

Instruction Manual, Toftejorg Sanitary Rotacheck System, Ex For Toftejorg TJ20G/TZ-74/TZ-79/TZ-89

IM-TE91A661-EN032

Introduction

The Toftejorg Sanitary Rotacheck System, Ex consisting of a Universal Relay and a Sensor is designed for verification of correct functioning of the installed tank cleaning machine.

The system is protected for use in potentially explosive atmospheres according to EN50014 and EN50020, zone 1 (intrinsically safe - see Certificate of Conformity), and has been tested and approved after EN50081-1 and EN50082-2 according to the European EMC-directive.

Functional Description

The Toftejorg Sanitary Rotacheck Sensor, positioned in the top of the tank will give a signal to the Relay each time the Sensor diaphragm is hit by the jet from the rotating Tank Cleaning machine.

The Sensor has a built-in automatic zero-adjustment, which compensates for a standing pressure without giving a signal. This enables the system to operate in tanks under pressure.

The Sensor is a 2-wire open collector that cannot be supplied from a traditional power supply. The electrical output pulse is extended to 1 sec. for normal pressure loads. The cable is shielded in order to protect the system against disturbance from electro-magnetic noise.

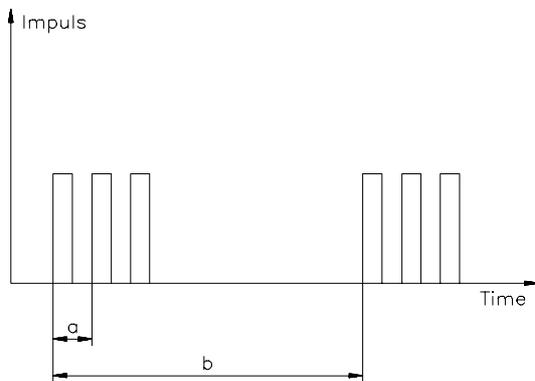
The Universal Relay can be supplied from AC mains 24 V, 115 V or 230 V, 50-60 Hz. (terminal 16 - 19) The built-in electronics constitutes the power supply for the Sensor supplying the required current and voltage. Power consumption from the mains is approx. 4 VA.

Outputs from the Relay are:

- 1) a relay switch rated at 250V, 2A AC (terminal 23-25)
- 2) a DC output facility supplying 24 V. Max load is 50 mA (terminal 29 - 30)
- 3) a DC signal of open collector type for PLC link-up. Max load is 50 mA and max. voltage is 50 V (terminal 28 -29).

Signal sequence

When the tank cleaning machine is rotating, the relay gives impulse signals of min. 1 sec. duration each time one of the jets impinges on the sensor. For Alfa Laval Tank Equipment tank cleaning machines impulse signals will come in sequences of 2-4 signals with a distance approx. equal to the time for one revolution of the body, and between the sequences equal to one cycle. For information on figures - see Instruction Manual for the machine in question.



a: time for 1 revolution = $60/\text{RPM}$ of Body (sec)

b: time for 1 cycle = Pattern time/No. of cycles

Example:

For a Toftejorg TZ-74, 100% 4x6 mm, at 6 bar inlet pressure, we expect the following figures:

RPM of machine body = 2.9 RPM
Cleaning pattern time = 14 min.

Time between signals:

a = $60 \text{ sec.}/2,9 \text{ RPM}$ = 20.7 sec.
b = $14 \text{ min.}/8 \text{ cycles}$ = 1,75 min. = 105 sec.

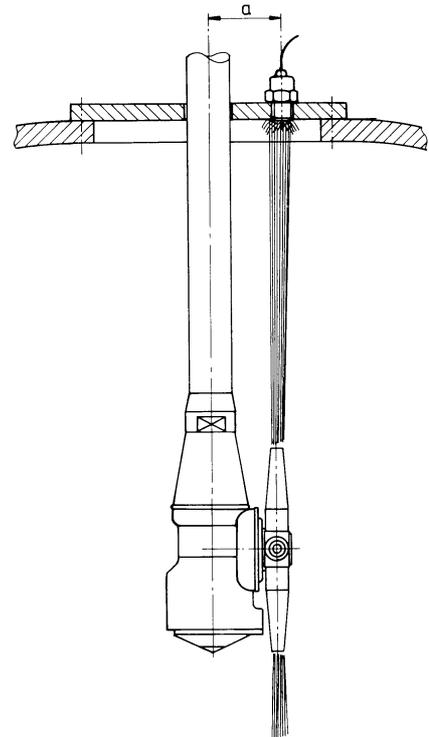
Installation

Position of Sensor in tank with welding adapter:

