

# GRAVITY INDICATORS

## 1. FEATURES

- 1.1 Suitable for use on control spindles with horizontal or max 60° inclined position.
- 1.2 The movement is housed in a sealed case (fig. 1). It consists of a counterweight system, fitted on a precision ballrace, which rotates on a central spindle integral with the indicator case, fitted on the handwheel/knob. At the end of the spindle there is a red pointer, which rotates with the handwheel/knob. A series of gears with different ratios transmits the rotation of the spindle to a black pointer. On the counterweight is also fixed a graduated dial. If the indicator is fitted on spindles with horizontal position (or max 60° inclined) the dial is kept still by the gravity force and the pointers rotate over it when the handwheel/knob turns.

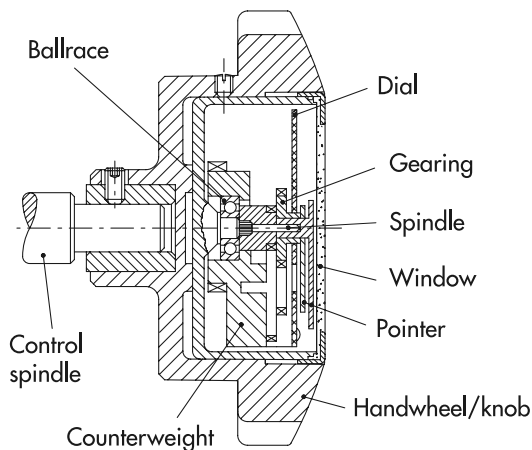


Fig.1

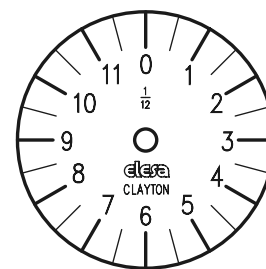


Fig.2

## 2. RATIOS

- 2.1 Each complete turn of the big pointer (red) corresponds to a fraction of turn of the small pointer (black). The number of turns of the red pointer to make the black pointer to carry out one complete turn is the ratio of the indicator.

Example: a ratio of 12:1 means that to 12 turns of the red pointer correspond to a complete turn of the black pointer (fig. 2).

12 turns of the handwheel cover the entire setting range. For each turn of the handwheel, the black pointer indicates 1/12 of the entire dial.

## 3. CHOICE OF THE INDICATOR RATIO

- 3.1 Set the control spindle to the initial or referring position.
- 3.2 Count the number of turns of the control spindle to cover the entire setting range.
- 3.3 The result of this operation is the ratio. Should it not correspond to a standard ratio, choose the next highest one.

POSSIBLE ASSEMBLY HANDWHEELS - INDICATORS					
	HANDWHEELS/KNOBS	IZN.	MBT.	VHT.	VRTP.
INDICATORS	page	475	476	477	478
GA01	466	•	•	•	
GA02	466	•	•	•	•
GA05	466				
GA11	467	•	•	•	
GA12	467	•	•	•	•
GW12	469	•	•	•	•
MBT.50/GA11	468	INTEGRAL (indicator fitted in during the production)			
MBT.70/GA12	468	INTEGRAL (indicator fitted in during the production)			

**3.4** For an optimal dial reading, and therefore for a more precise reading we recommend to choose a ratio which is as near as possible to the handwheel turns required to cover the entire setting range. For instance, if 11 turns are required, the ratio 12:1 is the most convenient, because 11/12 of the available graduation will be used. If 24:1 ratio would be chosen, only 11/24 of the graduation would be used and reading would be less accurate.

**3.5** Indicators with standard ratios are normally on stock to suit most requirements.

**4. DIALS**

**4.1** Dials are available for all standard ratios in both clockwise (D) or anticlockwise (S) configurations.

**4.2** Standard dials give a number which can be translated by means of conversion tables to the value of the set-up executed.

**4.3** On request and for sufficient quantities special dials with marks or customised graduations can be supplied to have a direct reading.

**5. ACCURACY**

**5.1** The gravity indicator is more accurate when used on horizontal control spindles. It can be however used on spindles max 60° inclined, but the accuracy decreases as the angle of inclination  $\alpha^\circ$  increases (fig. 3).

**6. ASSEMBLY INSTRUCTIONS**

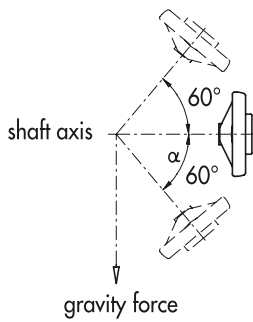


Fig.3

**6.1** If the hole of the handwheel/knob hub or boss needs to be reamed for coupling to the control spindle, please refer to the handwheel/knob relevant page for further details and advice.

**6.2** Assembly of the indicators to handwheels/knobs:

- couple the handwheel to the control spindle by means of a pin or a grub screw
- set the control spindle to the initial or referring position, by rotating the handwheel
- turn the indicator, by keeping it in the hands, until the pointers are in zero position
- fit the zeroed indicator into the handwheel/knob and uniformly tighten the radial securing screws with a moderate torque to prevent distortion of the indicator case and thus locking the movement.

**6.3** Assembly of integral indicators (built-in in the handwheel):

- set the control spindle to the initial or referring position
- turn the indicator, by keeping it in the hands, until the pointers are in zero position
- couple the integral indicator to the control spindle by tightening the grub screw, after checking that spindle and indicator are in zero position.

**Example of gravity indicator description**

Series	Ratio	Clockwise graduations (Right)
<b>G A 0 1</b>	<b>- 0 0 1 2</b>	<b>- D</b>

<b>VD+I</b>	<b>VDC.</b>	<b>VDSC+I</b>	<b>VAD.</b>
<b>479</b>	<b>480</b>	<b>482</b>	<b>484</b>
	•		•
	•	•	•
•	•		•
	•		•
	•	•	•
	•	•	•