



**J.W. WINCO,<sup>®</sup>**  
**INC.**



**Bull's-Eye Levels  
and Screw-On Levels**



# Bull's-Eye Levels and Screw-On Levels

Technical information



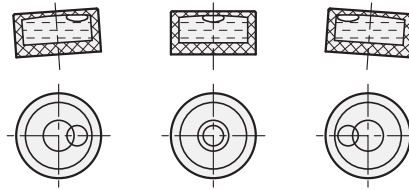
## Definition of terms

A spirit level is a hollow body filled with a fluid and a gas bubble which is used to check the horizontal position of an object. The position of the gas bubble in the fluid shows the angle and the direction at which the object is inclined in relation to the horizontal level.

## The function

The hollow body containing the fluid and the gas bubble has a defined radius at its top side, causing the gas bubble to float by its buoyancy always to the highest point.

The transparent upper section normally carries markings or a circle centric to the middle position. If the gas bubble is centered precisely inside the marking and if the air level is properly adjusted, the object to be checked is in the horizontal position.



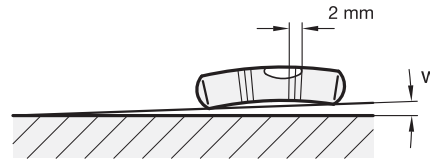
## Types of spirit levels

Spirit levels are available as bull's eye levels or screw-on levels.

Bull's eye levels simultaneously measure the angle of inclination and the angular position, e.g. of a certain level, whereas screw-on levels indicate the angle of inclination in one dimension only along the axis of the level.

## Sensitivity

The sensitivity of spirit levels is given as angle of inclination, e.g. 30 angular minutes or 0.5 degrees. This is the angle of inclination by which the spirit level must be tilted to make the bubble move by 2 mm. A spirit level with a sensitivity of 6 angular minutes therefore has a higher sensitivity than a spirit level with a sensitivity of 30 angular minutes.



## Angle of inclination and difference in altitude




Sensitivity is sometimes also given in millimeters per meter, i.e. as difference in altitude per unit of length. See also the reference table opposite.

Difference in altitude in millimeters per meter	Angle w	
	in angular minutes	Degree, decimal
0.3	1	0.0167
0.9	3	0.0500
1.7	6	0.1000
2.9	10	0.1667
5.8	20	0.3333
8.7	30	0.5000
11.6	40	0.6667
14.5	50	0.8333
17.5	60	1.0000

# Bull's-Eye Levels and Screw-On Levels

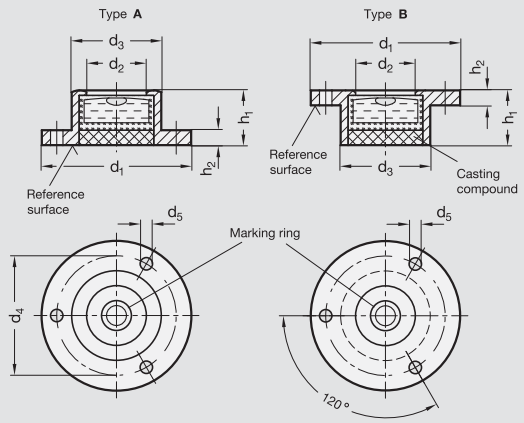
Range



<p><b>Bull's eye levels</b> with mounting flange <b>GN 2277</b> → Page 4</p>	
<p><b>Adjustment plates</b> for bull's eye levels GN 2277 <b>GN 2277.1</b> → Page 6</p>	
<p><b>Bull's eye levels</b> for insertion into bore holes <b>GN 2278</b> → Page 7</p>	
<p><b>Bull's eye levels</b> for surface mounting <b>GN 2279</b> → Page 8</p>	
<p><b>Bull's eye levels</b> adjustable, with mounting threads <b>GN 2280</b> → Page 9</p>	
<p><b>Bull's eye levels</b> for installation in plates and housings <b>GN 2281</b> → Page 10</p>	
<p><b>Screw-on levels</b> for mounting with screws <b>GN 2282</b> → Page 12</p>	

