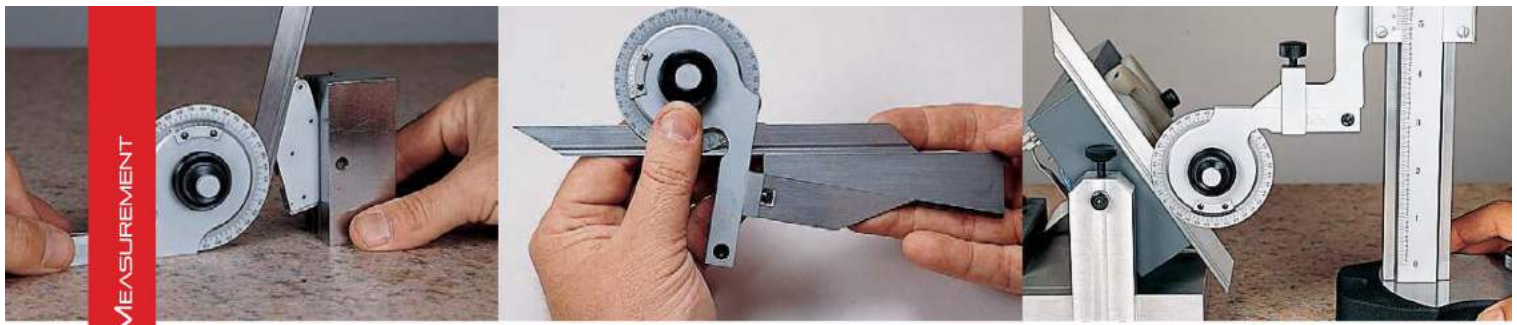


**PROTRACTORS,
ANGLE MEASUREMENT**



PROTRACTORS

359 PRECISION UNIVERSAL BEVEL VERNIER PROTRACTORS WITH FINE ADJUSTMENT

GRADUATIONS IN DEGREES THRU 360°

These tools are designed for precision measuring and for laying out angles. The protractor is one of the most valuable and useful tools for the kit of every good toolmaker, inspector or machinist.

359 Precision Universal Bevel Vernier Protractors - Graduations in Degrees through 360°			
Blade Size	Graduation	In Case Cat. No.	EDP
7"	5 min. or 1/12 degree	C359BZ	51394
12"	5 min. or 1/12 degree	C359DZ	51396
7" and 12"	5 min. or 1/12 degree	C359FZ	51398
		C359FZ W/SLC*	66929
Accessories for 359 Precision Universal Bevel Vernier Protractors			
Description	Cat. No.	EDP	
7" Blade Only	PT04780	70538	
12" Blade Only	PT04781	70539	
Acute Angle Attachment Only	PT99329	51392	

* Includes redemption card for Standard Letter of Certification (SLC).

READABILITY FEATURES

- Satin chrome finish on all reading surfaces – eliminates glare and resists rust
- Sharp, machine-divided graduations

EASE-OF-HANDLING FEATURES

- Available with hardened 7" (175mm) or 12" (300mm) blades which can be rotated to the desired angle and adjusted to the desired length
- Both the dial and the blade can be locked independently
- An acute angle attachment is available
- Flush surfaces on the base permits use on height gages
- One side of the tool is flat so it can be laid on paper or on the work

ACCURACY FEATURES

- Machine-divided graduations read to 5 minutes (1/12 of a degree) and accuracy is finer than can be read
- The most convenient, ultra-sensitive fine adjustment for precision setting

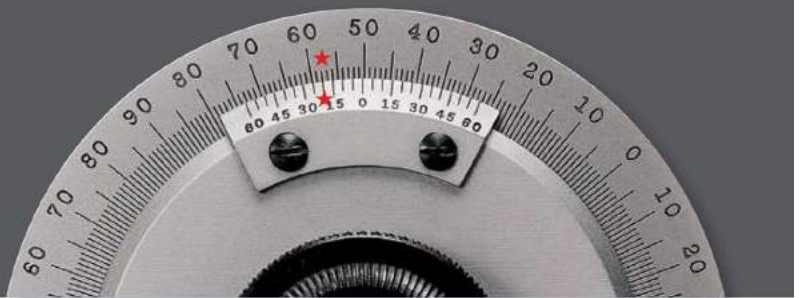
HOW TO READ A VERNIER ON UNIVERSAL BEVEL PROTRACTORS

Universal Bevel Protractors with Vernier can be accurately read to 5 minutes (5') or 1/12 of a degree. The dial of the protractor is graduated both to the right and left of zero up to 90 degrees. The Vernier scale is also graduated to the right and left of zero up to 60 minutes (60'), each of the 12 Vernier graduations representing 5 minutes. Any angle can be measured, and remember that the Vernier reading must be read in the same direction from zero as the protractor, either left or right.

