

## GESTRA Steam Systems

Product Range B1

Oil and Turbidity Detector TURBISCOPE®  
OR 52/5, OR 52/6

OR 52/5  
OR 52/6

### Description

The equipment combination ORG... and ORT 6 is designed for the continuous monitoring of transparent liquids to detect the ingress of insoluble light-scattering foreign matter. Measuring of turbidity and signal evaluation for indication, recording and control. Tripping of alarms, control valves etc.

The oil and turbidity detector OR 52/... consists of the measuring sensor ORG 12 or ORG 22 and the measuring transducer ORT 6.

### Typical Applications

- Steam boiler plants: Monitoring condensate returned to the boiler for contamination by oils and fats, in particular for boilers operating without constant supervision in accordance with TRD 604 sheet 1 (2 devices are required for 72 hrs. operation).
- Raw-water monitoring and water treatment: sand filters, demineralization plants, reverse osmosis plants.
- Design for Ex zone 1 available on request.
- Breweries and the beverage industry: filtration, monitoring of wort, quality assurance etc.
- Oil content alarm for feedwater and condensate conditioning.

### Design

The GESTRA TURBISCOPE consists of a measuring sensor and a measuring transducer:

#### Measuring Sensor ORG...

The sensor is a photometric measuring device with separate light emitter and light receiver and a glass cylinder serving as sightglass. The sensor is provided with two connections for the inlet and outlet of the liquid to be monitored (with flow reversal) and one connection for the discharge of the rinsing water or for sampling. The upper and lower cover flanges can be interchanged and turned through 90° or 180°. It is possible to clean the inside of the glass cylinder during operation with the aid of the cleaning plunger.

Two different designs are available:

- ORG 12: Grey cast iron GG-25
- ORG 22: Stainless steel 1.4580

#### Measuring Transducer ORT 6

The measuring transducer ORT 6 is located in a field case for wall installation. The cover of the case is provided with the indicators and operating buttons as well as a seven-segment display indicating the measured values and LEDs for signalling alarm condition or malfunction.

### Function

The GESTRA TURBISCOPE is a continuous measuring device of turbidity as produced by foreign matter that is not dissolved in transparent liquids. The system operates on the Tyndall effect (concerning the scattering of light by suspended particles) which provides a high sensitivity of measurement for emulsified oils and greases and other suspended particles.

The light emitted by the light emitter of the sensor is focused by diaphragms fitted in the tube of the light emitter. The light beam penetrates through the glass cylinder into the liquid to be monitored where it is divided into a beam which passes through the liquid and a beam scattered at the foreign particles whose light intensity depends on the concentration of the foreign particles. The light intensity is transformed by a photo-electric cell in the light receiver into a proportional electric current fed to the measuring transducer which determines the concentration of foreign particles.

The light beam passing through the liquid is received by a second photo-electric cell. If the light intensity received deviates from a reference value in the measuring transducer the light intensity of the light emitter is correspondingly readjusted. Extinction and lamp aging are thus compensated. If the deviation can no longer be compensated, for example, because of breaking of lamp filament, heavy contamination of glass cylinder or excessive turbidity, a switch in the measuring transducer immediately de-energizes a relay. Simultaneously the LED MALFUNCTION lights up and the output current returns to zero.

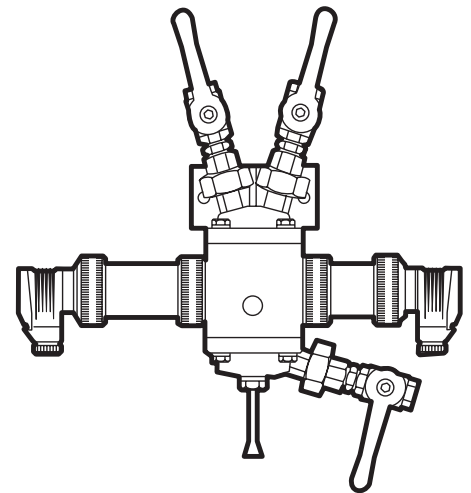
The zero point and measuring range can be adjusted on the measuring transducer. The zero-point adjuster (0 %) is used to compensate stray light (reference fluid) which might vary from sensor to sensor. The 100 % adjuster permits the calibration of the measuring range to the specific turbidity of the plant (see "Important Notes").