# GN 2277 | Bull's-Eye Levels

With Mounting Flange • Metric Size • Aluminum



RoHS Compliant

## Housing

Aluminum, anodized

Version ALN – natural color finish

Version ALS – black finish

## Spirit level element

Glass or plastic body

## Filling

Isoparaffin (C9-CI-2), colorless-transparent

## Casting compound

Mineral-based

## Sensitivity

30 angle minutes, bubble moves by 2 mm

Type A – With mounting flange for bolting to surface

Type B – With mounting flange with collar for inserting into bore holes

GN 2277 bull's-eye levels are used to check the horizontal position of jigs, machines, devices, appliances and instruments.

The spirit levels are aligned in relation to the reference surface so that the bubble is located inside the marking ring when the horizontal position of the contact surface is achieved.

See also GN 2277.1 adjustment plates, page 6.

Available upon request:

- Filling: green-transparent
- Other sensitivities
- Housing in brass or stainless steel

## Type A - Mounting Flange for Bolting to Surface

Dimensions in: millimeters (*inches*)

Part Number		d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	h <sub>1</sub>	h <sub>2</sub>
ALN Natural Finish	ALS Black Finish							
2277-ALN-20-K-30-A	2277-ALS-20-K-30-A	20 (.79)	10 (.39)	14 (.55)	17 (.67)	1.8 (.07)	10 (.39)	1.8 (.07)
2277-ALN-25-K-30-A	2277-ALS-25-K-30-A	25 (.98)	12 (.47)	17 (.67)	21 (.83)	2.2 (.09)	10 (.39)	2 (.08)
2277-ALN-30-K-30-A	2277-ALS-30-K-30-A	30 (1.18)	12 (.47)	18 (.71)	24 (.94)	3.2 (.13)	11 (.43)	3 (.12)
2277-ALN-40-K-30-A	2277-ALS-40-K-30-A	40 (1.57)	20 (.79)	28 (1.10)	34.5 (1.36)	3.2 (.13)	14 (.55)	4 (.16)
2277-ALN-50-K-30-A	2277-ALS-50-K-30-A	50 (1.97)	25 (.98)	34 (1.34)	43 (1.69)	3.2 (.13)	15 (.59)	5 (.20)

Bull's-Eye Levels and Screw-On Levels



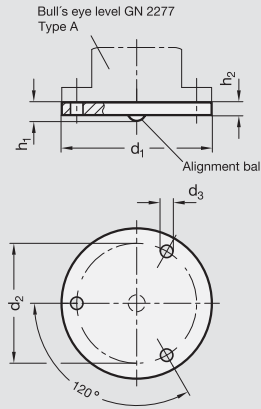
## Type B - Mounting Flange with Collar for Inserting into Bore Holes

Dimensions in: millimeters (*inches*)

Part Number		d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	h <sub>1</sub>	h <sub>2</sub>
ALN Natural Finish	ALS Black Finish							
2277-ALN-20-K-30-B	2277-ALS-20-K-30-B	20 (.79)	10 (.39)	14 (.55)	17 (.67)	1.8 (.07)	10 (.39)	1.8 (.07)
2277-ALN-25-K-30-B	2277-ALS-25-K-30-B	25 (.98)	12 (.47)	17 (.67)	21 (.83)	2.2 (.09)	10 (.39)	2 (.08)
2277-ALN-30-K-30-B	2277-ALS-30-K-30-B	30 (1.18)	12 (.47)	18 (.71)	24 (.94)	3.2 (.13)	11 (.43)	3 (.12)
2277-ALN-40-K-30-B	2277-ALS-40-K-30-B	40 (1.57)	20 (.79)	28 (1.10)	34.5 (1.36)	3.2 (.13)	14 (.55)	4 (.16)
2277-ALN-50-K-30-B	2277-ALS-50-K-30-B	50 (1.97)	25 (.98)	34 (1.34)	43 (1.69)	3.2 (.13)	15 (.59)	5 (.20)

# GN 2277.1 | Adjustment Plates

For GN 2277 Bull's-Eye Levels • Metric Size • Stainless Steel



RoHS Compliant

## Adjustment plate

Stainless steel, European Standard No. 1.4305 (American Standard Series 303)

GN 2277.1 adjustment plates are used in combination with GN 2277, Type A bull's-eye levels.

