

DX Deluxe Rod™ Cylinders Program

Welcome to the newest, most innovative special cylinder ordering program ever developed by a U.S. manufacturer of pneumatic cylinders...

The Humphrey DX Deluxe Rod Cylinders Program

Humphrey DX Deluxe Rod™ Cylinders turn cylinders previously categorized as “specials” into standard, make-to-order products. The Deluxe Rod ordering system provides a fast, easy, cost effective way to produce cylinders for customers who have requirements for non-cataloged rod features and/or dimensions.

In effect, the DX concept enables a customer to design, specify, and order a unique cylinder on the spot, quickly and efficiently, with no long lead times, and no minimum order quantities.

Once the customer has decided upon the particular rod requirements, that information is filled-in on the order sheet for the specific DX option desired. The order sheet is faxed or mailed to Humphrey, and upon receipt, is entered into the processing stream immediately and is queued for fabrication and assembly. No specials. No long lead times. No minimum order quantities. Just “what you need when you need it.”

Benefits of the DX Rod concept

- Variety. Currently, fifteen different rod types are offered, each with its own specific set of user definable dimensions. The user creates a cylinder that is essentially unique. There are literally millions of different combinations.
- Normal delivery time. These products are manufactured in our regular production stream. They are not classified as “specials,” but are standard products. Consequently, delivery time on most orders is our normal delivery time.
- No minimum quantities. Most “specials” are subject to a minimum order quantity. Because these products are not classified as “specials,” they can be ordered in any quantity, from one to infinity. The customer is no longer faced with minimum order quantities and unneeded purchases.
- Humphrey Quality. Our HMQ and TOE processes help provide the excellent quality that customers have come to expect from Humphrey. At Humphrey, quality is an ongoing process that never stops.

How to Use This Information

Please refer to “DX Options at a Glance” (following the Restrictions and Limitations section). This provides a quick overview of the various rods that are readily available. This page 5 can also be used as a design tool to give customers numerous ideas to help create ideal design solutions.

The DX Options at a Glance sheet is followed by the actual order sheets themselves. Photocopy the order sheet, complete the requested information, and fax or mail the form to Humphrey.

Please examine any one of the order sheets that follow the Options at a Glance page 18. Note that a DX number appears in the upper right corner of each sheet. This number identifies the particular option described on the sheet. Also at the top of the sheet is information the customer has to complete regarding cylinder model and stroke, expected ship date, and other details. A large drawing of the rod shows the dimensions pertinent to the particular option. The dimensions that are definable by the customer are listed in the “Size” box at the right of the drawing.

“Size” Box

LETTER	SIZE	Ref.
D		1.
J		2.
JL		3.
S	.047 or .094	4.

This is the number of the limitations to check against in the references below each drawing.

DX Deluxe Rod™ Cylinders Program

Below the drawing is information to be completed by Humphrey. This is followed by an explanation of the intended purpose of the particular DX option. This, in turn, is followed by a Reference section that lists certain restrictions on certain customer-selected dimensions. The restrictions are imposed to keep manufacturing flowing smoothly.

How to fill out the Order Sheets

Once a DX option has been selected, the original order sheet should be photocopied so that the original can be used again. The information can either be typed or printed clearly by hand. Complete the boxed information as follows:

Distributor Name: This is the name of the distributor that is ordering the cylinder(s).

Customer Name: This is the customer that requested the cylinder(s).

Ship to Address: This is the address to where Humphrey will ship the completed cylinder(s).

Distributor's Purchase Order Number:

Customer's Purchase Order Number:

Contact Person: This is the distributor contact person.

Contact Person: This is the customer contact person.

Distributor Name:		Contact Person:		PO#		DX01
Customer Name:		Contact Person:		PO#		
Ship To Address:		Requested Ship Date:				
		Model, Type, Stroke, and Options:				Qty:

Requested Ship Date: This is the date that the customer would like to see the order leave Humphrey Products. A 7 day minimum lead time is required

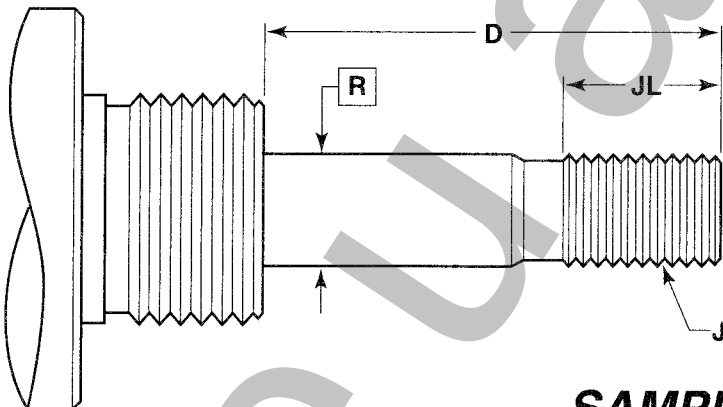
Qty: The quantity of this particular model cylinder desired.

