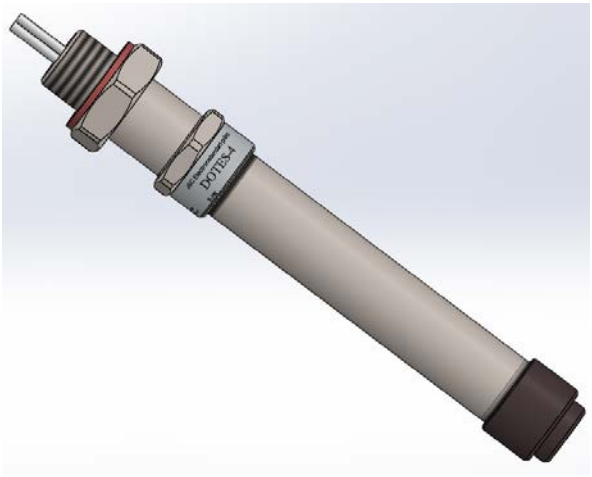
HIGH TEMPERATURE DETECTORS – SPECIAL HEAT FIRE DETECTORS IP 103-1 «DOTES»

Operation Manual
405242.004 OM



Date	Revision	Description	Approved
03/10/14	01	Initial Draft	O.Zverev

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1 Designation

1.1 High temperature detectors – Special Heat Fire Detectors IP 103-1 «DOTES» (hereinafter DOTES) are used in the fire alarm and automatic fire extinguishing systems. The detectors are installed near technological equipment of pumping plants of main oil and gas pipelines. They alert about temperature rise above permissible value.

Scope of application: explosion hazard zones of premises and outside installations according to GOST R 51330.9, chapter 7.3 of Electrical Safety Rules and other regulatory documents regulating use of electric equipment in explosion hazard zone.

The DOTES detectors meet requirements of GOST R 51330.0, ГОСТ R 51330.1, GOST 14254 (IP67 group).

Operating conditions:

- temperature from minus 60 up to 90 °C for DOTES-1, from minus 60 up to 170 °C for DOTES-2, from minus 60 up to 190 °C for DOTES-3 and from minus 60 up to 240 °C for DOTES-4;
- atmospheric pressure from 0.01 up to 300 KPa;
- relative air humidity up to 93 % at 40 ºC.

DOTES consists of a temperature-sensitive unit and explosion-proof terminal box.

The temperature-sensitive unit ensures automatic reset of DOTES upon reduction of the temperature lower than the minimal response temperature. Depending on the detector model, the reset temperature is 20 °C (for DOTES-1), 30 °C (for DOTES-2), 40 °C (for DOTES-3) or 50 °C (for DOTES-4) lower than their minimal response temperature.

The following models of DOTES detectors are manufactured (see Table 1):

Table 1

Identification	Main Engineering Document	Bimetallic Relay	Terminal Box
DOTES-1	405242.004	KSD-85	240 – 424
DOTES-2	405242.004-01	KSD-160	240 – 424
DOTES-3	405242.004-02	KSD-180	240 – 424
DOTES-4	405242.004-03	52N12T044(225/175)	240 – 424

2 Basic Specifications

2.1DOTES dimensions, maximal, mm: 300×130×90.

2.2. DOTES weight, maximal, kg: 2.3.

2.3 Response temperature and time of DOTES are within the ranges specified in Table 2.

Table 2

Identification	Main Engineering Document	Maximal Normal Temperature, °C	Response Temperature, °C	Maximal Response Time, s
			Minimal	Maximal
DOTES-1	405242.004	76	80	90
DOTES-2	405242.004-01	146	150	170
DOTES-3	405242.004-02	166	170	190
DOTES-4	405242.004-03	209	215	235

2.4 DOTES has outputs in the form of normally closed “dry” relay contacts. The relay contacts shall unclose at the response temperature.

2.5 DOTES shall reset automatically upon temperature reduction below the reset temperature of the heat-sensitive unit and the relay contacts shall close.