The mounting bore holes offset by 120° allow the bull's-eye levels and the mounting plate to be aligned in relation to the mounting surface. An alignment ball at the bottom surface of the adjustment plate serves as a tilting point. Specific tightening torques of the bolts are allowed to be achieved, so that the bubble is centrally located inside the marking ring once the horizontal alignment is reached.

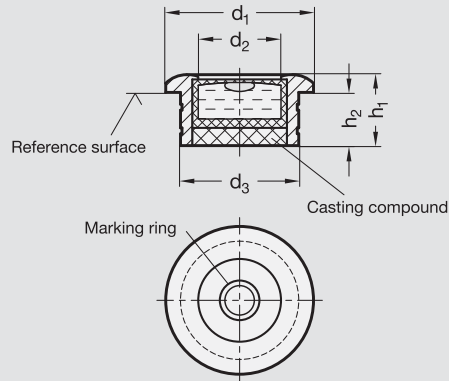
## Metric Table

Dimensions in: millimeters (*inches*)

Part Number	d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	h <sub>1</sub>	h <sub>2</sub>
2277.1-NI-20	20 (.79)	17 (.67)	1.8 (.07)	3.2 (.13)	1.2 (.05)
2277.1-NI-25	25 (.98)	21 (.83)	2.2 (.09)	3.2 (.13)	1.2 (.05)
2277.1-NI-30	30 (1.18)	24 (.94)	3.2 (.13)	3.2 (.13)	1.2 (.05)
2277.1-NI-40	40 (1.57)	34.5 (1.36)	3.2 (.13)	3.2 (.13)	1.2 (.05)
2277.1-NI-50	50 (1.97)	43 (1.69)	3.2 (.13)	3.2 (.13)	1.2 (.05)

# GN 2278 | Bull's-Eye Levels

For Insertion into Bore Holes • Metric Size • Aluminum



RoHS Compliant

### Housing

Aluminum, anodized

Version ALN – natural color finish

Version ALS – black finish

### Spirit level element

Glass or plastic body

### Filling

Isoparaffin (C9-CI-2), colorless-transparent

### Casting compound

Mineral-based

### Sensitivity

30 angle minutes, bubble moves by 2 mm

GN 2278 bull's-eye levels are used to check the horizontal position of jigs, machines, devices, appliances and instruments.

The housing is grooved at its lower diameter  $d_3$ , making it easier to mount in place, e.g. by gluing.

The spirit levels are aligned in relation to the reference or contact surface, so that the bubble is centrally located inside the marking ring once the horizontal position of the contact surface is reached.

Available upon request:

- Filling: green-transparent
- Other sensitivities
- Housing in brass or stainless steel

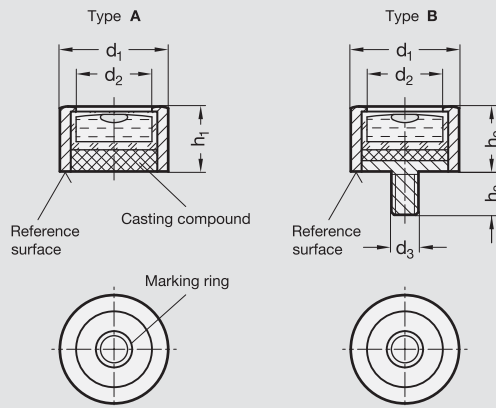
## Metric Table

Dimensions in: millimeters (*inches*)

Part Number		$d_1$	$d_2$	$d_3$	$h_1$	$h_2$
ALN Natural Finish	ALS Black Finish					
2278-ALN-20-K-30	2278-ALS-20-K-30	20 (.79)	12 (.47)	18 (.71)	10 (.39)	8 (.31)
2278-ALN-25-K-30	2278-ALS-25-K-30	25 (.98)	14 (.55)	20 (.79)	12 (.47)	9 (.35)
2278-ALN-30-K-30	2278-ALS-30-K-30	30 (1.18)	20 (.79)	28 (1.10)	13 (.51)	10 (.39)