Since 12 graduations on the Vernier scale occupy the same space as 23 graduations or 23 degrees on the protractor dial, each Vernier graduation is 1/12 degree or 5 minutes shorter than 2 graduations on the protractor dial. Therefore, if the zero graduation on the Vernier scale coincides with a graduation on the protractor dial, the reading is in exact degrees, but if some other graduation on the Vernier scale coincides with a protractor graduation, the number of Vernier graduations multiplied by 5 minutes must be added to the number of degrees read between the zeros on the protractor dial and Vernier scale.

EXAMPLE:

★ In the illustration on the below, the zero on the Vernier scale lies between the "50" and "51" on the protractor dial to the left of the zero, indicating 50 whole degrees. Also reading to the left, the 4th line on the Vernier scale coincides with a graduation on the protractor dial as indicated by the asterisks (*) and therefore 4 x 5 minutes or 20 minutes are to be added to the number of degrees. The reading of the protractor therefore, is 50 degrees and 20 minutes (50° 20').



STEEL PROTRACTORS

C19 STEEL PROTRACTOR

0-180°

This is a highly useful and accurate tool for setting bevels, transferring angles, small squaring tasks, checking cutter clearances within certain limits, and many other applications.

- Double graduations from 0-180° in opposite directions permitting the direct reading of angles and supplementary angles
- The back of the tool is flat for ease of use
- The blade can be locked firmly at any angle by the lock nut
- Satin chrome finish for ease of reading and resistance to rust

C183 STEEL PROTRACTOR

0-180°

This protractor is exactly the same as the C19, except that it has a rectangular head, thus providing four convenient working edges.

C182 STEEL PROTRACTOR

0-180°

This protractor has the same type of head as our 19 but it is designed for draftsmen, civil engineers, and others who need a protractor that will allow the drawing of any number of radial lines at any angle through a common center. This is especially useful for someone in the field who can only carry a minimum of equipment. Weight is approximately 3 ounces.

To use the protractor, the fulcrum point is pressed into the drawing at the required center. This is done by removing the fulcrum point from the hub, pressing it in the drawing, and then placing the protractor hub over the fulcrum point. The desired angles can then be laid out.

The fulcrum point can be left in the tool. Press the whole tool down so that the point penetrates the drawing. (However, this will make it harder to find the center.)

When not in use, the fulcrum point can be drawn back into the hub and frictionally held in a safe position.

Satin chrome finish for ease of reading and resistance to rust.

Furnished with one needle point and one cone point.



Side view of protractor with fulcrum point in place

Steel Protractors			
Blade Length	Range	Cat. No.	EDP
6"	0-180°	C19	50127
		C183	50672
		C183 W/SLC*	66930
		C182	64361

* Includes redemption card for Standard Letter of Certification (SLC).



Check out our website for interactive features at starrett.com



PROTRACTORS

193 STEEL PROTRACTOR

0-180°

This protractor can be used with the 47 Universal Bevel by setting it against the revolving stud, which quickly and economically converts it into a Bevel Protractor. Protractor has double graduations from 0-180° in opposite directions.

Steel Protractor		
Range	Cat. No.	EDP
0-180°	193	50696



47 UNIVERSAL BEVEL

6"/150MM

This improved Universal Bevel has both offset and straight slots in the blade, in combination with straight slots in the stock that allow for a wide variety of adjustment and angle settings that are impossible to obtain with many ordinary bevels.

Length of the blade is 6" (150mm), and the stock, 3-1/2" (90mm). The stock lies flat on the work or paper since the head of the clamping bolt is recessed. This tool can be set to duplicate an angle from a master, or it may be easily converted into a Bevel Protractor by using this tool with the 193 Protractor.

Universal Bevel		
Blade Length	Cat. No.	EDP
6"	47	50266



SPECIAL DIAL PROTRACTOR HEADS

We make dial protractor heads for special applications that permit rapid angular measurements over a 90° range, in increments of 5 minutes.

These special tools are similar to AGD Group-2 Dial Indicators. They have a rear-mounted rotary input shaft attached to a movable arm that measures the angle in relation to a fixed arm.

They are available with continuous or balanced dials and with clockwise or counterclockwise reading.

(See our Special Gage section for more information.)



PROTRACTORS

493 PROTRACTOR AND DEPTH GAGES

0-180°

The ability to measure angles and depths is combined in these convenient tools.