2.6 Electric insulation between DOTES short-circuited output contacts and enclosure stands sine-curve alternating voltage 1.5 kV with frequency 50 Hz at environmental temperature (25 ± 10) °C and relative humidity 80%.

2.7 Electric resistance of the insulation between DOTES short-circuited output contacts and enclosure is not less than:

20 megohm at temperature (25 ± 10) °C and maximal relative humidity 80%;

5 megohm at upper operating limit temperature 45 °C;

1 megohm at temperature 35 °C and relative humidity 95%.

2.8 DOTES ensures twenty-four-hour continuous operation.

2.9 DOTES is resistant to high temperature 15ºC higher than the response temperature and low environmental temperature down to minus 60 ºC.

2.10 DOTES is resistant to cyclic impact of relative air humidity 95% at temperature 25 ºC.

2.11 DOTES is resistant to cyclic impact of relative air humidity 93 % at temperature 40 ºC.

2.12 DOTES is resistant to impact of sinusoidal vibration with acceleration 4.905 m/s^2 (0.5 g) within the frequency range from 10 up to 150 Hz.

2.13 DOTES is resistant to impact of sinusoidal vibration with acceleration 9.81 m/s^2 (1 g) within the frequency range from 10 up to 150 Hz.

2.14 DOTES is resistant to impact of single impact half-sine impulses. The peal acceleration shall be at least 50 m/s^2, pulse length shall be within the range from 10 to 20 ms.

2.15 DOTES is resistant to impact of electrostatic discharges. Stiffness degree is at least 4 according to fire safety regulations 57-97.

2.16 DOTES is resistant to impact of magnetic field with frequency 50 Hz. Stiffness degree is 4 according to fire safety regulations 57-97.

2.17 DOTES enclosure meets requirements of GOST 14254 for group IP67.

2.18 Relay contact of heat-sensitive unit ensure commutation of AC voltage up to 250 V with current up to 10 A.

2.19 Mean time between failures, minimal: 200,000 hours.

2.20 Average service life, minimal: 10 years.

3 Delivery Set

3.1. The delivery set includes:

a) the DOTES special heat fire detector, configuration in accordance with Table 1;

b) certificate 405242.004 PS;

c) set of accessories according to specification 405242.004.

4 Structure and Operation

4.1 DOTES assembly drawing is given in Annex A.

4.2 DOTES consists of a heat-sensitive unit and explosion-proof terminal box.

The heat-sensitive unit consists of a housing, bimetallic relay, threaded cap and threaded reducing sleeve M16×1.5. Relay is inside the housing. It is retained against the housing face with the threaded cap.

The unit is screwed down (M16×1.5) in the explosion-proof terminal box and fastened by a stop washer.

Explosion protection is provided by tightening torque of cover bolts, threaded joints of the reducing sleeve and structural elements of the joints (thread length and pitch, length of seating and mounting surfaces).

5 Safety Measures

5.1 Safety of DOTES structure complies with GOST 12.2.007.0. As for human protection against electrical shock, DOTES complies with class I.

5.2 DOTES has a dust-ignition-proof enclosure identified as “Explosion-Proof Enclosure” according to GOST R 51330.1 and “explosion-proof” explosion protection level with the following marking: 1ExdIICT5 – for DOTES-1, 1ExdIICT3 – for DOTES-2, DOTES-3, 1ExdIICT2 – for DOTES-4 according to GOST 51330.0.