# GN 2279 | Bull's-Eye Levels

For Surface Mounting • Metric Size • Aluminum



RoHS Compliant

## Housing

Aluminum, anodized

Version ALN – natural color finish

Version ALS – black finish

## Spirit level element

Glass or plastic body

## Filling

Isoparaffin (C9-CI-2), colorless-transparent

## Casting compound

Mineral-based

## Sensitivity

30 angle minutes, bubble moves by 2 mm

Type A – With smooth reference surface

Type B – With threaded stud for mounting

GN 2279 bull's-eye levels are used to check the horizontal position of jigs, machines, devices, appliances and instruments.

Type A is used if the spirit level is to be used as a tool, e.g. at different measuring points.

The spirit levels are aligned in relation to the reference surface so that the bubble is centrally located inside the marking ring when the horizontal position of the contact surface is achieved.

Available upon request:

- Filling: green-transparent
- Other sensitivities
- Housing in brass or stainless steel

## Type A – With Smooth Reference Surface

Dimensions in: millimeters (*inches*)

Part Number		d <sub>1</sub>	d <sub>2</sub>	h <sub>1</sub>
ALN Natural Finish	ALS Black Finish			
2279-ALN-14-K-30-A	2279-ALS-14-K-30-A	14 (.55)	10 (.39)	7.7 (.30)
2279-ALN-20-K-30-A	2279-ALS-20-K-30-A	20 (.79)	14 (.55)	13 (.51)
2279-ALN-30-K-30-A	2279-ALS-30-K-30-A	30 (1.18)	21 (.83)	15 (.59)

## Type B – With Threaded Stud for Mounting

Dimensions in: millimeters (*inches*)

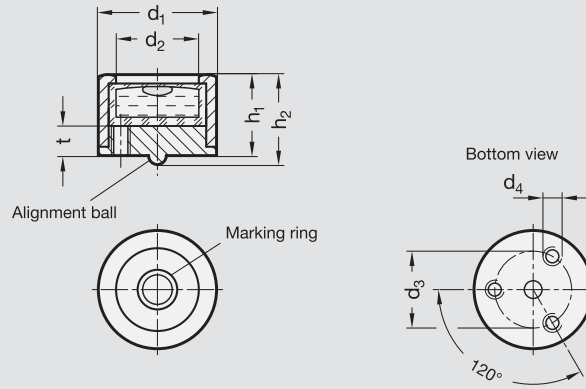
Part Number		d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub> Thread	h <sub>2</sub>	h <sub>3</sub>
ALN Natural Finish	ALS Black Finish					
2279-ALN-14-K-30-B	2279-ALS-14-K-30-B	14 (.55)	10 (.39)	M4 x .7	9.5 (.37)	5 (.20)
2279-ALN-20-K-30-B	2279-ALS-20-K-30-B	20 (.79)	14 (.55)	M5 x .8	13 (.51)	6 (.24)
2279-ALN-30-K-30-B	2279-ALS-30-K-30-B	30 (1.18)	21 (.83)	M6 x 1.0	15 (.59)	7.5 (.29)

Bull's-Eye Levels and Screw-On Levels



# GN 2280 | Adjustable Bull's-Eye Levels

With Mounting Threads • Metric Size • Aluminum



RoHS Compliant

## Housing

Aluminum, anodized

Version ALN – natural color finish

Version ALS – black finish

## Spirit level element

Glass or plastic body

## Filling

Isoparaffin (C9-CI-2), colorless-transparent

## Casting compound

Mineral-based

## Sensitivity

30 angle minutes, bubble moves by 2 mm

GN 2280 bull's-eye levels are used to check the horizontal position of jigs, machines, devices, appliances and instruments.

The mounting threads offset by 120° allow the spirit levels to be aligned in relation to the mounting surface. An alignment ball at the bottom surface of the adjustment plate serves as a tilting point. Specific tightening torques of the bolts are allowed to be achieved, so that the bubble is centrally located inside the marking ring once the horizontal alignment is reached.