Model Type Stroke and Options: Enter here the cylinder Model (ex. 3, 4, 25 etc.), the Type (ex. D, DP, SRP, etc.), the Stroke desired for the cylinder (in 1/16 inch increments) and any Options desired (ex. B = Bumper, M = Magnet, etc.).

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Next, complete the information in the "Size" box at the right of the drawing, taking care to check this against the References at the bottom portion of the sheet. Simply write-in "STD" for any standard catalog dimension desired. For example, if a customer wants a DX05 option, and wants to change the "D" dimension only, the other boxes should be marked "STD." The cylinder supplied would have the customer-specified "D" dimension and standard threads. Refer to Table 5 for a definition of all Standard Dimensions. A completed example order sheet follows.

Distributor Name:	ACME FLUID POWER	Contact Person:	AMANDA B. RECONDWITH	PO#	P040625	DX05
Customer Name:	JOHNSON AUTOMATION	Contact Person:	ANITA D. LUCKS	PO#	\$5R4056	
Ship To Address:	10027 8th STREET BEMIDJI, MN 48685	Requested Ship Date:	FEBRUARY 23, 1996			
		Model, Type, Stroke, and Options:	6-DP 4 $\frac{3}{4}$ B	Qty:	3	



LETTER	SIZE	Ref.
D	STD	1.
J	$\frac{1}{4}$ - 20 UNC	2.
JL	STD	3.

SAMPLE ORDER
(Everything is standard except the thread type)

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX Ordering Information

Program Restrictions and Limitations

Because of the high degree of flexibility of the DX Deluxe Rod concept, some exceptions are necessary:

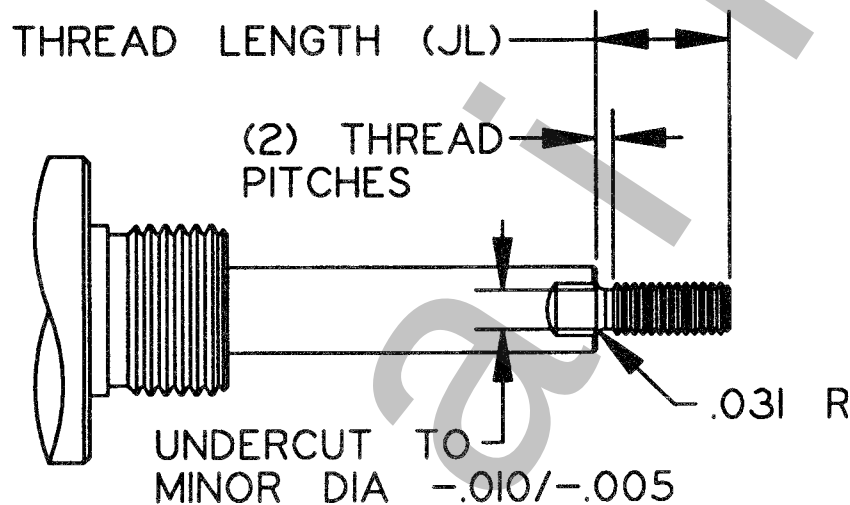
- One DX option per cylinder order. This means that only one DX option may appear on a cylinder rod at a time.
- This program is available on cylinders with round rods only. It is available only on those Humphrey Stainless Steel Barrel Cylinder that have model prefixes from #8 (1/2 inch bore) to #3 (2-1/2 inch bore). Hex-rod cylinders do not qualify for this program. This program is also not available on double-end rod (D2EY) cylinders.
- Once the order is received at Humphrey, it is considered firm and non-cancelable.
- Only the threads, cross-holes, and dimensions shown in Tables 1 through 4 are available.
- Dimensions in Table 4 are determined by the cylinder itself and cannot be modified.
- Humphrey Products reserves the right to either roll or cut the threads available on DX models.
- All threads will be Class 2 for US threads, and Class 6-H for metric threads.
- The restrictions and limitations listed below each DX option prevent cut metal from entering the cylinder head. Internal female rod threads, however, may enter the cylinder head.
- Products outside the parameters of the DX Rod capabilities must be considered “special.”
- Tolerances. Listed below are the tolerances for several of the dimensions on these rod ends. All tolerances are in inches unless specified otherwise.
 - * Rod Extension Tolerance = ± 0.031 (“D” dimension)
 - * Any other lengths = ± 0.005
 - * Diameter Tolerances = ± 0.002
 - * Tolerances on the thread lengths; min. = specification, max. = specification + 2 threads
 - * “JL” = length of full thread required. The distance from the rod end to the rod shoulder on undercut threads (in inches).
 - * Cross drilled hole diameters = ± 0.005

Program Restrictions and Limitations continued on next page.