5.3 Explosion protection

DOTES explosion protection is provided by:

1) placing of live parts into explosion-proof enclosure with flameproof threaded joints in the junctions of explosion-proof enclosure parts capable to stand explosion pressure and prevent from explosion delivery to the explosive environment. Part junctions on the drawings are marked with “Explosion” word with specification of permissible explosion protection parameters: roughness of surfaces making flameproof joints, axial length and pitch of thread for threaded flameproof joints according to the requirements of GOST R 51330.1-99;

2) restriction of heating temperature of DOTES external parts;

3) cable gland in the cable input with a special rubber ring according to GOST R 51330.1-99;

4) prevention from self-unfastening of all bolts fastening the parts ensuring explosion protection of detectors as well as current-carrying and grounding clamps using spring and stop washers;

5) high mechanical stability of DOTES according to GOST R 51330.0-99;

6) warning label on the cover of DOTES housing:

“De-energize before opening!”;

7) protection of all surfaces marked with “Explosion” word by grease lubricant;

8) minimal protection degree of DOTES housing is IP67 according to GOST 14254-96.

6 Pre-staring Procedures

6.1 DOTES is installed in explosion hazard zones. Installation shall be performed in accordance with this manual, chapter ESh-13 Electric Installations of Explosion Hazardous Facilities of Operating Rules and Safety Regulations, Electrical Installation Regulations, guidelines on installation of electric equipment of power and lighting lines in explosion hazard zones VSN 332-74 and other regulatory documents.

6.2 Visual inspection of DOTES shall be conducted before installation. The following aspects shall be checked:

a) consistency of the enclosure and threaded explosion-proof surfaces;

b) availability of all fastening elements;

c) availability of explosion protection marking and warning label;

d) availability of grounding devices;

e) availability of glands for cable and cable input.

6.3 DOTES shall be grounded both with internal grounding clamp and external grounding clamp meeting requirements of GOST 21130-75. The requirements of Electrical Installation Regulations and guideline VSN 332-74 shall be fulfilled.

External grounding clamp of DOTES shall be connected with the common ground by a steel bar. The external grounding conductor shall be cleaned up thoroughly. Its joint with external grounding clamp shall be protected against corrosion using grease lubricant.

Upon completion of grounding works, it is necessary to measure grounding resistance using an ohmmeter. It shall not exceed 4 ohm.

6.4 Condition of explosion-proof surfaces of parts subject to disassembly shall be checked during DOTES installation.

6.5 Removable parts shall bear against the surface as tightly as the structure allows.

6.6 Cable gland in the cable input shall be made accurately as DOTES explosion-resistance depends on it.

7 Operation Procedure

7.1 Only qualified specialists who have read this operating manual and undergone safety training of electric installation operation, including installations in explosion hazardous zones, are allowed to operate DOTES.

7.2 Safety measures provided by requirements of Operational Code for Electrical Installations, including chapter 3.4 Electrical Installations in Explosion Hazardous Zones of Power System Safety Standards shall be taken when operating DOTES.

7.3 DOTES shall be equipped with internal and external grounding devices and grounding signs according to GOST 21130-75.

7.4 All requirements and parameters specified in sections 5 and 6.2 of this Operating Manual shall be fulfilled when operating DOTES.

8 Maintenance

8.1 Maintenance includes regular visual inspection of DOTES. Consistency of all DOTES parts and assemblies, frame-grounding circuit and cable shall be checked.

Consumer is to determine frequency of inspections depending of conditions of DOTES operation.

9 Inspection Procedure

9.1 General Provisions

All tests are conducted under normal conditions:

- ambient air temperature 20 ± 5 °C;
- relative air humidity - from 30 up to 80%;
- atmospheric pressure - from 84 to 106.7 KPa;
- error in temperature measurement shall not exceed ±3 ^{o}C.

9.2 Inspection Operations

The operations to be performed for inspection are specified in Table 4.

Table 4

No. Operation	Clause	Mandatory operation	
		Initial inspection and after repair	During operation
1 Inspection of insulating strength	9.3.1	+	-
2 Inspection of electrical insulation resistance	9.3.2	+	-
3 Determination of response temperature and time	9.3.3	+	+

9.3 Inspection

9.3.1 DOTES insulating strength between short-circuited output contacts and housing is checked using the UPU-10 OI.2029-80 TU device for insulating strength testing as follows:

Connect one output of UPU-10 to the short-circuited output contact and the other one to the housing;

Switch UPU-10 on and increase testing voltage gradually from 0 to 1.5 kV for 5-10 s. Monitor voltage using a voltmeter. Leave the insulation under voltage impact for 1 minute. Then reduce the testing pressure down to zero gradually for 5-10 s and switch the device off.