Available upon request:

- Filling: green-transparent
- Other sensitivities
- Housing in brass or stainless steel

## Metric Table

Dimensions in: millimeters (inches)

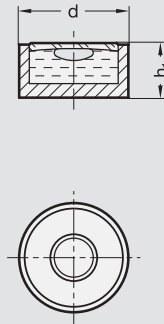
Part Number		d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub> Tapped	h <sub>1</sub>	h <sub>2</sub>	t
ALN Natural Finish	ALS Black Finish							
2280-ALN-17-K-30	2280-ALS-17-K-30	17 (.67)	13 (.51)	12 (.47)	M3 x .5	13 (.51)	14.5 (.57)	5 (.20)
2280-ALN-20-K-30	2280-ALS-20-K-30	20 (.79)	13 (.51)	14 (.55)	M3 x .5	15 (.59)	17 (.67)	5 (.20)
2280-ALN-24-K-30	2280-ALS-24-K-30	24 (.94)	13 (.51)	16 (.63)	M3 x .5	17 (.67)	20 (.79)	5 (.20)

# GN 2281 | Bull's-Eye Levels

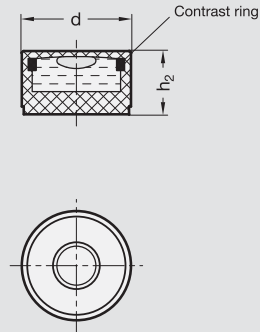
For Installation in Recessed Bore Holes and Housings • Metric Size • Aluminum or Plastic



Version ALS



Version KT



RoHS Compliant

## Housing

Version ALS – Aluminum, anodized, black finish  
Viewing window glass

Version KT – Plastic, white  
Viewing window transparent plastic

## Filling

Type K – Isoparaffin (C9-CI-2), colorless-transparent

Type G – Mineral spirit 135/180, green-transparent (Version KT only)

## Casting compound

Mineral-based

## Sensitivity for Version ALS

10 angle minutes, bubble moves by 2 mm

## Sensitivity for Version KT

40 angle minutes, bubble moves by 2 mm

Style 1 – Without contrast ring

Style 2 – With contrast ring (only on Version KT with d=12 – 18 mm)

Due to their cylindrical design, GN 2281 bull's-eye levels are suitable for installation in recessed bore holes and housings where they serve to check the horizontal position of jigs, machines and devices.

Bull's-eye levels are not aligned, i.e. there is no reference to the external outline of the level. The vertical position must be ensured by aligning the holding/building element.

The black housing of the version ALS creates a reflection at the edge of the bubble which significantly improves the readability. Version KT with d=12-18 is available with contrast ring inside the air level housing (Style 2) which creates the same effect.

Alternatively, the contrast can also be improved by a dark surface inside the mounting bore hole.

Available upon request:

- Other sensitivities

## Version ALS – Aluminum Housing

### Without Contrast Ring, Colorless Filling, Sensitivity 10

Dimensions in: millimeters (*inches*)

Part Number	d	h <sub>1</sub>
2281-ALS-10-K-10-1	10 (.39)	6.9 (.28)
2281-ALS-12-K-10-1	12 (.47)	6.4 (.26)
2281-ALS-14-K-10-1	14 (.55)	6.2 (.25)
2281-ALS-15-K-10-1	15 (.59)	7.4 (.29)
2281-ALS-18-K-10-1	18 (.71)	7.3 (.29)



## Version KT – Plastic Housing

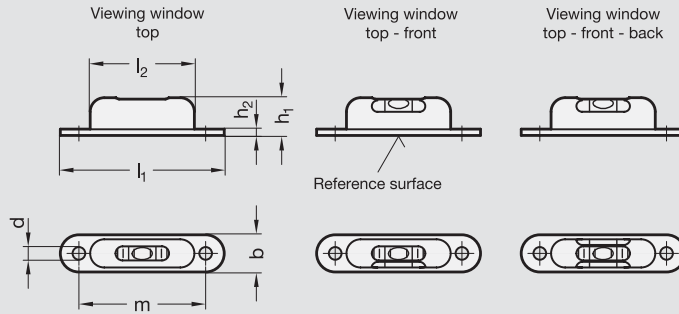
### Sensitivity 40

Dimensions in: millimeters (*inches*)

