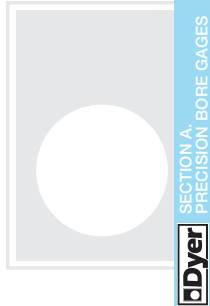


DYER'S HIGH ACCURACY & REPEATABILITY ADVANTAGE



Authorized Distributor: Willrich Precision
Ph: 866-945-5742 email:sales@willrich.com

Dyer's experience and superior gage designs result in better bore gaging

Non-tipping, two point contact "hands off" bore gages

Dyer is a technical leader in bore gages. We have a large selection of proven gage designs to choose from when we are evaluating a bore measuring application. Many of our new designs make bore measuring a "Hands off" process.

Advances in gage technology and electronics have brought significant improvements to the bore measuring process. Dyer's non-tipping two point contact bore gages assure parts manufacturers that the accuracy and repeatability of a measurement does not depend on the skill of the operator. These "hands off" gages guarantee that every measurement taken is correct and Gage R & R capable.

Eliminating Operator Error

A look at the operation of a non-tipping gage will show the instrument's advantages. The gaging process is quick and easy. The operator inserts the gage and takes a reading without having to do any rocking or aligning. Operator influence is a problem of the past.

Superior Design and Construction

Here are real reasons Dyer's bore gages are the industry's best performers.

⦿ **Linearity**

$\leq \pm 0.000040"$ (± 0.001 mm) a simple direct transfer of the contact point movement to the measurement indicator. This results in the best linear accuracy.

⦿ **Repeatability**

$\leq \pm 0.000040"$ ($\leq \pm 0.001$ mm)

⦿ **Automatic Centering**

The correct self-centering base for each measuring range assures axial and radial alignment in each bore every time it measures.

⦿ **Gage Stability**

Heat Stabilization. The handles (measuring transfer shafts) of all Dyer precision bore gages are made from Invar steel, a special alloyed steel that resists temperature change. This eliminates errors due to circulating temperatures.

GAGE REPEATABILITY AND REPRODUCIBILITY REPORT

Gage I.D.: General Gage R & R
 Spec. Limits: 25.375 / 25.426

Comments: Mastered @ 25.40mm
 Characteristic: Main Bore ID

No. Trials: 2
 No. Operators: 3
 No. Parts: 10

Operator A				Operator B				Operator C			
	1 Trial	2 Trial	Range		1 Trial	2 Trial	Range		1 Trial	2 Trial	Range
1	25.386	25.385	0.001	1	25.386	25.385	0.001	1	25.384	25.385	0.001
2	25.384	25.384	0.000	2	25.384	25.384	0.000	2	25.383	25.383	0.000
3	25.382	25.382	0.000	3	25.382	25.381	0.000	3	25.381	25.381	0.000
4	25.383	25.383	0.000	4	25.383	25.382	0.001	4	25.382	25.382	0.000
5	25.382	25.382	0.000	5	25.352	25.381	0.001	5	25.381	25.381	0.000
6	25.382	25.380	0.002*	6	25.381	25.380	0.001	6	25.381	25.381	0.000
7	25.382	25.382	0.000	7	25.383	25.381	0.002*	7	25.382	25.381	0.001
8	25.384	25.384	0.000	8	25.385	25.384	0.001	8	25.385	25.384	0.001
9	25.384	25.384	0.000	9	25.383	25.383	0.000	9	25.383	25.383	0.000
10	25.382	25.381	0.001	10	25.381	25.380	0.001	10	25.381	25.381	0.000
Totals	253.831	253.827	0.004	Totals	253.830	253.821	0.009	Totals	253.823	253.822	0.003

Sum	Xbar A	Rbar A	Sum	Xbar B	Rbar B	Sum	Xbar C	Rbar C
507.658	25.3829	0.004	507.651	25.3826	0.009	507.645	25.3823	0.0003

Rp: 0.0043 R: 0.0005 Max X: 25.3829 * Limit of individual R's. Correct Rbar by repeating those readings using the same appraiser and unit or discard the values and reaverage and recompute R-bar and the value UCL-R.
 TV: 0.0076 UCL-R: 0.0017 Min X: 25.3823

Measurement Unit Analysis:	Process Variation Analysis:	Tolerance Analysis: TOL = 0.0510
Equipment Variation (E.V.) E.V. = 0.0024	% Equipment Variation (E.V.) % E.V. = 31.94%	% Equipment Variation (E.V.) % E.V. = 4.77%
Appraiser Variation (A.V.) A.V. = 0.0017	% Appraiser Variation (A.V.) % e. v. = 31.94%	% Appraiser Variation (A.V.) % A.V. = 3.27%
Repeatability & Reproducibility R & R = 0.0029	% Repeatability & Reproducibility % R & R = 38.73%	% Repeatability & Reproducibility % R & R = 5.78%
Process Variation (P.V.) P.V. = 0.0070	% Process Variation (P.V.) % P.V. = 92.19%	% Process Variation (P.V.) % P.V. = 13.76%



240 SERIES FASTER GAGING TIMES ORDERING NAMES



Willrich Precision email: sales@willrich.com

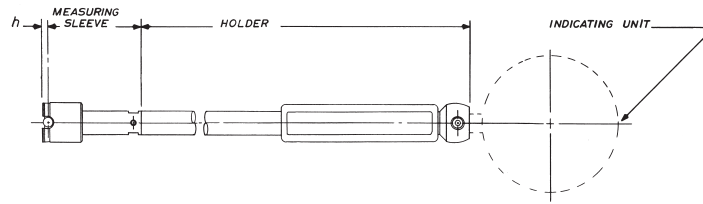
Maximum Measuring Accuracy

Linear $\pm 0.000040''$ (± 0.001 mm)
 Repeatability $< 0.000040''$ (< 0.001 mm)
 Gage R & R $\leq 10\%$ capability when measuring high tolerance bores.
 Please contact Dyer with your application.

Custom Standards and Specials

Dyer also makes special design measuring sleeves to fit your unique application. These special design heads can have:

- More contact travel, rough cut/final cut possibilities
- Many unique sleeve profiles
- Extra long or short sleeve lengths
- 2 or 3 point contacts
- Special depth stops
- Special masters
- Special contact shapes, types and sizes
- Special coatings
- 2, 3, or 4 \emptyset planes and radial axis



CAD Prints and Drawings

Available from Dyer is our "Quick Reference" 8-1/2" x 11" reduced drawing of our 240 Series Bore Gages. CAD drawings of our gages on your drawing paper can be done. Contact Dyer Applications Engineering Services.

The 240 Series Measuring Sleeves are dedicated gages that are specifically machined to fit a customer's bore diameter. It is very important to know your part tolerance to make sure the gage has the appropriate range to cover the part specification. On average, the total travel of a gage head is 0.010" (0.25mm).

The "h" dimension is the distance from the centerline of the measuring contact to the bottom of the measuring sleeve. This determines how close to the bottom of a bore you can measure. There are basically (3) different standard "h"

dimensions. A thru bore "h" dimension is generally 0.400" (10mm), a blind bore "h" dimension is 0.118" (3mm) on average, and a super blind "h" dimension is 0.039" (1mm).

A complete setup includes a measuring sleeve head, a holder, an indicator (mechanical or electronic), and a master ring. If a customer already has an existing holder, indicator, or master, they can adapt the 240 Series Measuring Sleeve directly to it.

We encourage a customer to send us a drawing or sectioned part print of their specific measuring requirement. Our engineering staff will be able to clearly identify the proper measuring sleeve needed to perform the task. A formal quotation can be generated listing all the items needed to make a complete system.

Our standard delivery for diameters between 0.118" (3mm) and 5.118" (130mm) is 1 to 2 weeks. Our rush delivery for these same sizes is 1 to 2 days and carries with it a premium charge. We also have an "extended" (or longer delivery) of 6 weeks for these sizes for those customers that are not in a hurry and want a discounted price. Contact Dyer customer service for further details.

240 Series sizes under 0.118" (3mm) and over 5.118" (130mm) have a standard delivery of 6 weeks. There are no "rush" or "extended" delivery options for these 240 Series sizes. (Look into the Dyer 440 Series Twin Cross for larger dedicated heads for faster delivery.)