DOTES passed the test if there is no insulation breakdown or breakover.

9.3.2 Electrical insulation resistance of DOTES between the short-circuited output contacts and housing is checked using the F4101 25-04-2467-75 TU megohmmeter as follows: connect one output of the megohmmeter to the short-circuited output contacts and the other one to the housing and measure insulation resistance.

The inspection has satisfactory result if the minimal insulation resistance is 20 megohm.

9.3.3 Response temperature and time of DOTES are determined as follows: put the DOTES heat-sensitive unit into the hole of TS 600-2 leveling block of room temperature (20 ± 5) ^{o}C.

Increase temperature in the operating chamber up to the value equal to maximal normal temperature $T_{0\ max}$ (temperature setting and maintenance tolerance – minus 3 ^{o}C). Start countdown. Leave DOTES at this temperature for two hours. Monitor that the DOTES does not actuate.

Increase temperature in the operating chamber up to the value equal to maximal operation temperature $T_{op.max}$ (temperature setting and maintenance tolerance – plus 3 °C). Start countdown. Leave DOTES at this temperature until actuation, but not more than the response time specified in Table 2. Record the actuation using the Ts4311 25-04-3300-77 TU combined instrument operating in the resistance measurement mode and connected to the DOTES output contacts. The instrument reading shall become equal to infinity.

DOTES passed the test, if it does not actuate at maximal normal temperature and in case of operation temperature increase within the range from minimal $T_{op.min}$ to maximal $T_{cp.max}$ it actuates within the period which does not exceed the value specified in Table 2.

9.4 Recording of Inspection Results

9.4.1 Positive testing results are specified in the certificate of due form or in the section "Acceptance Certificate" of the operating manual.

9.4.2 DOTES detectors meeting requirements of this inspection procedure are recognized to be ready for service.

9.4.3 DOTES detectors failing to meet requirements of this inspection procedure are recognized to be unserviceable and Unserviceability Notice is issued for such detectors.

10 Transportation and Storage Rules

10.1 DOTES packaged in accordance with specifications may be transported to any distance by any vehicle. Transit containers with packaged DOTES detectors shall be protected against atmospheric precipitation during transportation.

In case of air transportation the DOTES detectors shall be transported in heated sealed compartments. Cargo arrangement and fastening in vehicles shall ensure its stable position during transportation. Cargo shall not move out of position during transportation.

10.2 Railway cars, containers, car bodies used for DOTES transportation shall not have any signs of transportation of cement, coal, chemical, etc.

10.3 DOTES packaged in accordance with specifications shall be stored in accordance with requirements of GOST 15150 for group 3 during the warranty period. There shall be no dust, vapors of acids and alkalies, aggressive gases and other harmful impurities in the storage premises.

11 Marking and Sealing

11.1 DOTES marking shall contain the following data:

a) trademark of the manufacturing enterprise;

b) DOTES identification in accordance with Table 1;

c) mark of certification authority;

d) explosion protection marking: 1ExdIICT5 – for DOTES-1, 1ExdIICT3 – for DOTES-2, DOTES-3, 1ExdIICT2 – for DOTES-4;

e) range of operating temperatures from minus 60 up to 90 °C for DOTES-1, from minus 60 up to 170 °C for DOTES-2, from minus 60 up to 190 °C for DOTES-3 and from minus 60 up to 240 °C for DOTES-4;

f) housing protection level IP67;

g) permissible voltage and current commutated by relay contacts – 220 V, 10 A;

h) serial number;

i) year of manufacture.

11.2 The marking shall be made by one of the following methods: impact, photochemical printing, photochemical etching, engraving or pressing. Method and quality of marking shall ensure its safety during DOTES service life.