C493

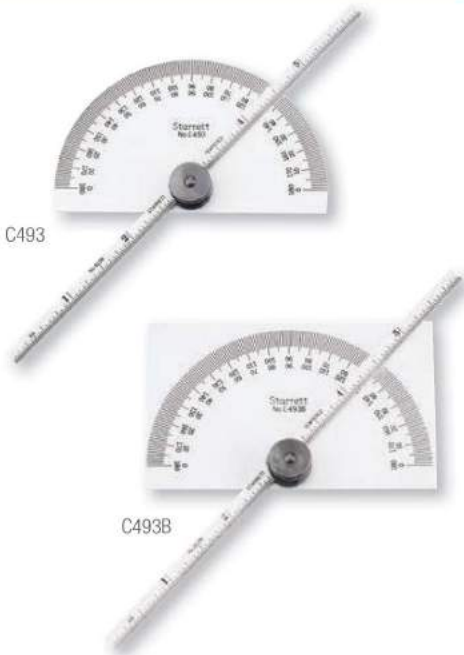
- Angular measurement is from 0-180° in opposite directions allowing the direct reading of angles and supplementary angles
- Depths are measured from a 6" (150mm) blade (our C610N)
- Both tools have a flat surface on the back of the head permitting laying the tool flat on paper or work
- No-glare satin chrome finish
- Semicircular head

C493B

This gage is exactly the same as the C493, except that it has a rectangular protractor head which provides four convenient working edges.

C493 Protractor and Depth Gages				
Cat. No.	EDP	Blade Length	Blade Graduations	Range
C493	52532	6"	32nds, 64ths	0-180°
C493B	52534	6"	32nds, 64ths	0-180°

Replacement Blades		
Cat. No.	EDP	Blade Length
C610N-6	52696	6"
C610N-12	67103	12"



22C DRILL POINT GAGE

59°

This gage was designed specifically for use in drill grinding. It provides a quick, accurate way for determining the correct drill point angle of 59° and the correct length of drill lips necessary for clean-cut drilling at maximum feeds and speeds.

- The sliding head may be adjusted to any position along the rule and locked by a thumb nut
- The head is beveled to 59° (the correct drill point angle), and is also graduated in 32nds along the 59° face for measuring the drill lips which should be of equal lengths
- The hook rule has accurate, machine-divided graduations in 8ths, 16ths, quick-reading 32nds and 64ths
- Hook is adjustable and can be shortened or extended on either side of the rule, and may also be removed if desired
- Tool can also be used as a Plain Rule, Hook Rule, Depth Gage, and Slide Caliper
- Will handle up to a 2" diameter drill

22C Drill Point Gage					
Cat. No.	EDP	Head		Hook Rule	
		Bevel	Graduations	Length	Graduations
22C	50150	59°	32nds	6"	8ths, 16ths; Quick-Reading 32nds, 64ths



Check out our website for interactive features at starrett.com



BEVEL PROTRACTORS

490, 491 REVERSIBLE BEVEL PROTRACTORS

0-180°

12 NON-REVERSIBLE BEVEL PROTRACTORS

0-180°

READABILITY FEATURES

- Starrett satin chrome blades and protractor heads for easier reading are available (on 12" sizes)
- Direct reading 0-180° in opposite directions, permitting the direct reading of angles and supplementary angles

EASE-OF-HANDLING FEATURES

- Reversible lock bolt allows choice of which graduated side of the blade faces the operator
- The 12 is non-reversible, meaning the blade is on the outside of the frame, so the frame stays on the same side of the workpiece
- The 490 and 491 are reversible, meaning there is a shoulder on both sides of the blade, allowing the tool to be reversed so the same angle can be scribed or measured left and right

LONG-LIFE AND ACCURACY FEATURES

- Protractor heads are made of stable cast iron and finished with a choice of attractive black wrinkle finish or smooth black finish
- Tempered steel blades with accurate, photo-engraved graduations
- A spirit level indicates when the base reference surface is level – a feature not usually available on comparable protractors



C490-12-4R reversible bevel protractor with black wrinkle finish



C12-12-4R non-reversible bevel protractor with smooth finish



Close-up of spirit level on back side of protractor

Bevel Protractors								
Size	Blade Finish	Graduation	Reversible				Non-reversible	
			Black Wrinkle Finish		Black Smooth Finish		Black Wrinkle Finish	
			Cat. No.	EDP	Cat. No.	EDP	Cat. No.	EDP
12"	Satin Chrome	4R: 8ths, 16ths, Quick Reading, 32nds, 64ths	C491-12-4R	64602	C490-12-4R	52514	C12-12-4R	64290
	Regular		491-12-4R	52521	490-12-4R	52511	C12-12-4R W/SLC*	66931
18"	Regular	4R: 8ths, 16ths, Quick Reading, 32nds, 64ths	491-18-4R	52522	490-18-4R	52512	12-18-4R	50103
24"	Regular	4R: 8ths, 16ths, Quick Reading, 32nds, 64ths	491-24-4R	52523	490-24-4R	52513	12-24-4R	50104
300mm and 11-3/4"	Regular	1/2mm and 32nds one side; mm and 64ths, reverse side	491ME-300	52524			12ME-300	50105

Since the protractor heads and blades are furnished with combination square sets, individual protractor heads or blades can be ordered separately. See the Squares section for information and catalog numbers.

* Includes redemption card for Standard Letter of Certification (SLC).