240 Measuring Sleeves

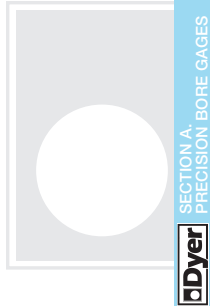
Sleeve Size Selection		Thru Bores		Blind Hole Bores		Super Blind Hole Bores	
Inch	mm	Tool Steel	h**	Tool Steel	h**	Tool Steel	h**
0.098-0.117	2.5-3.5	N/A	N/A	240-035		N/A	
0.118-0.157	3.0-4.0	240-400	0.236 (6 mm)	240-040		240-500	N/A
0.158-0.236	4.1-6.0	240-405		240-050		240-505	
0.240-0.472	6.1-12	240-410		240-052		240-510	0.039"
0.473-0.787	12.1-20.0	240-415		240-055		240-515	(1mm)
0.791-1.181	20.1-30.0	240-420		240-060		240-520	
1.182-1.574	30.1-40.0	240-425		240-065	"h" DIM's	240-525	
1.579-2.362	40.1-60.0	240-430		240-070		240-530	
2.363-3.150	60.1-80.0	240-435	All "h"	240-075	range between	240-535	
3.151-3.937	80.0-100.0	240-440	DIM are	240-080	0.059" (1.5 mm)	240-540	
3.938-4.331	100.1-110.0	240-445		240-085		240-545	
4.332-4.724	110.1-120.0	240-450	0.400"	240-090	and 0.157" (4 mm)	240-550	"h" DIM is
4.725-5.118	120.1-130.0	240-455	(10 mm)	240-095		240-555	0.047"
5.119-5.512	130.1-140.0	240-460		240-100	Depends on	240-560	(1.2 mm)
5.513-5.906	140.1-150.0	240-465		240-105	Sleeve Size	240-565	
5.907-6.299	150.1-160.0	240-470		240-110		240-570	
6.300-6.693	160.1-170.0	240-475		240-115		240-575	
6.694-7.087	170.1-180.0	240-480		240-120		240-580	
7.088-7.480	180.1-190.0	240-485		240-125		240-585	
7.481-7.874	190.1-200.0	240-490		240-130		240-590	
7.875-9.000	200.1-230.0	240-616	INQ.	240-617	INQ.	N/A	N/A

Note: Specify exact depth of bore for diameters under 0.472" (12 mm).
 1. For sizes between 4 mm and 12 mm, we offer extended measuring depths of 2.0" (50 mm), 4.0" (100 mm), and 6.0" (150mm). Contact Dyer.

Chrome Rc 72-74
 Tool Steel Rc 62-65

**Distance from the centerline of contact to the bottom of sleeve.

240 SERIES INDICATING PLUG BORE GAGES



Willrich Precision email: sales@willrich.com

Maximum Measuring Accuracy
 Linear $\leq \pm 0.000040"$ ($\leq \pm 0.001$ mm)
 Repeatability $< 0.000040"$ (< 0.001 mm)

Fast Delivery 24-48 hours or 1-2 weeks • 240 Bore Gages

Fast, Accurate and Repeatable Measurements

Dyer's 240 Series indicating plug gages are used for repetitive bore measurement applications or dedicated high volume production runs.

This rugged and dependable 24-7 bore gage was designed with the operator in mind. Fast, easy to use and no operator error.

Best in Gage R & R performance with an impressive $\leq 10\%$ capability, even during high tolerance applications and when measuring small or large bores.

Heavy-duty measurement transfer holder is made of Invar steel with hand insulator shield

Sleeve tool steel Rc62-65, Chrome coating optional

Fast maintenance service, returned "just like new"

We can turn your gage around in one day at our Lancaster facility. Also, if part dimensions change it is possible to rework your existing measuring head to a new size. If you need to quickly replace another manufacturer's measuring head, just tell us the model and thread size, we will supply a head that will fit your present holder. "Quick factory floor problem-solving reduces downtime and assures quality."

ALL CUSTOM MEASURING SLEEVES
 240 Series SIZES
 0.118" (3 mm) thru
 5.118" (130 mm)
 Fast Delivery, Rush 24-48 hours
 or standard 1-2 weeks



Complete System Availability

Dyer is also a "one-stop" system supplier. We package in a single case the measuring sleeve, depth stop, gage holder, indicator and setting master. We will supply the indicator of your choice on each 240 Series gage. Each set is inspected for function and accuracy before shipping. "Single source responsibility assure gages arrive on time, complete and working."

Automatic Centering and No Operator Error

In achieving the highest accuracies, the centering sleeve is made approximately 0.001" – 0.002" under the low limit of your minimum bore tolerance. The carbide ball contact points housed in the centering sleeve, along with the free floating movement, permit the highest measuring accuracy.

The measurement is "locked in" and no operator error is possible. A special chamfer at the bottom of centering sleeve (top chamfer is optional) permits easy entry into the bore.

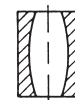
The spring-loaded outward contact pressure along with automatic centering and non tipping means no operator error when measuring bores.

Two-Point Floating Contact Measuring System

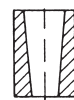
Positive two-point outward contact pressure and continuous on-line indication of the measured value permits the operator to see the bore's profile. The following geometry can be measured.



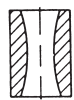
Ovality



Barrel Shape



Taper



Hourglass or bell mouth



DYER DELIVERS ADDED VALUE WITH OUR MEASURING SLEEVES



240 Series Measuring Sleeves are adaptable to other manufacturers' handles.

FREE, Fast Application Engineering

Contact Dyer via web site, e-mail, fax or phone with your measuring application.

We will immediately review your specific application and supply you with a detailed quote.

We can look at a part drawing and say, "Here is what you need."

Fast Delivery
24-48 hours or 1-2 weeks

Fast service on custom dedicated measuring sleeves

Notable Features

Dyer supplies measuring sleeves with post threads M6, M10, M11, M12 with delivery as short as 24-48 hours Rush Delivery. Dyer's standard post thread is an M11 and our competition uses M6, M10 and M12. Now, when you quickly need to replace another manufacturers measuring sleeve, just tell us the model and we will supply a Dyer sleeve with the correct thread that will fit your present holder.

It is easy to change over to Dyer measuring sleeves.

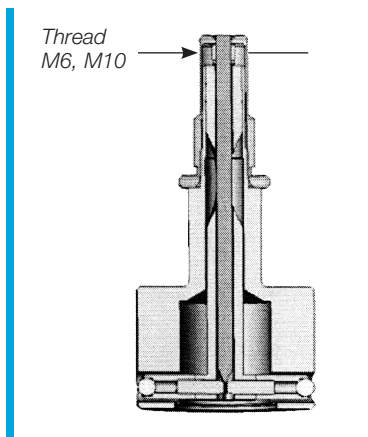
All Dyer carbide measuring needles can be taken out of the sleeve without use of a tool. Just screw off the security cap/nut. The needle movement is securely guided during the measurement transfer assuring accuracy.



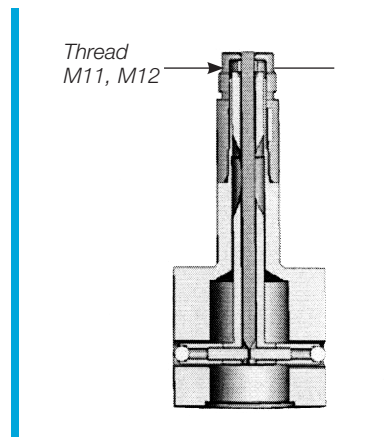
Fast, Precise Measurement



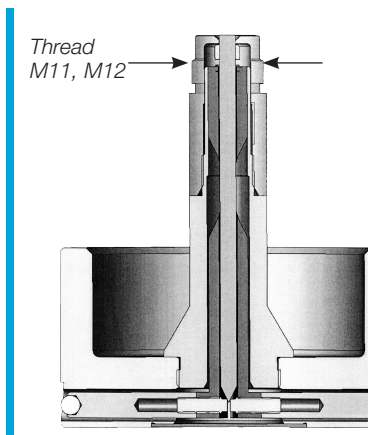
No Operator Error



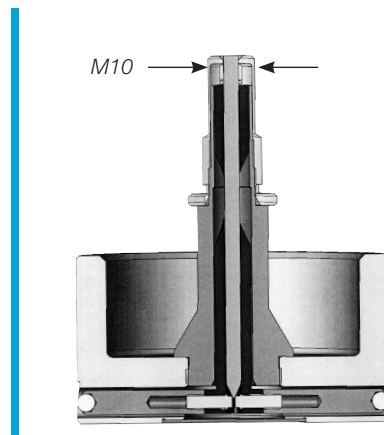
Blind hole bore small sleeve design



Thru bore small sleeve design

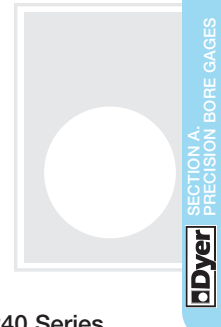


Large sleeve design



Large sleeve design

SPECIAL ACCESSORY OPTIONS FOR DEDICATED GAGING



Willrich Precision email: sales@willrich.com

Special Contact Points, Form, Size and Material Type

Carbide balls – Standard on all 240 Series gage heads. Special sizes are available

Ruby, Ceramic, Chrome, Delrin and Industrial Diamond balls – Special ball materials and sizes are available depending on your unique part application needs.

Aluminum and other non-ferrous metals measuring

A sliding friction between carbide and aluminum or other non-ferrous metals can cause built up local heating at the contact points when measuring. This can result in aluminum sticking to the contact points.

Ruby, ceramic or chrome contacts and Dyer's push button handle are solutions to this special application.