#### Measuring Transducer ORT 6

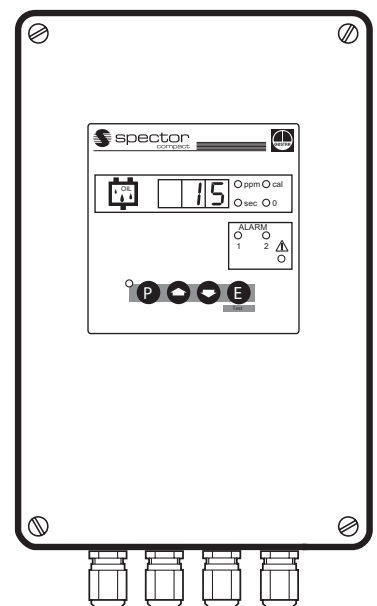
This equipment serves as transmitter for measuring and control purposes. A stabilized output current of 4 to 20 mA is provided at the output. The switchpoints are continuously adjustable over the complete measuring range of 0 to 25 ppm. If the scattered light or the turbidity value exceeds the switchpoint, the output relay is de-energized after a preset time lag (time delay adjustable between 0 to 20 sec.)

Malfunction causes the immediate de-energizing of the limit value relay and is indicated by the lighting-up of a yellow LED.

The readings are indicated on the digital seven-segment display unit.



Measuring sensor ORG 12, ORG 22



Measuring Transducer ORT 6

## Technical Data ORT 6

### Wiring

8 cable glands with integral cable clamps, M 16 x 1.5  
Screw-type terminal strips with wire guard, max. conductor size 1.5 mm<sup>2</sup>

### Mains voltage

230 V + 10 / - 15 %, 50 - 60 Hz  
115 V + 10 / - 15 %, 50 - 60 Hz (optional)  
For nominal voltage rating see name plate

### Fuse

Thermal fuse (semi-delay) 0.2 A

### Power consumption

25 VA

### Measured quantity

Turbidity (ppm = parts per million)

### Measuring range

0 - 25 ppm (cf. name plate)

### Lamp voltage for light emitter

No-load voltage: 14 V  
with light emitter connected: < 12 V AC, 10 W

### Actual value output

0/4 - 20 mA

### Bus Networking

CANopen (optional)

### Load

Load 0 to 500 Ω

### Output

3 volt-free change-over contacts  
Max. contact rating for switching voltages  
24/115/230 V: 4 A

### Switchpoints

Continuously adjustable over the whole measuring range. Other measuring ranges available on request.

### Time delays

Adjustable between 0 and 20 sec.  
Other time delays available on request.

### Indicators and adjustors

4 push buttons for programming one red LED  
"Alarm 1", one red LED "Alarm 2", one yellow LED  
"Malfunction", one yellow LED "Program status",  
one 7-segment display for three digits

### Protection

IP 65 to EN 60529

### Admissible ambient temperature

0 - 55 °C

### Housing material

Die-cast aluminium, "GESTRA blue", RAL 5002

### Approx. weight

3.6 kg

## Technical Data ORG ...

### Type approvals

- GL (Germanischer Lloyd) for condensate and feedwater monitoring on ships
- TÜV type approvals for condensate monitoring (land installations), based on WÜ 100 (VdTÜV Bulletin)

### Nominal size

DN 10, connection <sup>3</sup>/<sub>8</sub>" BSP to EN ISO 228-1

### Nominal pressure

PN 10

### Flowrate

0.5 to 50 l/min

### Pressure drop

At a flowrate of 2 l/min and V-shaped flow through the sensor with a pipe length of 1 m (DN 10) and 4 bends; approx. 5 mbar (ζ = 6.1).

### Fluids

Water, condensate, drinks etc.

### pH values

Up to 10.5 (a pH value of 11 and above will lead to wear of the glass, depending on the temperature).

### Fluid temperature ranges

0 ... 60 °C with drying cartridge,  
60 ... 120 °C with vent nipple.

### Protection

IP 65

### Max. ambient temperature

60 °C

### Light emitter

Glow lamp 12 V / 10 W BA 15 s  
cable connection via 4 pole connector

### Light receiver

Two silicon photo-electric cells,  
cable connection via 4 pole connector

### Approx. weight

6.8 kg

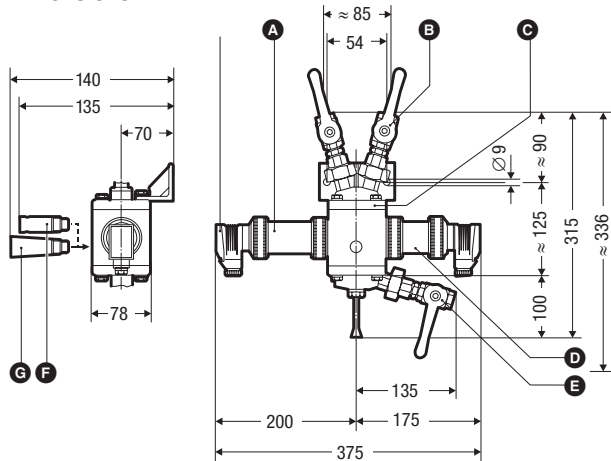
### Materials

	ORG 12	ORG 22
Housing cover	Grey cast iron	1.4580
	GG-25	
Wetted parts	0.6025	1.4580
	galvanized	
Ball valves	Brass 58	1.4436
Screwed unions	St	1.4571
Glass cylinder	Duran 50	Duran 50
O-rings	EPDM	EPDM
Housing	0.6025	0.6025
	galvanized	galvanized
Cleaning disc	EPDM	EPDM