In order to ensure correct signals, the sensor should be placed at the correct distance from the centreline of the down pipe according to the tank cleaning machine in question:

Toftejorg TJ 20G	a =	75 mm	
Toftejorg TZ-74	a =	78 mm	
Toftejorg TZ-79	a =	98 mm	
Toftejorg TZ-89	a =	50-90 mm	*)

*) depending on size of mounting connection



Deviations from the above given positions may work, but will influence the signal sequence. It is not recommended to go closer to the centreline, as there is a risk of having no signal. If the Sensor is placed further away from the centreline, the number of times it is directly hit by a jet reduces, and if too far away, there is a risk that the sensor is not directly hit by the jets at all.

The sensor is mounted by screwing it into a 3/4" BSP thread in the top flange. Recommended torque: 15Nm.

The Sensor is equipped with an O-ring for sealing against the flat top flange.

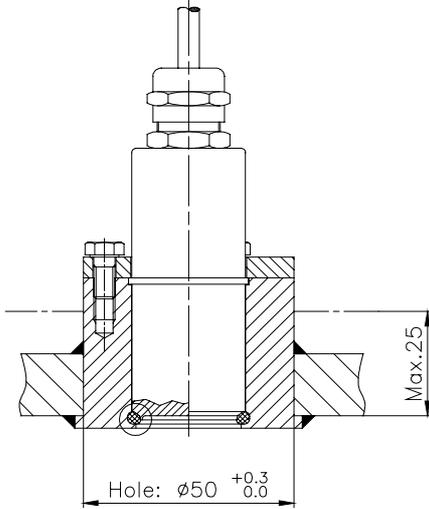
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Installation:

For installation use TE52E068 Welding adapter.



Bore hole $\varnothing 50 \pm 0.3/0$ mm in top flange.

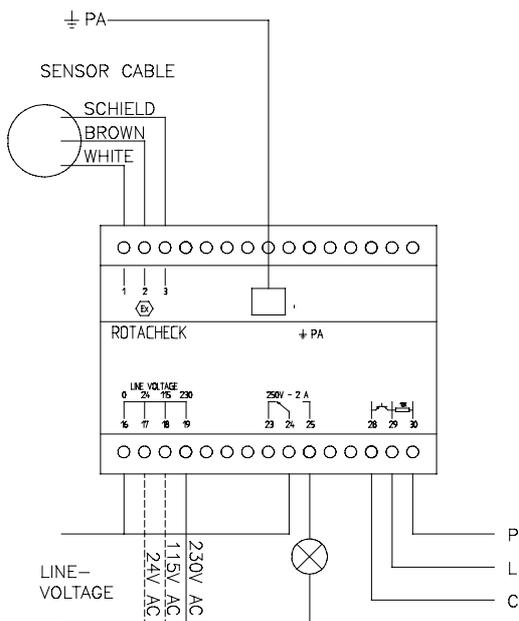
Remove O-ring and push in adapter. TIG-weld on both sides adding the minimum amount of filler material and heat input in order to avoid deformation of the thread.

After welding and cleaning the weld, reinsert O-ring and mount Sensor as described above.

Wiring:

Sensor and Relay box must always be fitted and wired according to the national regulations.

The system can be mounted with up to 200 m cable between Sensor and Relay. When extending the cable, make sure that the shield is properly connected in both ends.