Carbide balls



Ruby balls

Mushroom Contacts

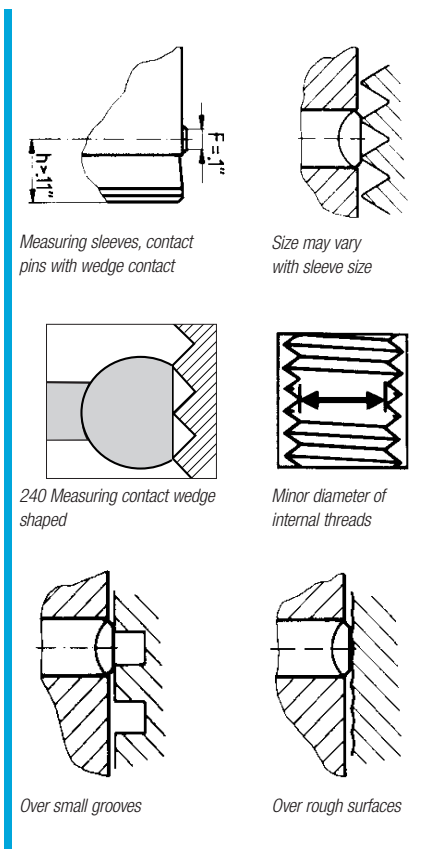
Large radius contacts are used for special applications. A radius that matches the bore size is also available. Contact Dyer.



Chisel Contacts – Special wedge contacts to measure the minor diameter of threads, gears, splines and other special internal profiles. These contacts are designed to span two or more teeth. Contact Dyer with your requirements.

Soft Surface Measuring

Soft part surface materials are scratch sensitive and the measuring pressure of the gage can cause deforming of the bore's surface. This gage application can be solved with large radius contacts of Chrome or Delrin. Dyer's push button handle is used to reduce contact point pressure when moving the gage in the bore.



Chisel contact applications

Special Chamfer Options 240 Series Measuring Heads

Unique Standard Insertion Chamfer

The insertion chamfer of Dyer's measuring sleeve allows for easy entering of the gage into the bore with no tilting. The height of the chamfer depends on the diameter of the sleeve.

Special 2nd Insertion Chamfer

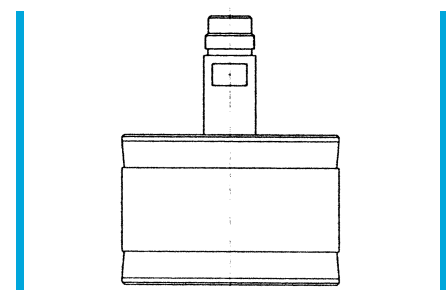
When measuring interrupted (same size) multiple bores on one line the return exiting of the measuring head can be difficult. To solve this problem we supply a measuring head with a second top chamfer. (See Dwg. 1)

Special Insertion Chamfer for Automatic Gage Measurement

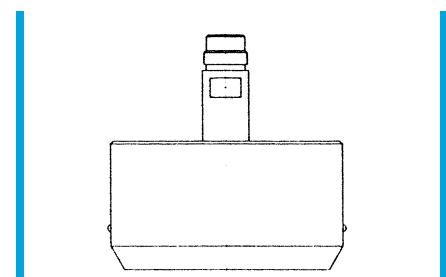
A floating holder that permits radial movement is used to hold the gage. This measuring head is offered with a special chamfer. (See Dwg. 2)

Special No Chamfer Measuring Head

When measuring very short or thin bores, an insertion chamfer can result in bad centering. In these cases we supply a gage with little or no chamfer with a depth stop. Contact Dyer with your application requirements.



Drawing 1.
240 Sleeve with insertion and retraction chamfer



Drawing 2.
240 Sleeve with 30° automatic insertion chamfer

240 SERIES THRU BORE MODELS



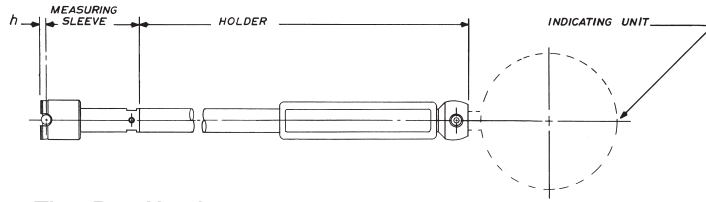
Willrich Precision email: sales@willrich.com

Maximum Measuring Accuracy

Linear $\pm 0.000040''$ (± 0.001 mm)
 Repeatability $< 0.000040''$ (< 0.001 mm)
 Gage R & R $\leq 10\%$ capability when measuring high tolerance bores. Please contact Dyer with your application.

- Used to measure bores without a bottom
- Contacts are set towards the middle of sleeve to help stabilize gage in part before measurement
- Insertion chamfer makes it easy for gage to enter part
- Carbide ball contacts are standard, but other materials are available upon request
- Special contact profiles are available: such as wedge, mushroom, and special radius versions
- If the length of the bore is short, then a depth stop is recommended to stabilize gage in bore

(See depth stop page for further details)



240 Series Thru Part Numbers

Sleeve Size Selection		Thru Bores
Inch	mm	Tool Steel
0.098–0.117	2.5–3.5	N/A
0.118–0.157	3.0–4.0	240-400
0.158–0.236	4.1–6.0	240-405
0.240–0.472	6.1–12	240-410
0.473–0.787	12.1–20.0	240-415
0.791–1.181	20.1–30.0	240-420
1.182–1.574	30.1–40.0	240-425
1.579–2.362	40.1–60.0	240-430
2.363–3.150	60.1–80.0	240-435
3.151–3.937	80.0–100.0	240-440
3.938–4.331	100.1–110.0	240-445
4.332–4.724	110.1–120.0	240-450
4.725–5.118	120.1–130.0	240-455
5.119–5.512	130.1–140.0	240-460
5.513–5.906	140.1–150.0	240-465
5.907–6.299	150.1–160.0	240-470
6.300–6.693	160.1–170.0	240-475
6.694–7.087	170.1–180.0	240-480
7.088–7.480	180.1–190.0	240-485
7.481–7.874	190.1–200.0	240-490
7.875–9.000	200.1–230.0	240-616

The "h" dimension is the distance from the centerline of the measuring contact to the bottom of the measuring sleeve.

- "h" = 6 mm for $\varnothing < 9$ mm
- "h" = 10 mm for $\varnothing > 9$ mm
- Special "h" dim. are offered on request
- A complete setup includes a measuring sleeve, holder, indicator, and master ring

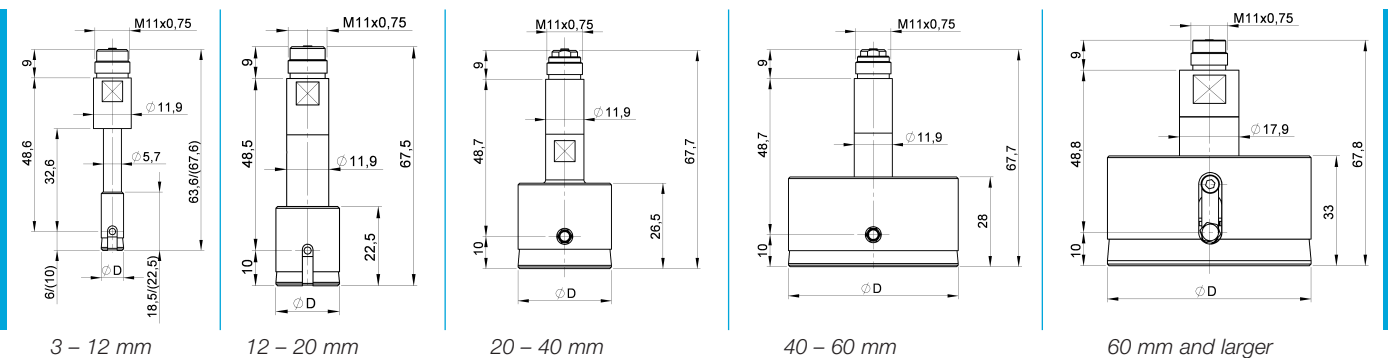


240 Series Thru Bore sleeve with 240-010 handle and 900-105 digital indicator

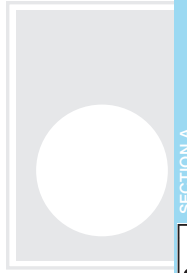


240 Thru Style measuring sleeve for 60mm \varnothing and greater

240 Thru Style Head Dimensions

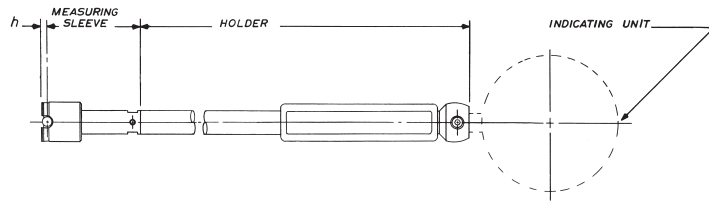


240 SERIES BLIND BORE MODELS



Maximum Measuring Accuracy

Linear $\pm 0.000040"$ (± 0.001 mm)
 Repeatability $< 0.000040"$ (< 0.001 mm)
 Gage R & R $\leq 10\%$ capability when measuring high tolerance bores. Please contact Dyer with your application.