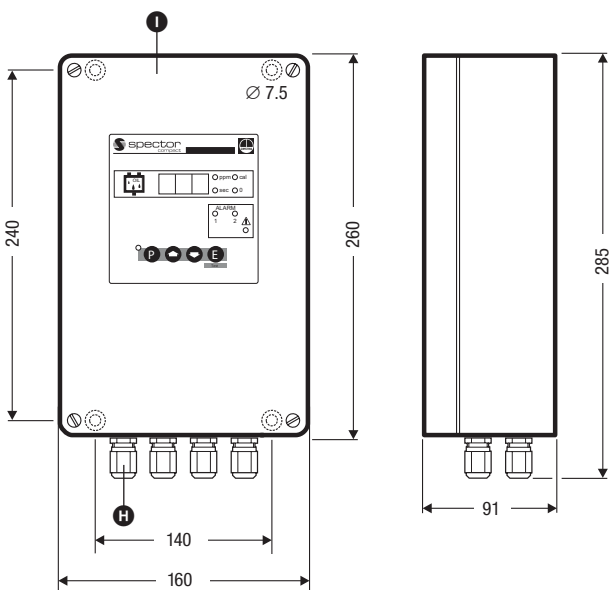
## Scope of supply

Items	OR 52/5	OR 52/6	Stock code (230 V)	Stock code (115 V)
Measuring transducer	ORT 6	ORT 6	392 099	392 106
Measuring sensor incl.	ORG 12	ORG 22	385 193	385 195
Ball valves	3	3	077 135	077 135
Screwed unions	3	3	077 133	077 133
Drying cartridge (supplied but not fitted)	1	1	077 139	077 139
Vent nipple (screwed in)	1	1	077 213	077 213
Turbidity standard 20 ppm (supplied)	1	1	387 369	387 369

## Dimensions



Measuring sensor ORG 12, ORG 22



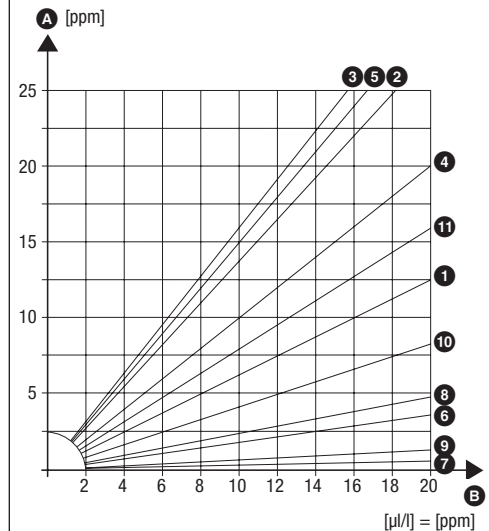
## Turbidity Curves

A light beam shines through the liquid and any foreign matter which is not dissolved scatters the beam. The scattered light intensity increases in proportion to the concentration of suspended particles, the degree of turbidity depending on:

1. size of the particles (degree of emulsification)
2. shape and composition of the particles
3. optical properties of the particles.

In the case of oils, fats and greases the degree of emulsification is a decisive factor.

These influences have been considered in the following chart:



- A: Indication
- B: Concentration
- 1: Fuel oil "EL" at 15 °C, coarse emulsification
- 2: Fuel oil "EL" at 15 °C, fine emulsification
- 3: Fuel oil "EL" at 80 °C, fine emulsification
- 4: Engine oil "SAE 15W40" at 15 °C, fine emulsification
- 5: Vegetable oil at 15 °C, fine emulsification
- 6: Xylene at 20 °C, fine emulsification
- 7: Xylene at 80 °C, fine emulsification
- 8: Red-berry juice, concentrated
- 9: Black-berry juice, concentrated
- 10: Skimmed milk, fat content 0.1 %, referred to fat concentration
- 11: Turbine oil "T 68", gearbox oil "M 68"

# Oil and Turbidity Detector TURBISCOPE® OR 52/5, OR 52/6

## Important Notes

### Condensate Monitoring

Condensate monitoring is recommended upstream of condensate tanks, in particular in steam boiler plants operating in accordance with TRD 604 / EN 12953, part 6. Readings are influenced by live steam and flash steam. Care should therefore be taken that the sensor does not come into contact with steam. For more information see Installation Manual OR.

### Connecting Three-Way Valve

For condensate monitoring a three-way valve should be controlled via alarm contacts such that contaminated condensate is discharged if the turbidity is too high (ingress of oil or start-up contamination).