11.3 Marking of the transport containers shall be made in accordance with GOST 14192 and drawings of the manufacturing enterprise. Marking shall be made using indelible ink applied directly to the container, by stenciling or stamping. Basic and additional notes provided by GOST 14192 and handling marks **"Up", "Protect from Moisture"** shall be applied to the transport containers.

11.4 DOTES is sealed with manufacturing enterprise's seals.

12 Warranty Obligations

12.1 Manufacturer Elektronstandart-pribor JSC warrants DOTES compliance with requirements of this specifications subject to observance of operation, transportation and storage conditions by the consumer.

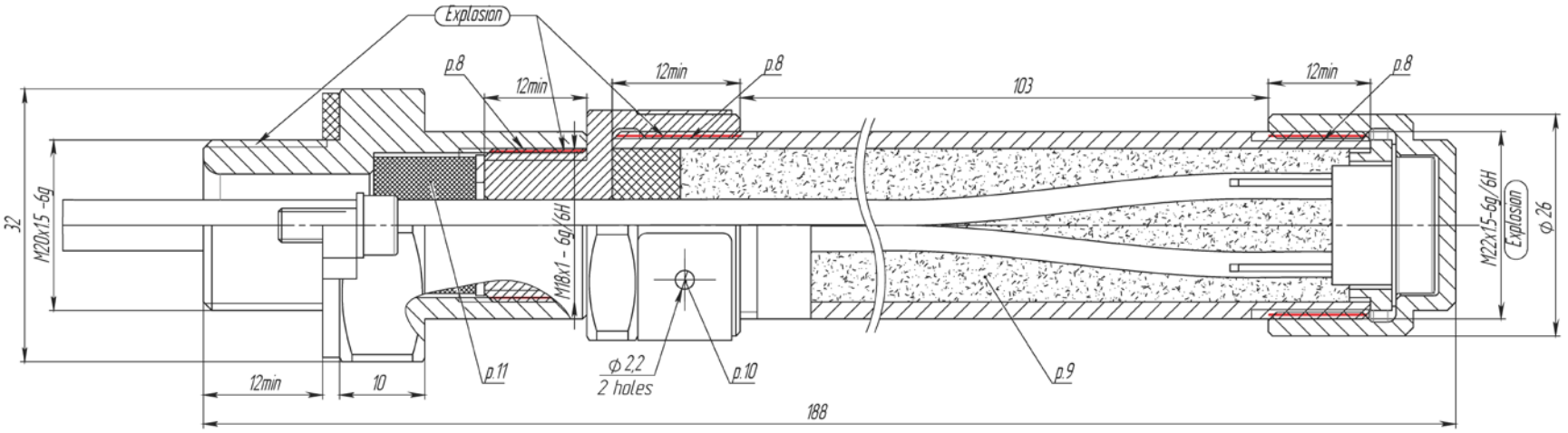
12.2 Guaranteed service life of DOTES is 18 months after detector commissioning, but not more than 24 months after manufacture.

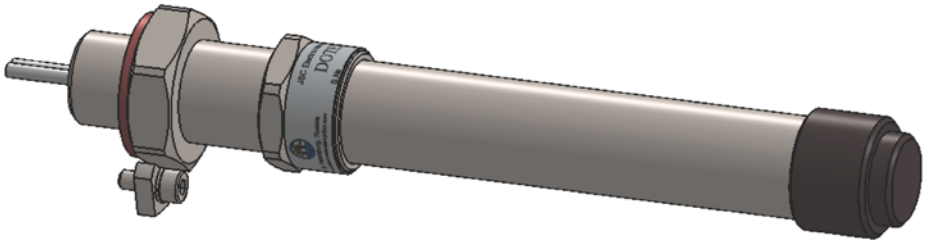
12.3 Guaranteed storage life is 6 months after manufacture of DOTES subject to observance of storage requirements of specifications.