Used to measure close to the bottom of a bore

Contacts are set towards the bottom of the sleeve to allow the measurement to be close to the bottom of the part

Gage can rest on the bottom of the part or be raised and lowered throughout the length of the bore.

Measuring at the top of the part requires a depth stop for added stability

Insertion chamfer makes it easy for gage to enter part

Carbide ball contacts are standard, but other materials are available upon request

Special contact profiles are available: such as wedge, mushroom, and special radius versions

240 Series Blind Part Numbers

Sleeve Size Selection		Blind Bores
Inch	mm	Tool Steel
0.098–0.117	2.5–3.5	240-035
0.118–0.157	3.0–4.0	240-040
0.158–0.236	4.1–6.0	240-050
0.240–0.472	6.1–12	240-052
0.473–0.787	12.1–20.0	240-055
0.791–1.181	20.1–30.0	240-060
1.182–1.574	30.1–40.0	240-065
1.579–2.362	40.1–60.0	240-070
2.363–3.150	60.1–80.0	240-075
3.151–3.937	80.0–100.0	240-080
3.938–4.331	100.1–110.0	240-085
4.332–4.724	110.1–120.0	240-090
4.725–5.118	120.1–130.0	240-095
5.119–5.512	130.1–140.0	240-100
5.513–5.906	140.1–150.0	240-105
5.907–6.299	150.1–160.0	240-110
6.300–6.693	160.1–170.0	240-115
6.694–7.087	170.1–180.0	240-120
7.088–7.480	180.1–190.0	240-125
7.481–7.874	190.1–200.0	240-130
7.875–9.000	200.1–230.0	240-617



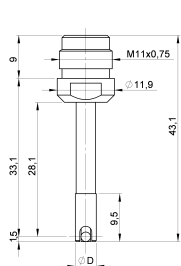
240 Blind Style measuring sleeve for 60mm \varnothing and greater

The "h" dimension is the distance from the centerline of the measuring contact to the bottom of the measuring sleeve.

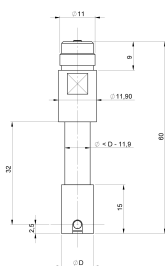
- "h" = 1.5 mm for \varnothing 3–6 mm
- "h" = 2.5 mm for \varnothing 6–20 mm
- "h" = 3.5 mm for \varnothing 20–60 mm
- "h" = 4.0 mm for \varnothing > 60 mm
- Special "h" dim. are offered on request
- A complete setup includes a measuring sleeve, holder, indicator, and master ring

240 Series Blind sleeve with 240-010 handle and 900-105 digital indicator

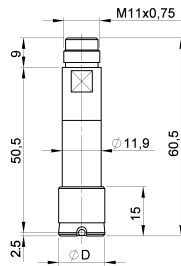
240 Blind Style Head Dimensions



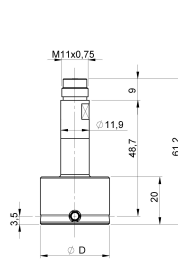
3 – 6 mm



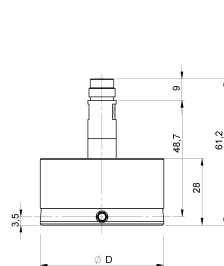
6 – 12 mm



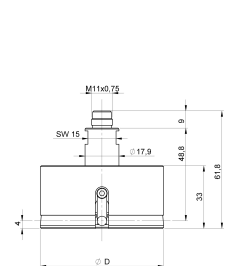
12 – 20 mm



20 – 40 mm



40 – 60 mm



60 mm and larger

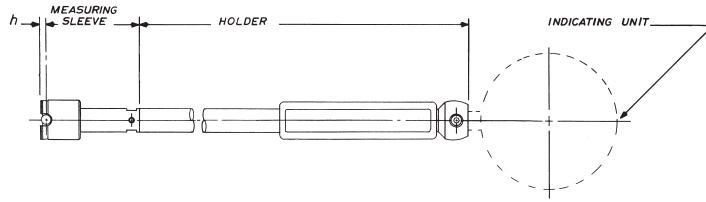
240 SERIES SUPER BLIND BORE MODELS



Maximum Measuring Accuracy

Linear $\pm 0.000040"$ (± 0.001 mm)
 Repeatability $< 0.000040"$ (< 0.001 mm)
 Gage R & R $\leq 10\%$ capability when measuring high tolerance bores. Please contact Dyer with your application.

- Used to measure the closest to the bottom of a bore
- Contacts are set towards the bottom of the sleeve to allow the measurement to be as close to the bottom of the part as possible
- Measuring at the top of the part requires a depth stop for added stability
- Insertion chamfer is minimal to allow for max centering in the part
- Carbide ball contacts are standard, but other materials are available upon request



240 Series Super Blind Part Numbers

Sleeve Size Selection		Thru Bores
Inch	mm	Tool Steel
0.240–0.472	6.1–12	240-510
0.473–0.787	12.1–20.0	240-515
0.791–1.181	20.1–30.0	240-520
1.182–1.574	30.1–40.0	240-525
1.579–2.362	40.1–60.0	240-530
2.363–3.150	60.1–80.0	240-535
3.151–3.937	80.0–100.0	240-540
3.938–4.331	100.1–110.0	240-545
4.332–4.724	110.1–120.0	240-550
4.725–5.118	120.1–130.0	240-555
5.119–5.512	130.1–140.0	240-560
5.513–5.906	140.1–150.0	240-565
5.907–6.299	150.1–160.0	240-570
6.300–6.693	160.1–170.0	240-575
6.694–7.087	170.1–180.0	240-580
7.088–7.480	180.1–190.0	240-585
7.481–7.874	190.1–200.0	240-590



240 Series Super Blind Bore sleeve with 240-010 handle and 900-105 digital indicator

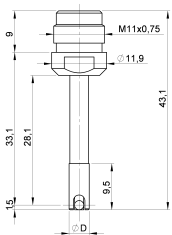


240 Super Blind Style measuring sleeve for 60mm \varnothing and greater

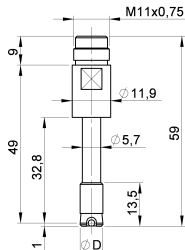
The "h" dimension is the distance from the centerline of the measuring contact to the bottom of the measuring sleeve.

- "h" = 1.0 mm for all $\varnothing < 20$ mm
- "h" = is 1.2 mm for 20–60mm
- "h" = is 1.0 mm for all $\varnothing > 60$ mm
- A complete setup includes a measuring sleeve, holder, indicator, and master ring

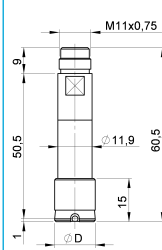
240 Blind Bore Style Head Dimensions



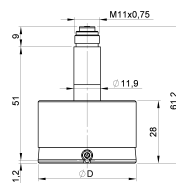
3 – 6 mm



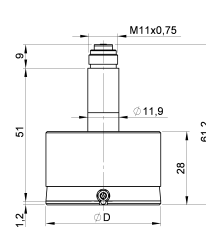
6 – 12 mm



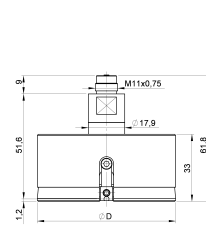
12 – 20 mm



20 – 40 mm



40 – 60 mm



60+ mm

240/440 SERIES HANDLES & DEPTH EXTENSIONS

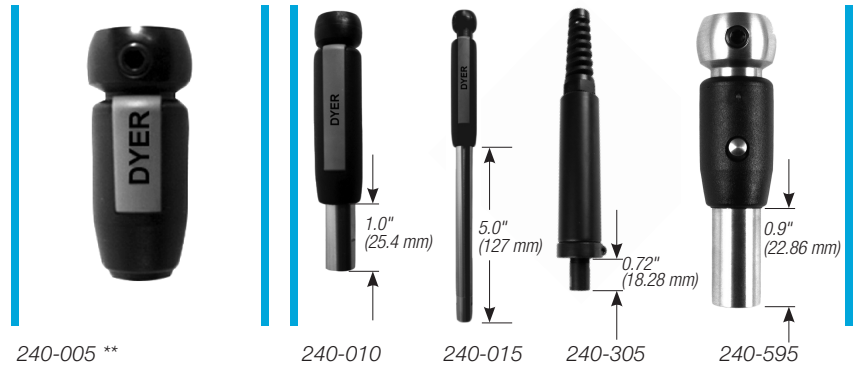
240/440 handles will accept 0.375" or 8 mm diameter stem indicator. Each handle includes two interchangeable brass bushings for each diameter and an allen wrench.

Heat Stabilization
Handles of all Dyer precision bore gages are made from Invar steel, a special alloyed steel that resists temperature change. This eliminates errors due to circulating temperatures.

