GRAVITY INDICATORS

1. FEAUTURES

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.

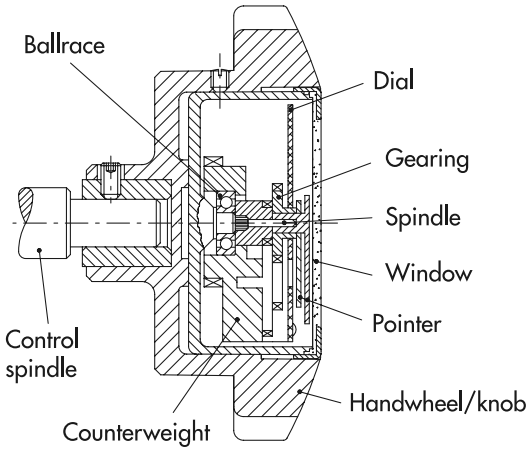

Fig.1

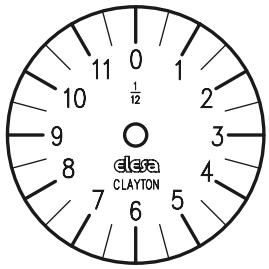

Fig.2

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 $\alpha°$ increases (fig. 3).

6. ASSEMBLY INSTRUCTIONS

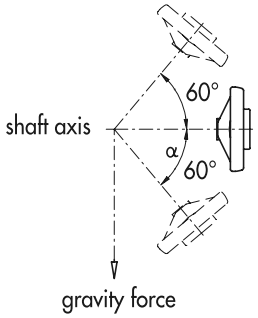

Fig.3

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)
G	A	0	1	-	0	0	1	2	-	D




VD+I	VDC.	VDSC+I	VAD.
479	480	482	484
	•		•
	•	•	•
•	•		•
	•		•
	•	•	•
	•	•	•

POSITIVE DRIVE INDICATORS

1. FEATURES

1.1 Suitable for use on control spindles in any position.

1.2 The movement is housed in a sealed case (fig. 4). The handwheel/knob, containing the indicator, is coupled to the control spindle. On the rear of the handwheel/knob a flange with internal crown gear wheel (shrouded) is fitted to the machine frame by means of an anchor pin (or similar). By so doing, during handwheel rotation, the flange is integral with the machine. The rotation of the handwheel causes the planet pinion to rotate, transmitting in this way the movement inside the indicator case. The rotation is then transmitted to both pointers by means of a gearing, while the graduated dial remains still thanks to the fixing to the machine frame by means of the anchor pin.

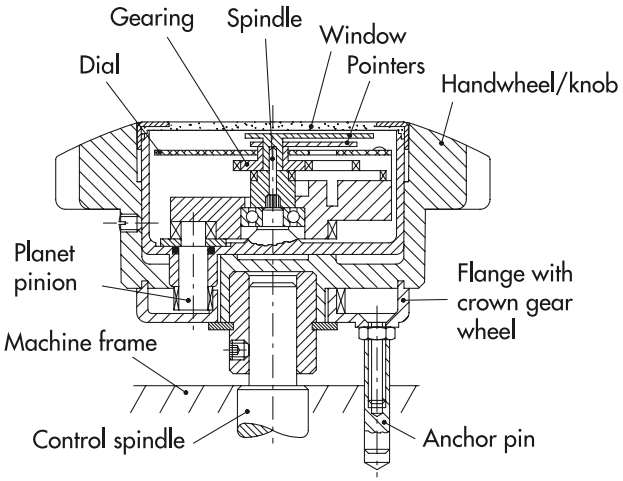

Fig.4

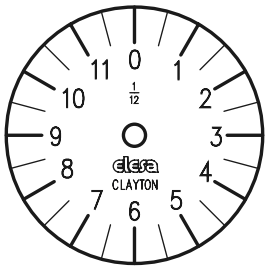

Fig.5

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. 5).
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		MBT.	VHT.
INDICATORS	page	476	477
PA01	472	•	•
PA02	472	•	•
PA05	472		
PA11	473	•	•
PA12	473	•	•
PW12	474	•	•

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. ASSEMBLY INSTRUCTIONS

5.1 Drill a bore in the machine frame for the rear anchor pin of the flange.

5.2 Set the control spindle to the initial or referring position.

5.3 Remove the black protection cap of the planet pinion, turn the latter until the pointers are in zero position.

5.4 Take the chosen handwheel/knob and mount the supplied anchor pin on the screw protruding from the rear flange. Be sure that the hole for the indicator planet pinion is at 12 o'clock. Turn the rear flange and position the anchor pin in line with the referring bore drilled on the machine.

5.5 Gently fit the zeroed indicator into the handwheel/knob, inserting the planet pinion smoothly into the corresponding hole. To make the fitting of the indicator easier, gently turn by some degrees the rear flange until the planet pinion is geared to the internal crown gear wheel. Check that the indicator is zeroed and that the screw for the anchor pin is in the correct position.

5.6 Uniformly tighten the lateral grub screws for fixing the indicator case with a moderate torque, to prevent distortion of the case itself and thus locking the movement.

5.7 Adjust the height of the anchor pin so that no undue strain is caused to the flange and tighten the locknut.

5.8 Couple the handwheel with the indicator to the zeroed control spindle. Be sure that the indicator pointers are in zero position and that the anchor pin is in line with the referring bore on the machine. Pin the handwheel on the spindle.

5.9 Check the right functioning of the indicator over all the rotation range.

Example of positive drive indicator description

Series					Ratio					Clockwise graduations (Right)
P	A	0	1	-	0	0	1	2	-	D

		
VDC.	**EWW+IEL**	**VAD.**
480	**483**	**484**
•		•
•	•	•
		•
		•
•	•	•
•	•	•