DX Ordering Information

Program Restrictions and Limitations continued

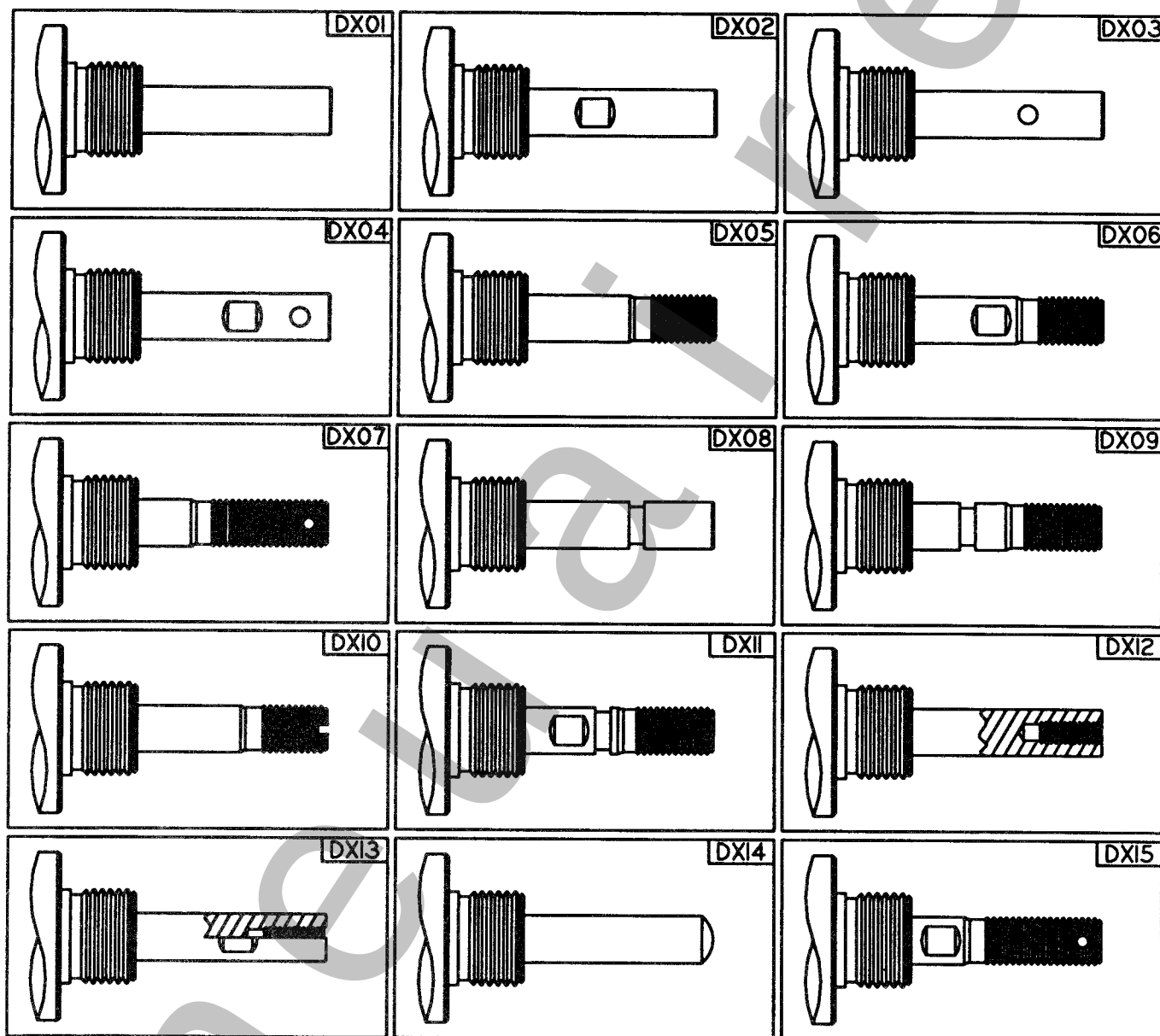
– Small threads on large rods will have an undercut at the end of the thread. See the figure below.