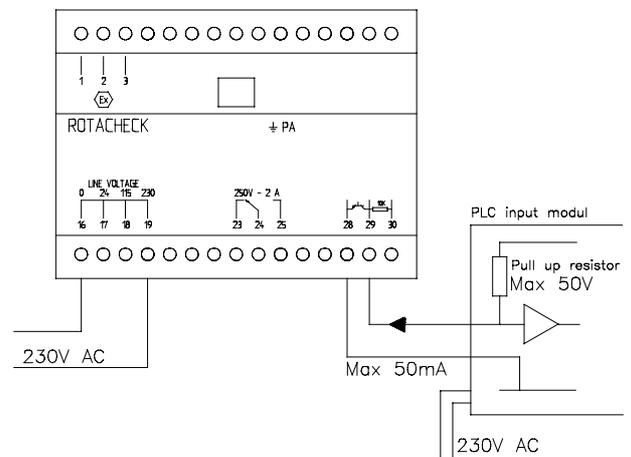
Conditions Relating to the EX-Approval

The Universal Relay must be placed outside the hazardous area, and the supply voltage for other kinds of equipment, which are connected to the same current circuit, must not exceed $U_m = 250$ VAC.

When installing the Sensor, attention should be brought to the fact that the electronics in the Sensor is galvanically connected to the housing for EMC regulations, and the Sensor must not be supplied from other source than the Universal Relay.

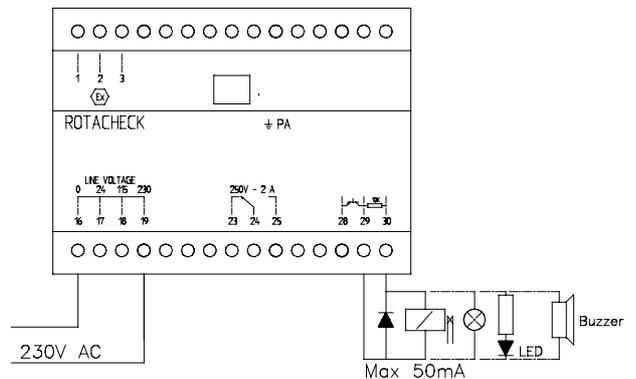
Example 1:

Relay coupled to typical PLC with "pull-up" resistance:



Example 2:

Relay can be used to drive various loads, for example an external relay, a lamp, a lightdiode with resistance or a buzzer:



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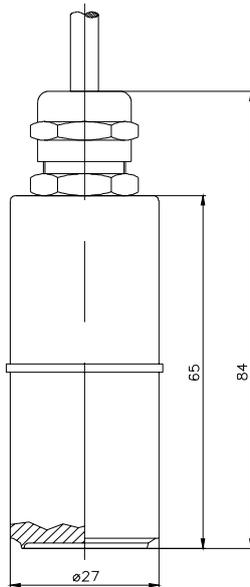
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Technical Specification

Sensor, TE52E067:

Mounting thread:	3/4" BSP x 20 mm
Weight, w. 2 meter cable:	309 g
Connection, electrical:	2 meter cable, ø6 mm, PVC 2x0,75 mm ² shielded
Power supply:	10 V ± 10%, max 10 mA
Pressure for sensor function:	min.: 0.1 bar max.: 2 bar
Overload pressure:	max.: 15 bar
Max. repetitions freq. for sensor function:	2 Hz
Duration of electrical output pulse:	min. 1.0 sec.
Area of diaphragm:	3 cm ²
Operating temp., sensor enclosure:	-20°C to 85°C
Operating temp., Ex-approved:	-20°C to 40°C
Max. medium temperature on diaphragm:	140°C
Material, sensor and diaphragm:	AISI 316L
Enclosure:	IP 67
EX-class:	EEx ib IIC T6

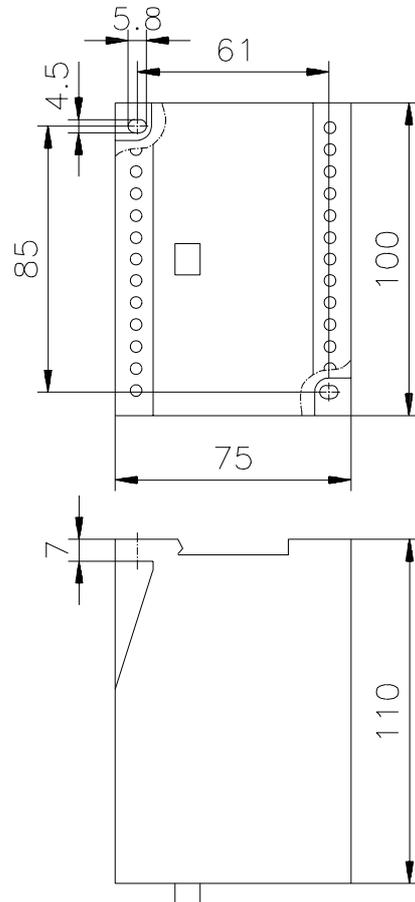
Dimensions:



Universal Relay, TE52E058:

Mounting:	By clipping onto 35 mm standard rail to DIN/EN50022 or by screw fixing
Weight:	550 g
Supply voltage:	
Terminals 16-17-18-19:	24-115-230V AC, 50-60 Hz
Power consumption	<4VA
Output voltage for sensor, nominal:	
Terminal 1-2:	10 V
Output current for sensor, nominal:	5mA
Output f. external load:	
Terminal 23-24-25:	Relay switch, 250V, 2A AC
DC output: Terminal 29-30 (max. 50 mA):	24V DC
Open collector output:	
Terminal 28-29 (max. 50mA):	<50V DC
Enclosure:	IP 54
EX-class:	[EEx] ib IIC

Dimensions



Marking:

ROTACHECK SENSOR 52E057

DEMKO nr. 95D.118759 X @Ex ib IIC T6

$U_{max} = 10,6 V$ $I_{max} = 15mA$ $C_{in} < 10nF$ $L_{in} < 100\mu H$

Marking:

ROTACHECK RELAY 52E058

DEMKO nr. 95D. 118997 X [EEx ib] IIC

Intrinsic safe circuit 1 - 2 - 3 : $U_n = 250V$.

$U_{max} = 10,6 V$ $I_{max} = 15mA$ $C_{in} < 500nF$ $L_{in} < 100mH$

Supply circuit : 16 - 17 - 18 - 19
24 - 115 - 230 V

Output circuit :
Relay : 23 - 24 - 25 Open collector : 28 - 29 - 30.



1.	CERTIFICATE OF CONFORMITY	
2.	DEMKO No.	95D.118997 X
3.	This certificate is issued for	Universal Relay with Sensor
	type	Rotacheck Universal Relay T&J 52E058 Rotacheck Sensor T&J 52E057
3.1.	Glossex-81:	44.0
4a.	Manufactured by	Toftejorg A/S, P.O.Box 1149 Baldershoej 19, DK-2635 Ishoej, Denmark
4b.	and submitted by	the Manufacturer
5.	This electrical apparatus and any acceptable variation thereto is specified in the Appendix to this certificate and the documents therein referred to.	
6.	DEMKO being an Approval Certification Body in accordance with Article 14 of the Council Directive of the European Communities of 18th December 1975, document 76/117/EEC, confirms that the apparatus has been found to comply with the harmonized European Standards:	
	EN 50014 incl. amd. 1 - 5 EN 50020 incl. amd. 1 - 5	
7.	The apparatus marking shall include the code:	
	[EEx ib] IIC / EEx ib IIC T6	
8.	The supplier of the electrical apparatus referred to in this certificate has the responsibility to ensure that the apparatus conforms to the specification laid down in the Appendix to this certificate and has satisfied routine verifications and tests specified therein.	
9.	The apparatus may be marked with the Distinctive Community Mark specified in Annex II to the Council Directive of 6th February 1979, document 79/196/EEC. A facsimile of this mark is printed at the top of this certificate. The marking of the equipment shall be visible, legible and durable.	
	Date	1995-08-29
	Signature	
	<small>This certificate is only allowed to be rendered in entirety and without alterations.</small>	
	DEMKO	Lyskaer 8, Postbox 514 Telex: 35125 (DEMKO DK) Telefax: +45 44 94 72 61 DK-2730 Herlev, Denmark Telephone: +45 44 94 72 66

Note: The illustrations and specifications contained in this manual were effective at the date of printing. However, as continuous improvement is the policy of Alfa Laval Tank Equipment A/S, we reserve the right to alter or modify any unit specification on any product without notice or any obligation.

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