Manufacturer's mail address: 120 Gatchinskoy Divizii street, Gatchina, Leningrad region, 188301.
Legal address: Bldg.2, 35 Slavy Avenue, Saint Petersburg, 192286

12.4 Manufacturing enterprise undertakes to remove any detected defects or inoperative parts of DOTES or the DOTES detector free of charge during the warranty period.

DOTES-1 – 3





IDENTIFICATION	OPERATION CONDITIONS	EXPLOSION-PROOF
DOTES-1	-60 UP TO 90°C	1ExdIICT5
DOTES-2	-60 UP TO 170°C	1ExdIICT3
DOTES-3	-60 UP TO 190°C	1ExdIICT3

St. Petersburg, Russia
www.electronstandart-pribor.com

JSC Electronstandart-pribor

DOTES-1

S.№

1ExdIICT5
-60C ≤ Ta ≤ +90C
IP 67

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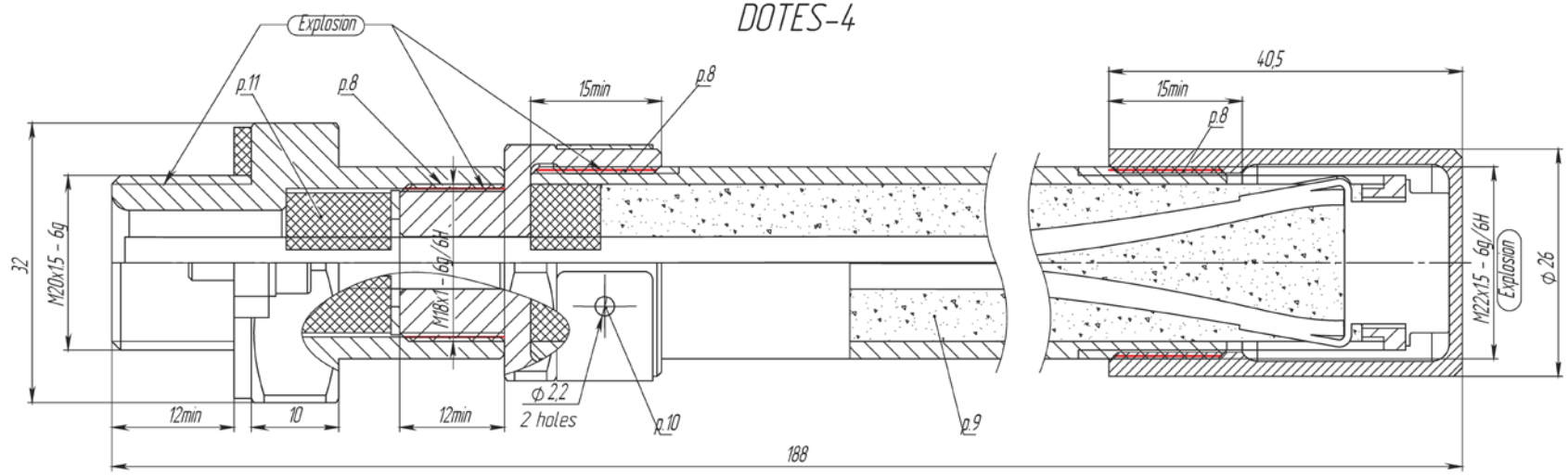
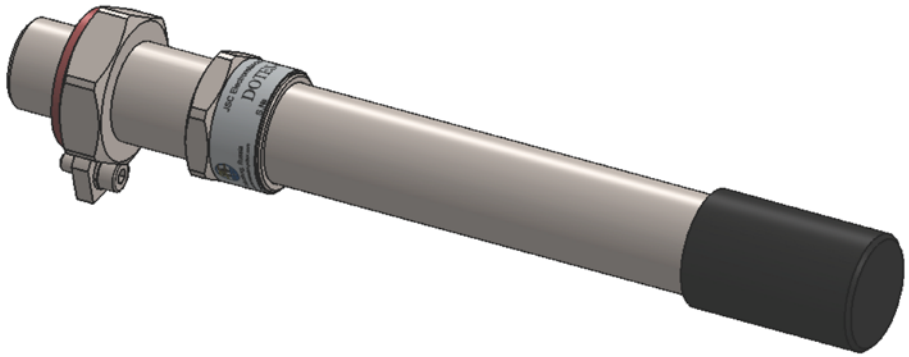
1. Reference dimensions.
2. Not stated limited dimension deviations H14, h14, ±IT14/2.
3. Conduct wiring in accordance with 405242.004 E3.
4. Technical requirements to electric wiring according to OST11010.004-79.
5. Mechanical damage, scratches on surfaces with word "Explosion" are not allowed.
6. Quantity of complete nonfailed threads of screw is not less than 5.
7. Coat the surfaces marked with the word "Explosion" with a thin layer of corrosion-resistant anti-sieze lubricant, such as lithium grease.
8. Cover threads with high-temperature sealent.
9. Fill the tube with quartz-sand filler GOST 2138-91.
10. Rivet over. Rivet 2x4.37 GOST10299-80.
11. Pinch sealing internal ring with a gland.