–Sales Conditions and Warranty

For sales conditions and warranty, contact the factory. The warranty for DX Rod cylinders is the same as for other Humphrey cylinders of this type, except the DX option itself. The warranty does not cover failure of the DX portion of the rod due to insufficient material strength. The suitability of DX products for specific applications must be determined by the designer.

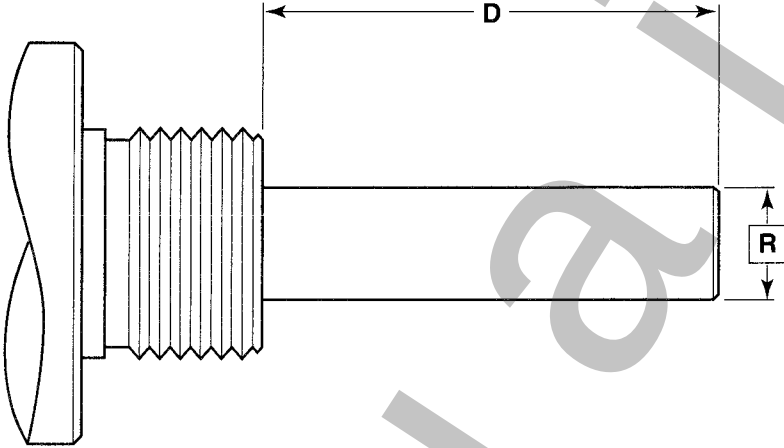
DX Options at a Glance



DX Deluxe Rod™ Options

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX01
Customer Name:		Contact Person:		PO#		
Ship To Address:		Requested Ship Date:				
		Model, Type, Stroke, and Options:		Qty:		



LETTER	SIZE	Ref.
D		1.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX01: Available on all cylinder models. All dimensions are to be in inches.

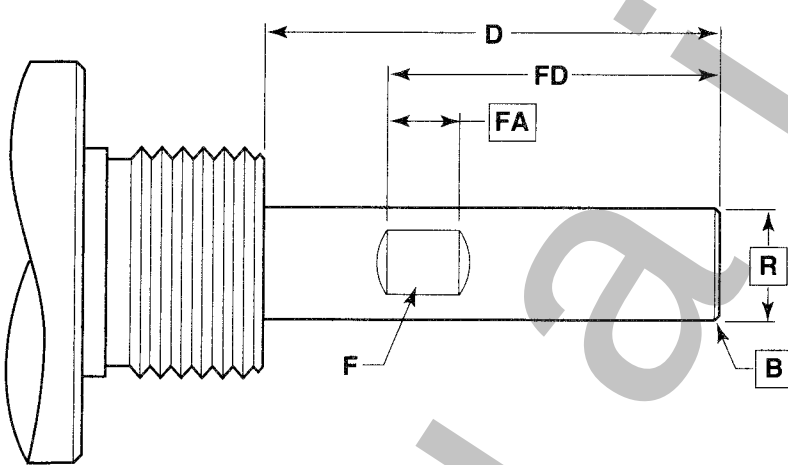
Purpose: Allows user to specify the length of a plain rod end. See Table 4 for boxed dimension definitions.

References

1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX02
Customer Name:		Contact Person:		PO#		
Ship To Address:		Requested Ship Date:				
		Model, Type, Stroke, and Options:		Qty:		



LETTER	SIZE	Ref.
D		1.
FD		2.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX02: Not available on Model 8. All dimensions are to be in inches.

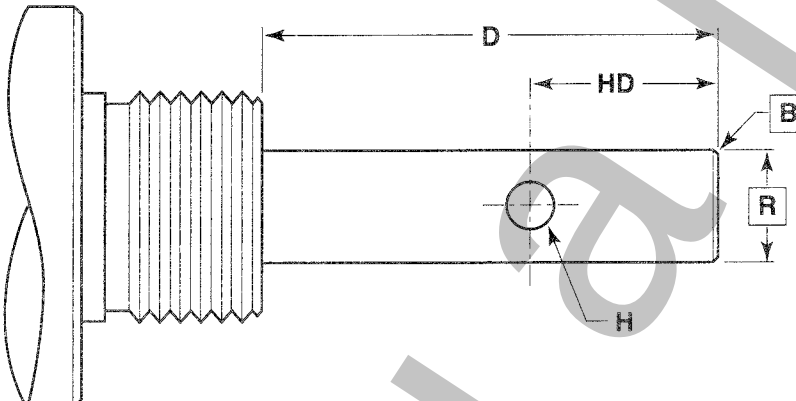
Purpose: Allows user to specify the location of a standard wrench flat on a rod of variable length. See Table 4 for boxed dimension definitions.