Measuring Sleeve Holders

Standard Sleeve Holders

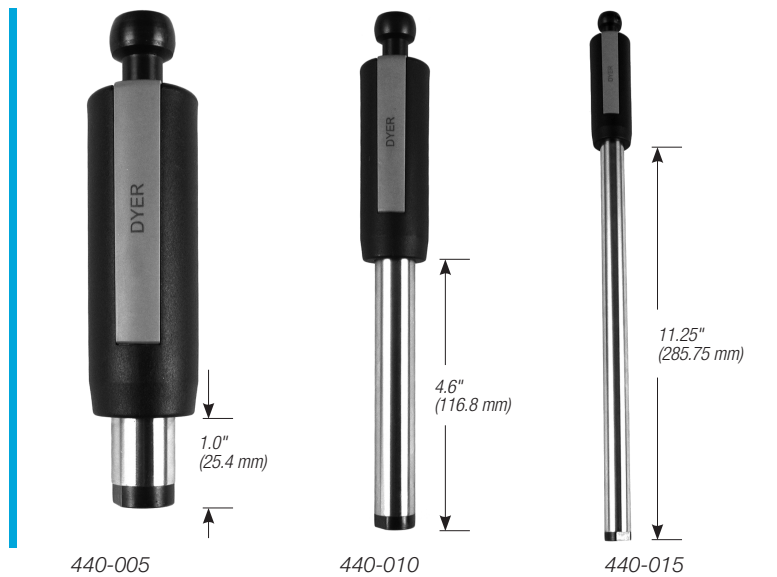
Order Number	Shaft Ø	Holder Length (overall)
240-005	0.472" (12 mm)	1.97" (50 mm) Less meas. contact pressure
240-010	0.472" (12 mm)	4.13" (105 mm)
240-015	0.472" (12 mm)	9.25" (235 mm)
240-305	0.550" (13.97 mm)	5.50" (140 mm) for electronic transducers
240-595	0.400" (10 mm)	2.75" (70 mm) Retractable (for super blind sleeves)



Larger Ø Sleeve Holders*

Order Number	Shaft Ø	Holder Length (overall)
440-005	0.708" (18 mm)	5.50" (139.7 mm)
440-010	0.708" (18 mm)	9.10" (235 mm)
440-015	0.708" (18 mm)	15.75" (400 mm)

*recommended for diameters larger than 2.00" (51 mm)



240 Series Depth Extensions*

Order Number	Extension Ø	Length
240-309	0.47" (12 mm)	3.9" (100 mm)
240-310	0.47" (12 mm)	9.8" (250 mm)
240-311	0.47" (12 mm)	19.7" (500 mm)
240-312	0.47" (12 mm)	29.5" (750 mm)
240-313	0.47" (12 mm)	39.3" (1000 mm)

*for measuring sleeves larger than 0.472" (12 mm) in diameter

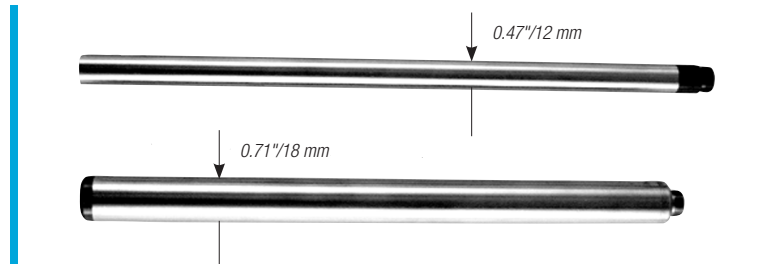
440 Series Depth Extensions*

Order Number	Extension Ø	Length
440-104	0.708" (18 mm)	3.9" (100 mm)
440-105	0.708" (18 mm)	9.8" (250 mm)
440-110	0.708" (18 mm)	19.7" (500 mm)
440-115	0.708" (18 mm)	39.3" (1000 mm)

*for measuring sleeves larger than 0.708" (18 mm) in diameter

For measuring sleeves smaller than 0.472" (12 mm) in diameter that require depth extensions, please contact Dyer.

Depth Extensions



** 240-005 Holder does not have a transfer rod. This means the only measuring pressure being applied to the transfer rod is from the indicating unit. Also, most likely a spindle extension or a longer contact will have to be added to the indicating unit.

240, 440, 441 SERIES STANDARD DEPTH STOP ACCESSORY OPTIONS



These depth stops are lightweight and easy to position and use. They will work on all types of Dyer bore gages. When purchased independently, please specify handle diameter of the gage.

“Bar-Type Bridge” Depth Stop • Set Screw or Hand Adjustable



Part 240-341



Part 240-340



Ring Type Depth Stop

Use for depths from 0.030" to 0.50". (0.8 – 13.0 mm)
Specify sleeve size and tolerance when ordering.

Stop for Measuring Depths of 0.500" (13 mm) and longer

Set Screw Type Order Number	Hand Adjustable Order Number	For sleeves With a Range		Size/Length	
		Inch	mm	Inch	mm
240-340	240-356	0.118"-1.575"	3.0-40 mm	Ø 1.97	Ø 50
240-341	240-358	1.576"-3.150"	40.1-80 mm	4.00	101.6
240-342	240-359	3.151"-4.724"	80.1-120 mm	6.00	152.4
240-343	240-360	4.724"-7.874"	120.1-200 mm	8.00	203.2

Part Order No.	Sleeve Range	
	Inch	mm
240-345	0.118-1.575	3.0-40
240-349	1.576-2.362	40.1-60
240-350	2.363-3.150	60.1-80
240-351	3.151-4.724	80.1-120
240-354	4.725-5.906	120.1-150

“Full Diameter Bridge Collar” Depth Stop • Set Screw or Hand Adjustable



Part 240-361

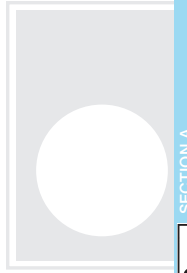


Part 240-366

Stop for Unlimited Measuring Depths, starting at 0.040", 1 mm Depths

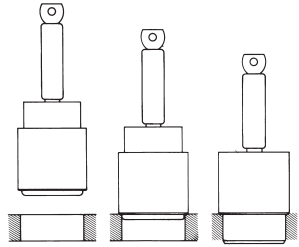
Set Screw Type Part Number	Hand Adjustable Part Number	Collar Diameter Size			
		ID Inch	OD Inch	ID mm	OD mm
240-361	340-366	1.37"	2.00"	34.8 mm	50.8 mm
240-362	340-367	1.97"	2.50"	50.0 mm	63.5 mm
240-363	340-368	2.60"	3.00"	66.0 mm	76.2 mm
240-364	340-369	3.16"	3.75"	80.3 mm	95.2 mm
240-365	340-370	3.75"	4.25"	95.2 mm	108.0 mm

240, 440, 441 SERIES ACCESSORY OPTIONS



Special Spring-Loaded

2-Step Depth Stop to Measure Diameter and Taper.
Specify diameter and distance between depth locations. Also available in bridge design.



Gage shown in three different insertion stages.

Outside Bore Stop One Stop Two*

* to operate, push gage into hole until it stops



240-320 Gage Stand



Special 1, 2, 3, 4 Position Depths to Measure Diameter and Taper



240 Series
Notched depth stop adjusts up and down holder. Up to 4 dedicated positions possible.



240 Series
Two-step spring-loaded depth stop. Stop, rotates and locks into position. Up to 4 depth locations possible.

240-315 Right Angle 90° Handle Attachment

Accessories for Series
240, 440, 441*

249-315
Right angle attachment maximum
(240 Series)
movement travel is 0.04"
(1.00 mm)



Part 904-001 Indicator protective housing will work with all Dyer bore gage handles

240 SERIES SPECIAL MEASURING SLEEVES



Fast, accurate, repeatable bore gaging

- | | |
|--|-------------------------------|
| Speed gaging times | Absolute numbers |
| Gage multiple dimensions with one gage | IP/OP to computer and machine |
| Automatic calculations | SPC data |



Special Sleeves – 2 sets of contacts in 1 plane

Gaging Application

Measure one bore diameter and out-of-round at specific depth with one gage and with no rotation of the gage in the bore.

Measuring Sleeve Design

Two (2) sets of floating contacts at 90° to each other, in one line and at one depth location.

Gage System Solution Configurations

1. 240 Special Sleeve

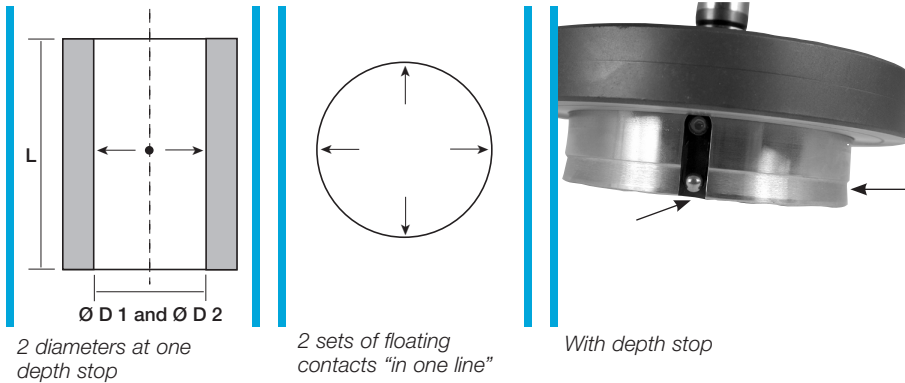
One depth stop, two handles, two electronic indicators, one ring gage set master per diameter.