Q.A	Lukitsa		24.03.19	MATERIAL:	DWG NO. 450242.004 AD	A3
				WEIGHT: 351.15	SCALE: 2:1	SHEET 2 OF 4





1. Reference dimensions.
2. Not stated limited dimension deviations H14, h14, ±IT14/2.
3. Conduct wiring in accordance with 405242.004 E3.
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8. Cover threads with high-temperature sealent.
9. Fill the tube with quartz-sand filler GOST 2138-91.
10. Rivet over. Rivet 2x4.37 GOST10299-80.
11. Pinch sealing internal ring with a gland.

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DOTES-4

S.№

1ExdIICT2
-60C ≤ Ta ≤ +240C
IP 67

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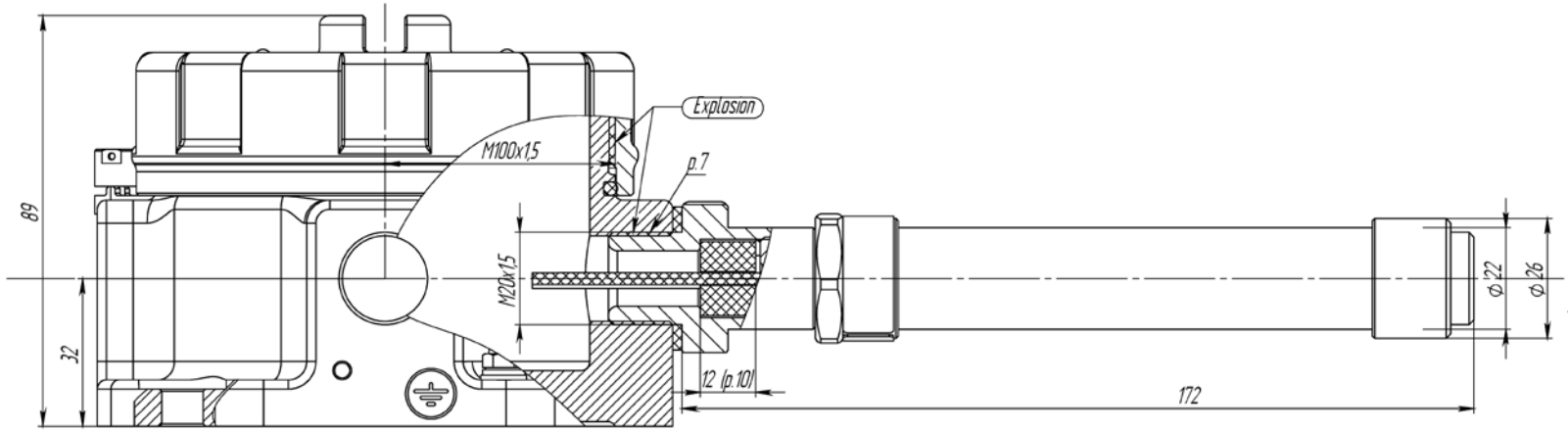
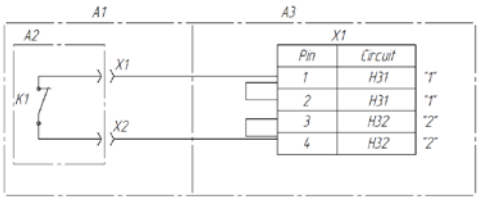
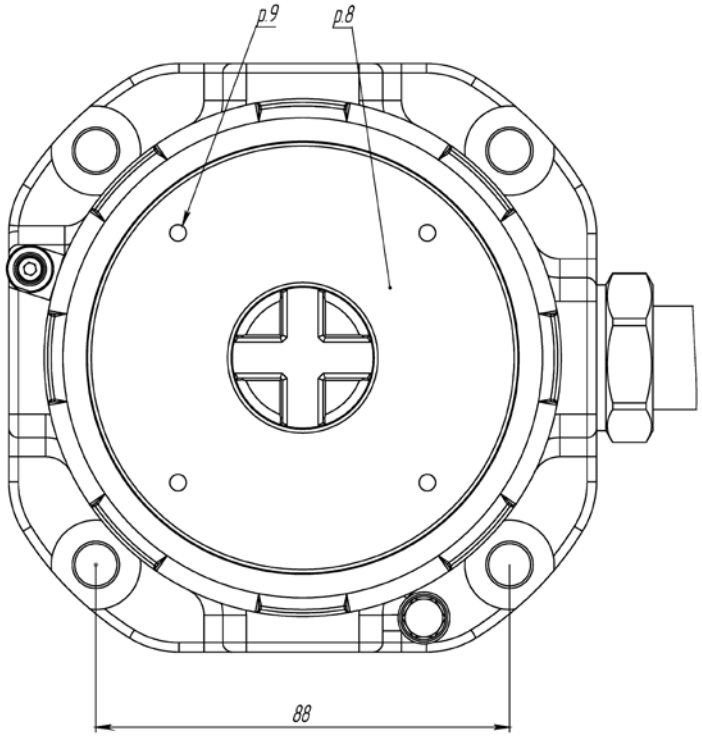
Q.A	Lukitsa		24.03.19	MATERIAL:	DWG NO. 450242.004 AD	A3
				WEIGHT: 351.15	SCALE:2:1	SHEET 3 OF 4