Without Contrast Ring		With Contrast Ring		d	h <sub>2</sub>
Colorless Filling	Green Filling	Colorless Filling	Green Filling		
2281-KT-10-K-40-1	2281-KT-10-G-40-1	–	–	10 (.39)	6 (.24)
2281-KT-12-K-40-1	2281-KT-12-G-40-1	2281-KT-12-K-40-2	2281-KT-12-G-40-2	12 (.47)	7 (.28)
2281-KT-14-K-40-1	2281-KT-14-G-40-1	2281-KT-14-K-40-2	2281-KT-14-G-40-2	14 (.55)	8 (.31)
2281-KT-15-K-40-1	2281-KT-15-G-40-1	2281-KT-15-K-40-2	2281-KT-15-G-40-2	15 (.59)	8 (.31)
2281-KT-18-K-40-1	2281-KT-18-G-40-1	2281-KT-18-K-40-2	2281-KT-18-G-40-2	18 (.71)	9 (.35)

# GN 2282 | Screw-On Levels

For Mounting with Screws • Metric Size • Brass



RoHS Compliant

## Housing

Brass, plastic coated

Version MSW – black textured finish

Version MSR – silver textured finish

## Spirit level element

Glass or plastic body

## Filling

Mineral spirit 135/180, green-transparent

## Casting compound

Mineral-based

## Sensitivity options

6 angle minutes, bubble moves by 2 mm  
50 angle minutes, bubble moves by 2 mm

Type 1 – Viewing window on top

Type 2 – Viewing window top-front

Type 3 – Viewing window top-front-back

(See line drawing)

GN 2282 screw-on levels are used to check the horizontal position of jigs, machines, devices, appliances and instruments.

The spirit levels are aligned in relation to the finished reference surface so that the bubble is centered in the middle of the marking lines once the horizontal position of the contact surface in the longitudinal direction is reached.

Available upon request:

- Filling: colorless-transparent
- Other sensitivities
- Other colors

## Type 1 – Viewing Window on Top

Dimensions in: millimeters (*inches*)

Part Number				l <sub>1</sub>	b	d	h <sub>1</sub>	h <sub>2</sub>	l <sub>2</sub>	m
MSW Black Finish		MSR Silver Finish								
6 Angle Minutes	50 Angle Minutes	6 Angle Minutes	50 Angle Minutes							
2282-MSW-57-G-6-1	2282-MSW-57-G-50-1	2282-MSR-57-G-6-1	2282-MSR-57-G-50-1	57 (2.24)	12 (.47)	4.5 (.18)	13 (.51)	1 (.04)	37 (1.46)	45 (1.77)

## Type 2 - Viewing Window Top-Front

Dimensions in: millimeters (*inches*)

Part Number				l <sub>1</sub>	b	d	h <sub>1</sub>	h <sub>2</sub>	l <sub>2</sub>	m
MSW Black Finish		MSR Silver Finish								
6 Angle Minutes	50 Angle Minutes	6 Angle Minutes	50 Angle Minutes							
2282-MSW-57-G-6-2	2282-MSW-57-G-50-2	2282-MSR-57-G-6-2	2282-MSR-57-G-50-2	57 (2.24)	12 (.47)	4.5 (.18)	13 (.51)	1 (.04)	37 (1.46)	45 (1.77)

