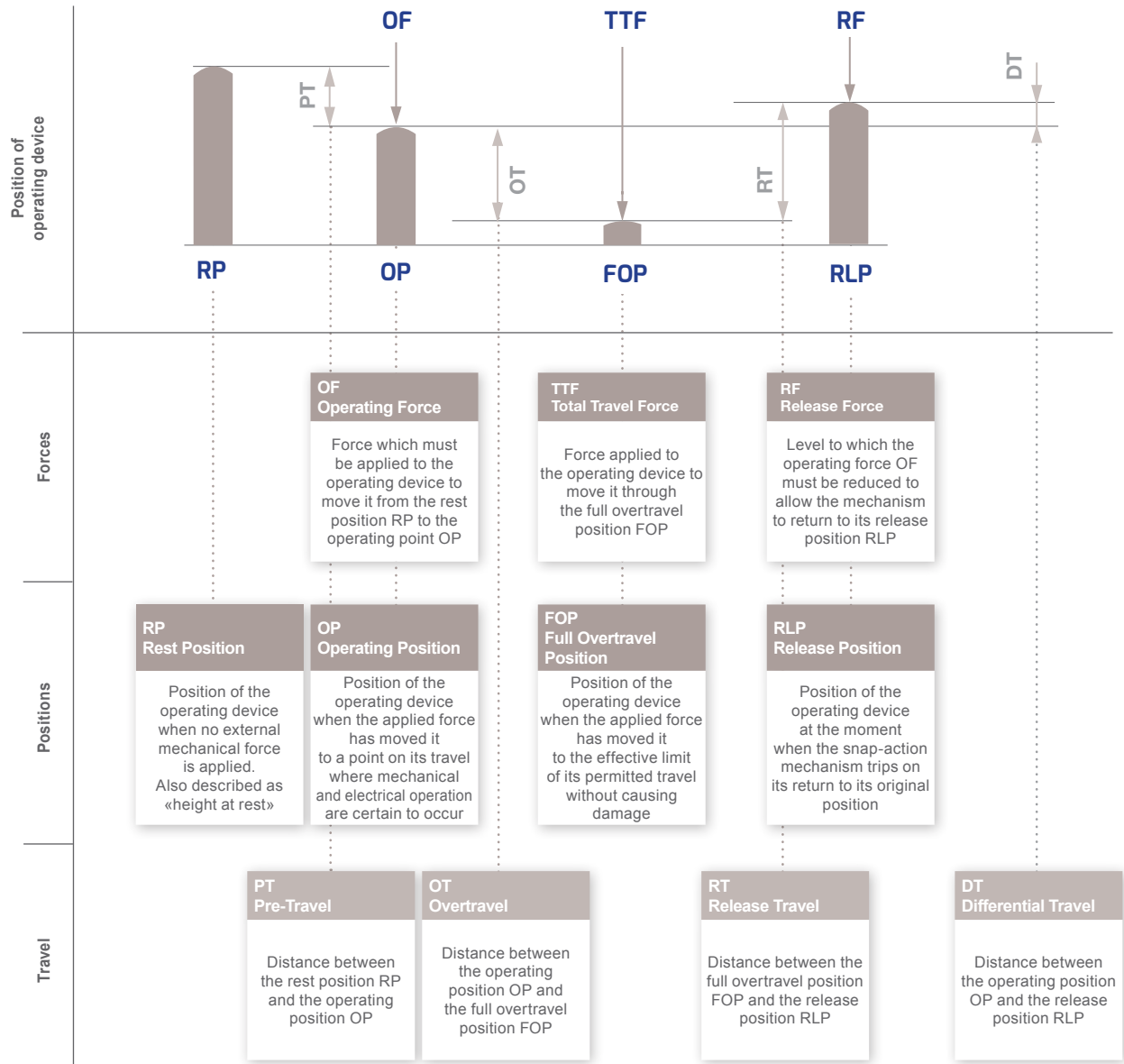
Dimensions (mm)



- ① Connector MS24264R 12T03 PN-2
- ② THD
- ③ Imperfect THD
- ④ Sensor head, always below the metal body
- ⑤ Master keyway

TERMINOLOGY

FORCES - POSITIONS - TRAVEL



NOTES

AMERICAS

CANADA

Tel.: +1 (855) 929-5465
americas.custserv@crouzet.com

MEXICO

Tel.: +1 (855) 929-5465
americas.custserv@crouzet.com

USA

+1 (855) 929-5465
americas.custserv@crouzet.com

COUNTRIES NOT LISTED

+1 (855) 929-5465
americas.custserv@crouzet.com

EUROPE / MIDDLE EAST / AFRICA

BELGIUM

Tel.: +32 (0) 2 620 06 05
Fax: +32 (0) 2 461 00 23
klantenservice@crouzet.com

FRANCE

Tel.: +33 (0) 475 802 101
Fax: +33 (0) 475 828 900
relationclient@crouzet.com

GERMANY / AUSTRIA

Tel.: +49 (0) 2103/9385930
Fax: +49 (0) 2103/980-222
kundenservice@crouzet.com

ITALY

Tel.: +39 (02) 38 594 099
Fax: +39 (02) 82 952 104
assistenzaclienti@crouzet.com

SPAIN / PORTUGAL

Tel.: +34 (91) 215 80 95
Fax: +34 (93) 2 20 02 05
atencionalcliente@crouzet.com

SWITZERLAND

Tel.: +41 (0) 225 67 57 90
Fax: +41 (0) 565 88 02 75
kundenservice@crouzet.com

THE NETHERLANDS

Tel.: +31 (0) 20-654 52 20
klantenservice@crouzet.com

UNITED KINGDOM

Tel.: +44 (0) 2076 600 025
customer.relation@crouzet.com

COUNTRIES NOT LISTED

Tel.: +33 (0) 475 802 102
Fax: +33 (0) 475 828 900
customer.relation@crouzet.com

ASIA / PACIFIC

CHINA

Tel.: +86 (75) 2 5303 200
china@crouzet.com

INDIA

india@crouzet.com

SOUTH KOREA

Tel.: +82 (2) 2679 8312
Fax: +82 (2) 2679 9888
korea@crouzet.com

EAST ASIA PACIFIC

Tel.: +86 (21) 8025 7177
Fax: +86 (21) 6107 1771
eap@crouzet.com

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