MAIN ENGINEERING DOCUMENTS	IDENTIFICATION	OPERATION CONDITIONS	EXPLOSION-PROOF	MINIMAL PROTECTITION DEGREE
405242.004	DOTES-1	-60 UP TO 90°C	1ExdIICT5	IP67
405242.004-01	DOTES-2	-60 UP TO 170°C	1ExdIICT3	IP67
405242.004-02	DOTES-3	-60 UP TO 190°C		IP67
405242.004-03	DOTES-4	-60 UP TO 240°C	1ExdIICT2	IP67

1. Reference dimensions.
2. Not stated limited dimension deviations H14, h14, ±IT14/2.
3. Conduct wiring in accordance with 405242.004 E3.
4. Technical requirements to electric wiring according to OST11010.004-79.
5. Mechanical damage, scratches on the surfaces marked with the word "Explosion"are not allowed.
6. Quantity of complate nonfailed threads of screw is not less than 5.
7. Cover threads with high-temperature sealent.
8. Designations plate.
9. Rivet over. Rivet 2x4,37 GOST 10299-80.
10. Pinch sealing internal ring with a gland.

Q.A	Lukitsa		24.03.19	MATERIAL:	DWG NO. 450242.004 AD	A3
				WEIGHT: 351.15	SCALE:1:1	SHEET 4 OF 4