2. 240 Special Sleeve

One depth stop, two handles, two digital electronic pencil probes, one digital readout that does calculations automatically, one ring gage set master per diameter.

3. Special All-Electronic Sleeves

Contact Dyer. One depth stop, two handles, one digital readout, one ring gage set master per diameter.



Special Sleeves – 2 sets of contacts in 2 planes

Gaging Application

Measure two bore diameters at two depth locations for diameter, taper, out-of-round, TIR, step or thru bore applications.

Measuring Sleeve Design

Two (2) sets of floating contacts at one or two radial positions, at two depth locations.

Gage System Solution Configuration

1. 240 Special Sleeve

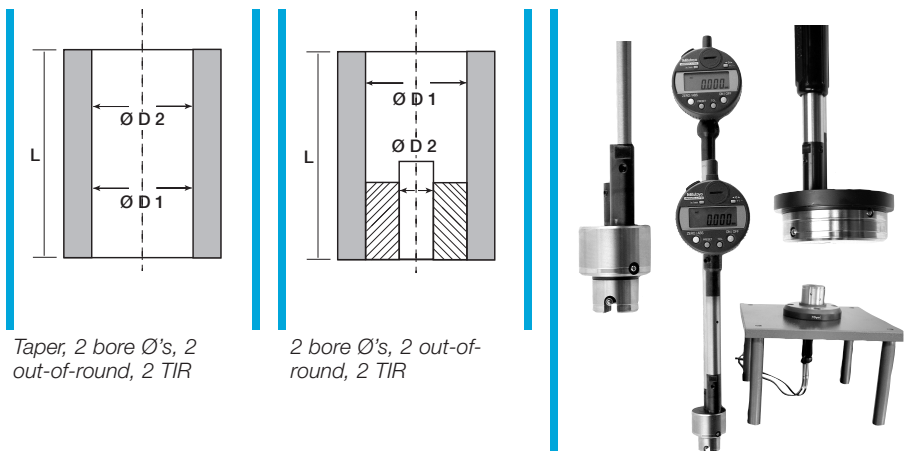
One depth stop, two handles, two electronic indicators, one ring gage set master per diameter.

2. 240 Special Sleeve

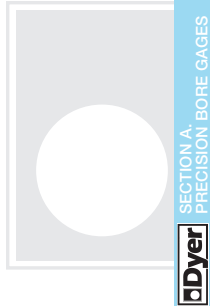
One depth stop, two handles, two digital electronic pencil probes, one digital readout that does calculations automatically, one ring gage set master per diameter.

3. Special All-Electronic Sleeves

Contact Dyer. One depth stop, two handles, one digital readout that does calculations automatically, one ring gage set master per diameter.



240 SERIES SPECIAL MEASURING SLEEVES



Fast, accurate, repeatable bore gaging

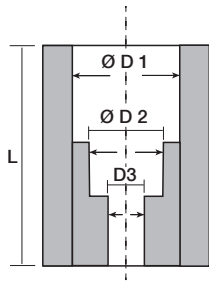
- Speed gaging times
- Measure multiple dimensions with one gage
- Automatic calculations
- Absolute numbers
- IP/OP to computer and machine
- Special sleeves available with 5 to unlimited contact positions. Contact Dyer with your application.



Special Sleeves — 3 sets of contacts in 3 planes

Gaging Application

Measure three bore diameters at three depth locations for diameter, taper, out-of-round and TIR.



Measuring Sleeve Design

Three set of floating contacts at three radial positions and at three depth locations.



3 Ø's, Taper, out-of-round, TIR

Gage System Solution Configuration

1. 240 Special Sleeve

One depth stop, three handles, three electronic indicators, one ring gage set master per diameter.

2. 240 Special Sleeve

One depth stop, three handles, three digital electronic pencil probes, one interface module and cable that connects to one digital read-out or direct to computer and does calculations automatically, one ring gage set master per diameter.

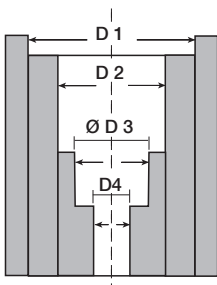
3. Special All-Electronic Sleeves

Contact Dyer. One depth stop, three handles, one interface module and cable that connects to digital read-out or direct to computer and does calculations automatically, one ring gage set master per diameter.

Special Sleeves — 4 sets of contacts in 4 planes

Gaging Application

Measure four bore diameters at four depth locations for diameter, taper, out-of-round, and TIR.



Measuring Sleeve Design

Four sets of floating contacts at four radial positions and at four depth locations.



Gage System Solution Configuration

1. 240 Special Sleeve

One depth stop, four handles, four electronic indicators, one ring gage set master per diameter.

2. 240 Special Sleeve

One depth stop, four handles, four digital electronic pencil probes, one interface module and cable that connects to one digital read-out or direct to computer and does calculations automatically, one ring gage set master per diameter.

3. Special All-Electronic Sleeves

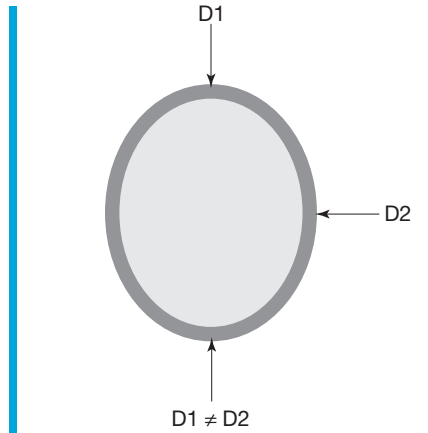
Contact Dyer. One depth stop, four handles, one interface module and cable that connects to digital read-out or direct to computer and does calculations automatically, one ring gage set master per diameter.

240 SERIES 3-POINT & 1-POINT MEASURING SLEEVES

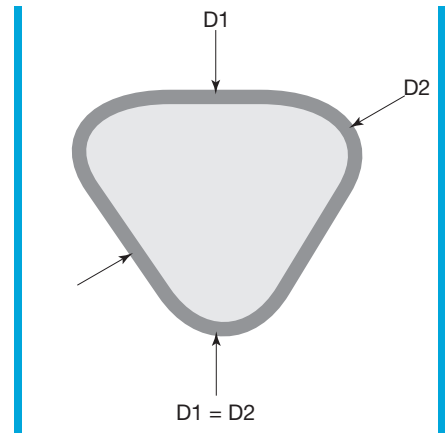


3-Point Measuring Sleeves

Three point contact bore gaging is designed to measure trilobing and polygonal shaped bores during the machining process. For example, centerless grinding process can produce three lobe parts. This can result in a non-fitting part assembly causing vibration, wear, and fatigue. Only 3-point contact gages are capable of measuring odd number lobes. See Figure B, Chart 1. Only 2-point contact gages will measure out-of-round conditions. See Figure A.



A. Elliptical Form, 2-point gaging



B. Trilobal Form, 3-point gaging

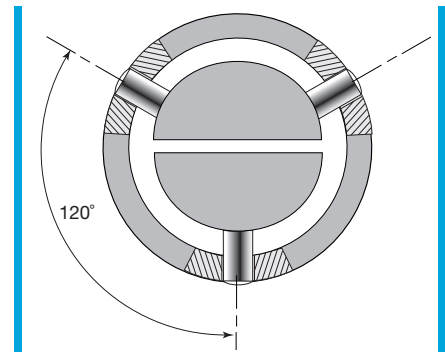
Note: When ordering 3-point contact sleeves just call Dyer and let us know your application.

3-point measuring sleeve ranges 0.390"-1.575" (10-40 mm)

By way of a special grinding of the measuring needle the linearity/maximum deviation in accuracy is $\leq 1\%$ of the measuring travel (max. travel is 0.008" [0.2 mm]). This special floating contact design (see Dwg. 1) is used to measure smaller size bores. Also the three contact balls can be located at different radial locations if the bore wall is interrupted. Fax or e-mail Dyer your application.



240 Series Group 1, 3-point measuring heads with special contact point location for interrupted bore



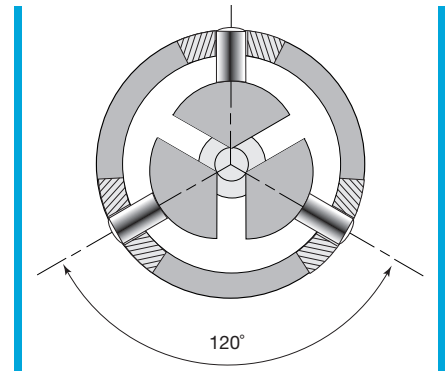
Drawing sizes <40 mm

3-point measuring sleeves with true 120° 3-point contact measuring ranges 1.575"-5.18" (40-130 mm)

This design has three independently moving contacts positioned at 120°. Sizes larger than 5.118" (130 mm) available. Contact Dyer with your application.