Valves with a single-phase a.c. motor can be directly connected, max. power 50 VA. If three-phase actuators are used a reversing contactor has to be inserted. Valves with pneumatic actuators can be triggered via solenoid valves.

## Wiring

- Light emitting device with screened two-core cable (e.g. LIYIC 2 x 0.75 mm<sup>2</sup>, max. length 50 m)
- Light receiving device with screened four-core cable (e.g. LIYIC 4 x 0.5 mm<sup>2</sup>, max. length 50 m)

## Order and Enquiry Specifications

GESTRA Oil and Turbidity Detector TURBISCOPE, consisting of measuring sensor and transducer

- GESTRA oil and turbidity detector OR 52/5, consisting of measuring sensor ORG 12 (grey cast iron GG-25) and measuring transducer ORT 6
- GESTRA oil and turbidity detector OR 52/6, consisting of measuring sensor ORG 22 (stainless steel) and measuring transducer ORT 6

Supply voltage .....V (230 V or 115 V)

## Ancillary Units

Three-way valve  
motorized, series 200  
pneumatic, series 500  
with three-way solenoid valve

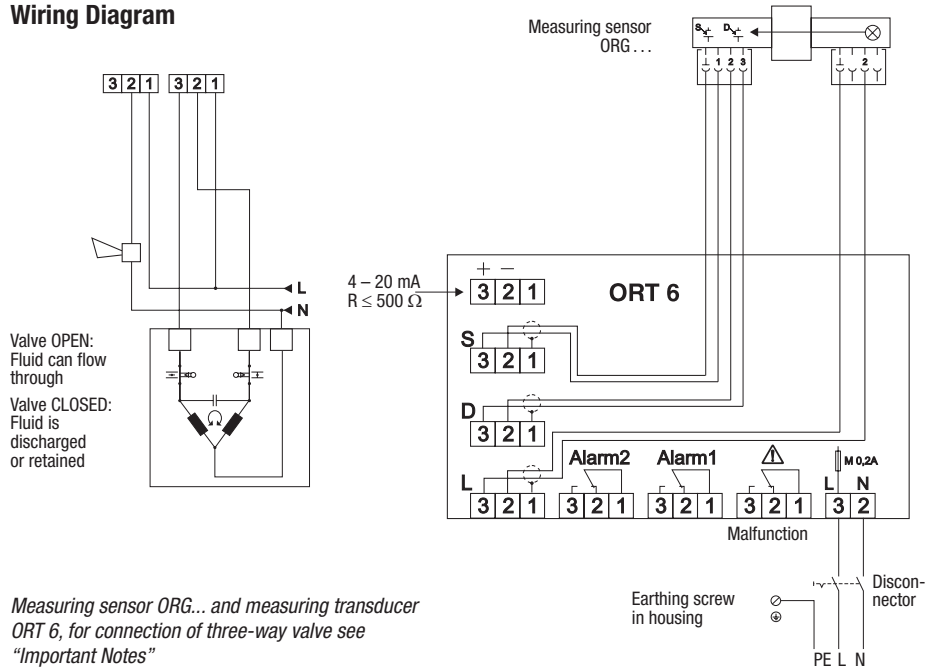
Stop valve GAV  
DISCO non-return valve type RK 86,  
20 mbar opening pressure

## ATEX (Atmosphère Explosible)

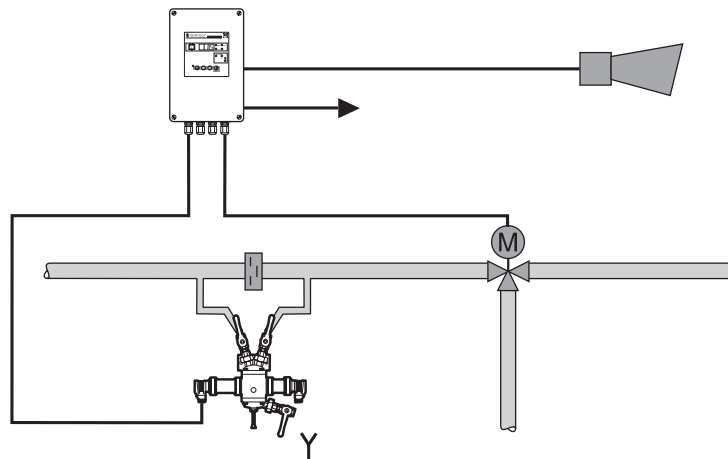
According to the European Directive 94/9/EC the equipment must **not** be used in potentially explosive areas.

Supply in accordance with our general terms of business.

## Wiring Diagram



## Typical example of condensate monitoring, water treatment, filtering etc.



For condensate monitoring install measuring sensor in bypass!

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