## Type 3 – Viewing Window Top-Front-Back

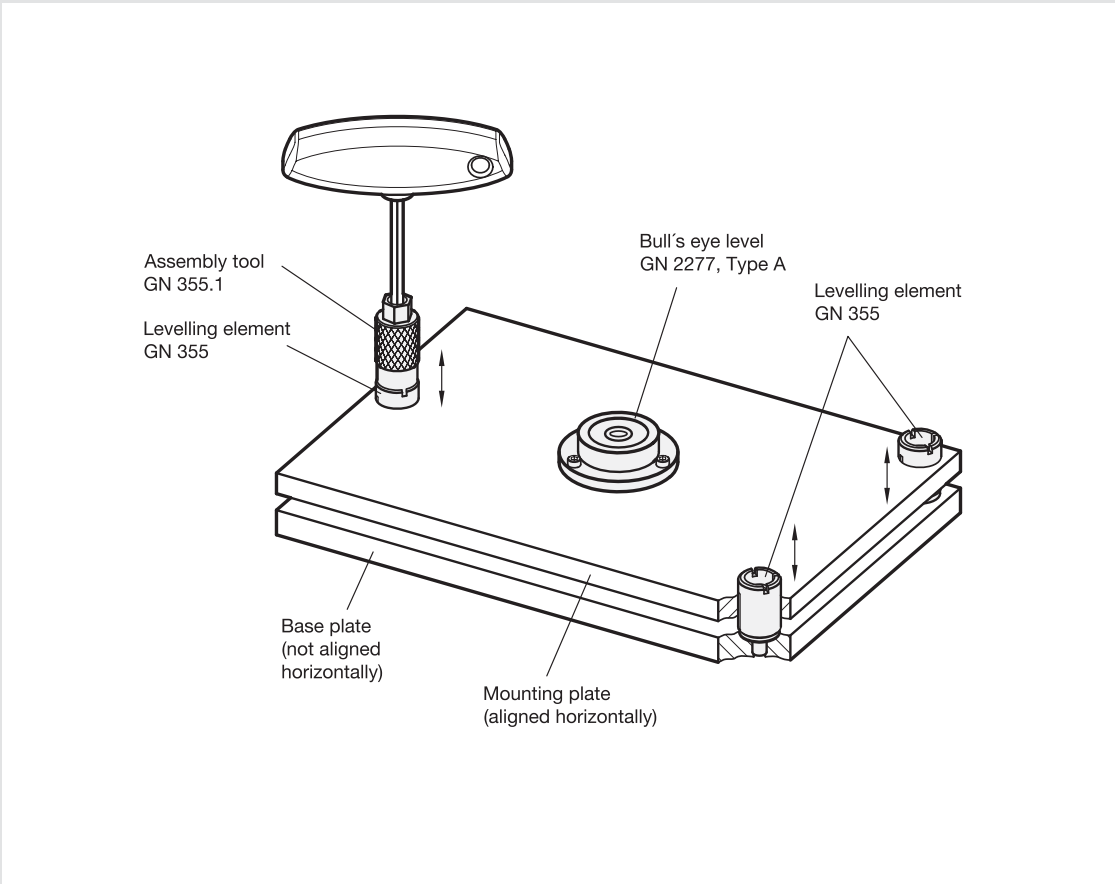
Dimensions in: millimeters (*inches*)

Part Number				l <sub>1</sub>	b	d	h <sub>1</sub>	h <sub>2</sub>	l <sub>2</sub>	m
MSW Black Finish		MSR Silver Finish								
6 Angle Minutes	50 Angle Minutes	6 Angle Minutes	50 Angle Minutes							
2282-MSW-57-G-6-3	2282-MSW-57-G-50-3	2282-MSR-57-G-6-3	2282-MSR-57-G-50-3	57 (2.24)	12 (.47)	4.5 (.18)	13 (.51)	1 (.04)	37 (1.46)	45 (1.77)

Bull's-Eye Levels and Screw-On Levels

# Bull's Eye Levels

Installation example – Bull's eye level GN 2277 used in conjunction with levelling elements GN 355



## Installation example

Bull's eye levels and leveling elements – in this example, GN 355 leveling elements and GN 355.1 assembly tool are ideal to use when a holding plate is to be brought into an exact horizontal position.

Even after the initial adjustment, the bull's eye level remains in the unit so that the correct alignment can be checked and adjusted again.

see also...

- GN 2277 Bull's eye levels → [Page 4](#)
- GN 355 Leveling elements → [Section 11 of our website at \[www.jwwinco.com\]\(http://www.jwwinco.com\)](#)
- GN 355.1 Assembly tool for leveling elements → [Section 11 of our website at \[www.jwwinco.com\]\(http://www.jwwinco.com\)](#)



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