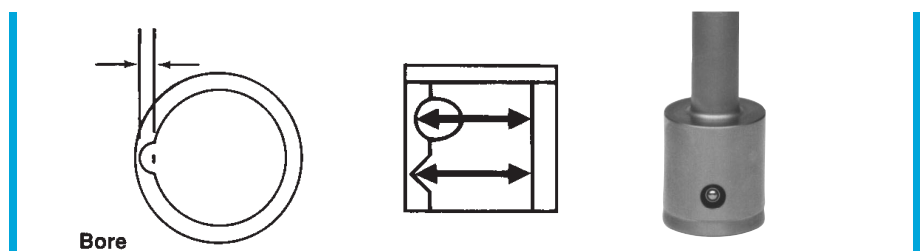
240 Series Group 2, 3-point contact sleeves for sizes >1.575" (40 mm)



Drawing sizes >40-130 mm

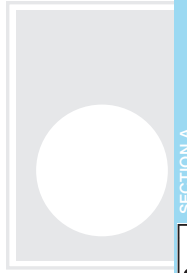
1-Point Contact Measuring Sleeves

Measure the depth of a groove in a bore or parallel surface. These measuring heads are made with only one moveable contact point. The contact point can be retracted. Contact Dyer with your application.



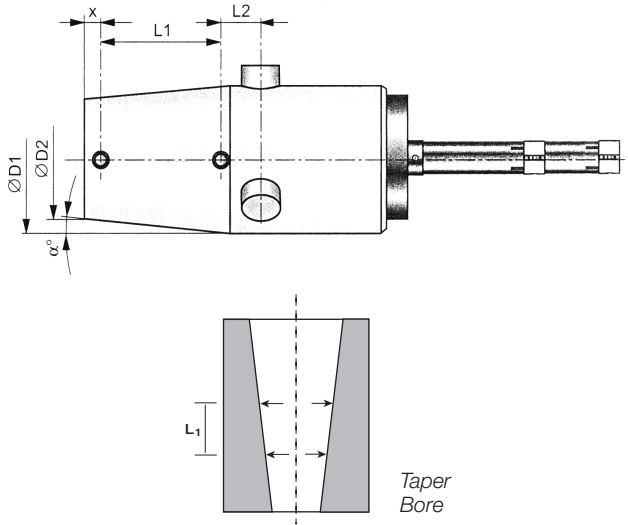
Bore

240 SERIES SPECIAL PROFILE SLEEVES



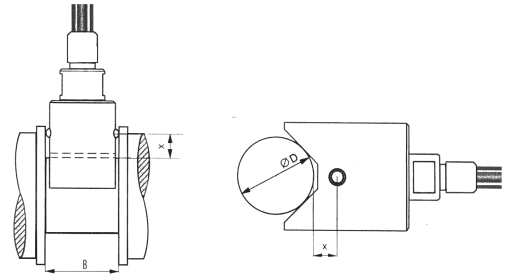
Measure Cone-Shaped Bores

Cone-shaped bores are defined by the taper angle and the diameters at two specific measuring depths. The integrated depth stop positions the measuring axis at the exact depth. You will measure angle, taper pitch, diameters D1 and D2, out-of-round, and TIR with this gage.

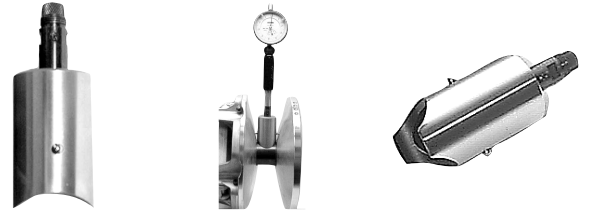


Measure Parallel Surfaces

240 Series angled and/or radius sleeve bottom is a stop to locate gage on shaft diameter or tapered parallel dimension.



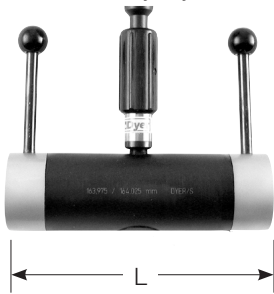
Measure crank shaft face.



Measure a tapered ID at a specific height above shaft diameter.

SPECIAL GROUND TO PROFILE SLEEVES 240 Series sleeves

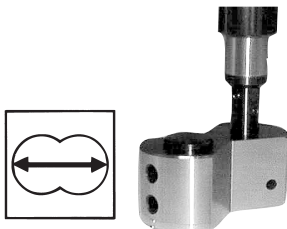
Custom shapes that will measure your irregular shaped hole. Fax or e-mail Dyer your measuring requirements.



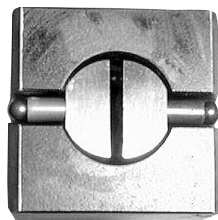
Gage aligns itself in radius yoke and measures "L" dim parallel width



Gage in measuring position

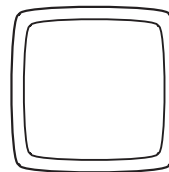


Measure major \varnothing of a figure-8 bore

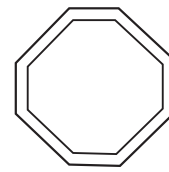


Square measuring sleeve bottom view

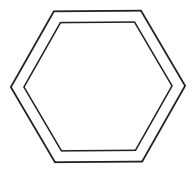
Typical profiles of irregular holes



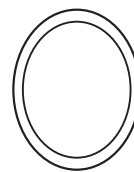
TV tube



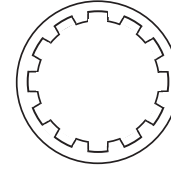
Octagon



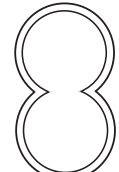
Hexagon



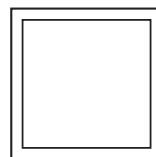
Elliptical



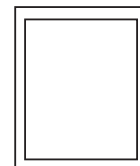
Lands & grooves



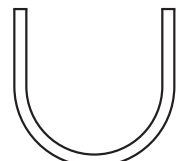
Snowman/Figure 8



Square



Rectangle



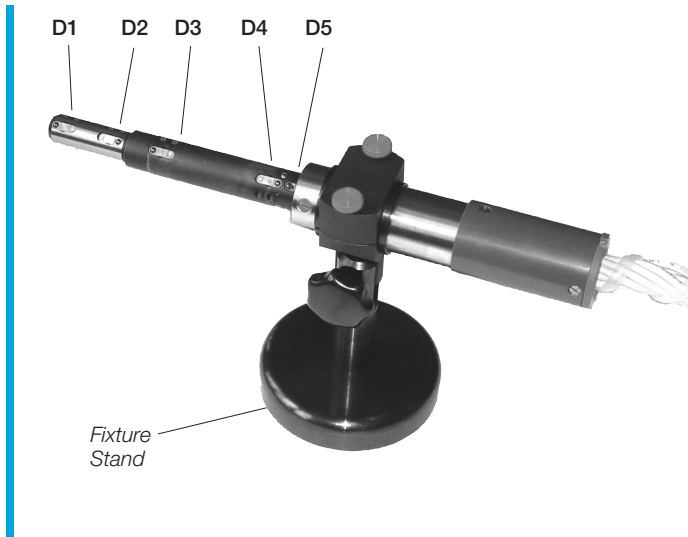
U-shape or half \varnothing

SPECIAL APPLICATIONS HAND & TABLETOP GAGES



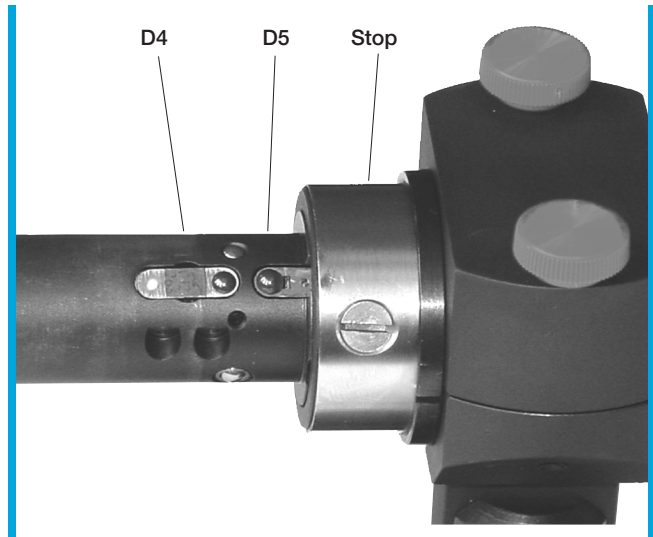
SHOW DYER YOUR APPLICATION. WE WILL HELP YOU SELECT THE RIGHT GAGE.

Special "All Electronic" 240 Series Bore Gage



Special 240 Series

Five sets of special small electronic contacts are placed in a measuring head. All five diameter measurements are made at once. Digital readings are displayed on one screen.



Special 240 Series

Part is placed on gage's measuring head and pushed against a part stop. Gage measures smallest diameter at two axial positions and a second larger diameter at a three axial position.

Tabletop stand for 240 Series gages

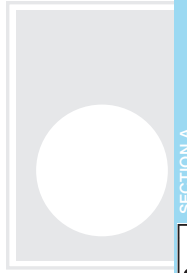


These gage stands will hold any number of 240 Series gages.



The part is placed on the gage head. Each gage has a part stop.

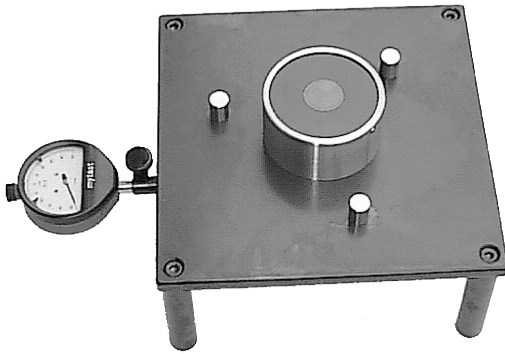
SPECIAL APPLICATIONS HAND & TABLETOP GAGES



Willrich Precision
Ph: 866-945-5742 email: sales@willrich.com

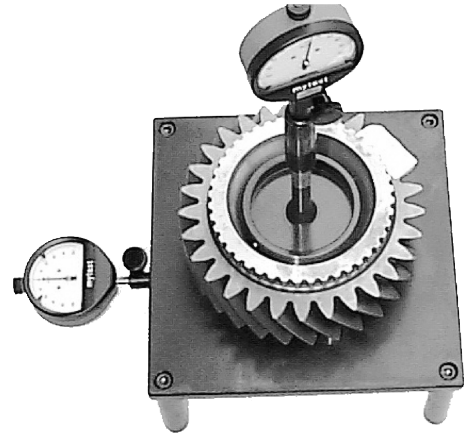
SHOW DYER YOUR APPLICATION. WE WILL HELP YOU SELECT THE RIGHT GAGE.

Measure two (2) different face diameters located on opposite sides of that part.

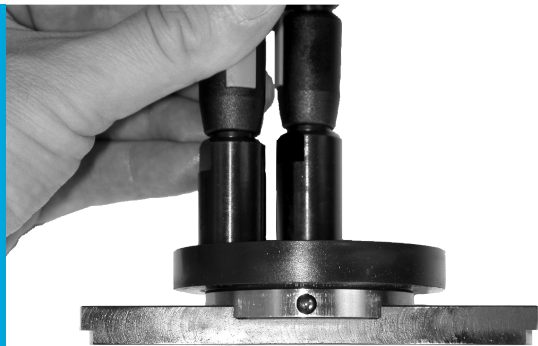


240 Series Special

This tabletop gage station positions the part for measuring two diameters located opposite each other. Above is Dyer's 240 Series measuring head located vertically with three part stops.

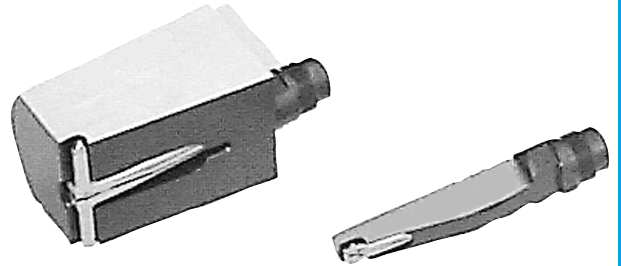


Place the part on the gage head for the first measurement. A second 240 Series gage is placed in the opposite side diameter.



Special Dual Plane

Lower contacts are measuring a large oval \emptyset . Top contacts are measuring a circular \emptyset .

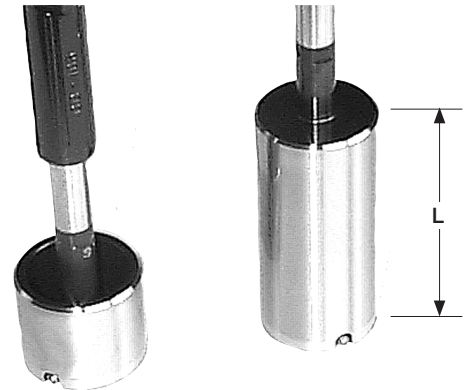


240 Sleeve with a square design and blind "h" (short) measuring height



Special Dual Contacts on one Plane

Measure the minor \emptyset of a gear-type part. A special pin located on the sleeve locates the gage head in the P.D. Two \emptyset 's are measured "in one line" at 90° to each other.



Standard L

Special L

240 Sleeve with special L dimension

440 SERIES TWIN CROSS® LARGE DIAMETER BORE GAGES



Maximum Measuring Accuracy

Linear $\pm 0.000040''$ (0.001 mm)
 Repeatability $\leq 0.000040''$ (0.001 mm)
 Gage R & R $\leq 10\%$ capability in high tolerance bores

Electronic Direct Reading Absolute Numbers, Bore Gages

No tipping, automatic centering and aligning of the gage in the bore.
 Dedicated to part size and tolerance.

Notable Features

Light weight, shop-rugged design
 24-7 production gage.
 Open design allows operator to view bore when measuring.
 High accuracy and repeatability, two-point floating contact.
 Very easy to use, no tipping and no operator error.
 Tool steel Rc 62-65, carbide ball contacts, handles Invar steel.
 Armoloy coating optional.

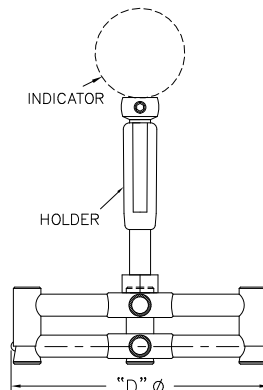


1. Choose bore gage head based on \varnothing and type of bore being measured.
2. Choose a holder.
3. Choose an indicator.
4. Use a master ring or adjustable setting master.

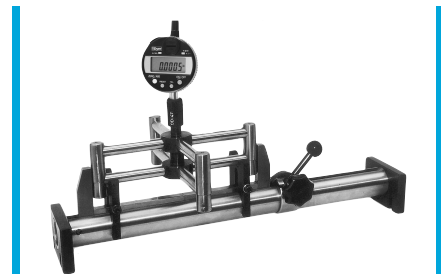
Fast Delivery, Rush 24-48 hours or 1-2 weeks

Quick delivery on Twin Cross® sizes 5.118" (130.0 mm) thru 16.000" (406 mm)

Cross Size Selection		Thru Bores		Blind Hole Bores	
Inch	mm	Tool Steel Cross	DIM	Tool Steel Cross	DIM
4.332-4.724	110.1-120.0	440-310		440-410	
4.725-5.118	120.1-130.0	440-315		440-415	
5.119-5.512	130.1-140.0	440-320		440-420	
5.513-5.906	140.1-150.0	440-325		440-425	
5.907-6.299	150.1-160.0	440-330		440-430	
6.300-6.693	160.1-170.0	440-335		440-435	
6.694-7.087	170.1-180.0	440-340		440-440	
7.088-7.480	180.1-190.0	440-345	ALL	440-445	ALL
7.481-7.874	190.1-200.0	440-350	"h"	440-450	"h"
7.875-8.268	200.1-210.0	440-355	DIM	440-455	DIM
8.269-8.661	210.1-220.0	440-360	ARE	440-460	ARE
8.662-9.055	220.1-230.0	440-365		440-465	
9.056-9.449	230.1-240.0	440-370	0.709"	440-470	0.276"
9.450-9.842	240.1-250.0	440-375	(18 mm)	440-475	(7 mm)
9.843-10.236	250.1-260.0	440-380		440-480	
10.237-10.629	260.1-270.0	440-385		440-485	
10.630-11.024	270.1-280.0	440-390		440-490	
11.025-11.417	280.1-290.0	440-395		440-495	
11.418-11.811	290.1-300.0	440-400		440-500	
11.812-16.690	300.1-500.0	440-700		440-800	
16.691-39.730	500.1-1000	440-705		440-805	



440 Series Twin Cross® Measuring Head



440 Twin Cross® with adjustable setting master

The "h" dimension is the distance from the centerline of the measuring conducts to the bottom of the gage head.

Twin Cross® Measure Multiple Bores "in-line"

Long reach Twin Cross® with special leading edge blind stop that stabilizes the handle, eliminating deep bore gravity errors during the measuring process.



Twin Cross® with special depth stops

Designed for large bores with depth stop requirements. Four rings are pinned in position on the four cross outer sleeves.



Special Twin Cross®

with additional centering rails to center the gage in a large interrupted bore.