References

1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")
2. $FD \geq FA$ and $FD \leq D$
(This constraint ensures that the whole wrench flat can be machined on the rod, and eliminates the potential for the wrench flat to enter the nose or the rod bearing.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX03
Customer Name:		Contact Person:		PO#		
Ship To Address:		Requested Ship Date:				
		Model, Type, Stroke, and Options:		Qty:		



LETTER	SIZE	Ref.
D		1.
HD		2.
H		3.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX03: Available on all cylinder models (prefix #8 through prefix #3). All dimensions are to be in inches.

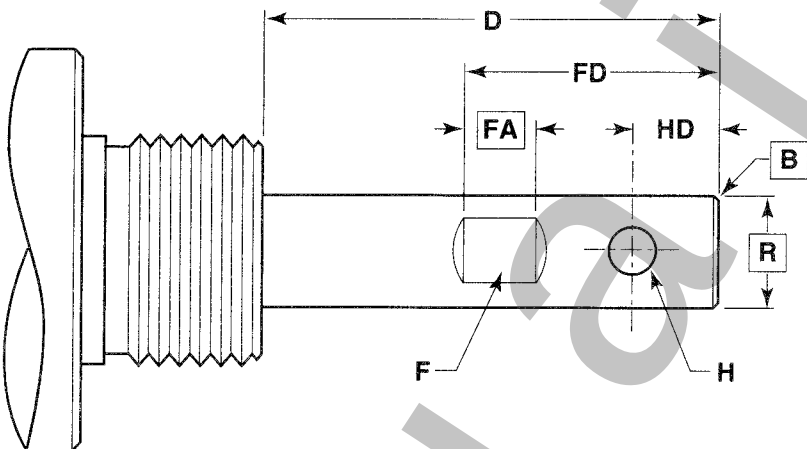
Purpose: Allows user to specify the location of a standard cross hole drilled onto a rod of variable length. The cross drilled hole is intended for use with a cotter pin and not a dowel pin. See Table 4 for boxed dimension definitions.

References

1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")
2. $HD \geq (1/2 \times H) + .030$ (Minimum wall thickness around hole) and $HD \leq D - (1/2 \times H)$
(This constraint ensures that the cross drilled hole will not break out of the rod end or enter the nose and/or rod bearing.)
3. $H = .078$ or $.141$ depending on model. See table 3 for hole sizes.
(Maximum hole size is dependent on model rod diameters.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX04
Customer Name:		Contact Person:		PO#		
Ship To Address:		Requested Ship Date:				
		Model, Type, Stroke, and Options:		Qty:		



LETTER	SIZE	Ref.
D		1.
FD		2.
HD		3.
H		4.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX04: Not available on Model #8. All dimensions are to be in inches.

Purpose: Allows user to specify the location of a standard wrench flat and a standard cross drilled hole on a plain rod. The user may also specify the length of the rod. The constraints referenced below (Ref. 3) will keep the user from placing the cross hole on the rounds of the wrench flat. The cross drilled hole will be in the same orientation as the wrench flat. The cross drilled hole is intended for use with a cotter pin and not a dowel pin. See Table 4 for boxed dimension definitions.

References

1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")
2. $HD \geq (1/2 \times H) + .030$ (minimum wall thickness around hole) and $HD \leq D - (1/2 \times H)$ (Makes sure hole is within "D")

3. $FD \leq D$ and (Makes sure wrench flat is within "D")

$FD \geq FA$ and (Guarantees user will get all of the wrench flat)

$(FD \geq FA + .075 \text{ (flat radius)} + (1/2 \times H) + HD \text{ or (Checks to see hole is on right hand side of flat)})$

$FD \leq HD - (1/2 \times H) - .075 \text{ (flat radius) or (Checks to see if hole is on left hand side of flat)}$

$(FD \geq HD + (1/2 \times H) \text{ and (Checks to see if hole is within bounds of wrench flat but not on flat radii)})$

$FD \leq HD - (1/2 \times H) + FA$

4. $H = .078$ or $.141$ depending on model. See Table 3 for hole sizes.

(Maximum hole size is dependent on model rod diameters.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX05
Customer Name:		Contact Person:		PO#		
Ship To Address:		Requested Ship Date:				
		Model, Type, Stroke, and Options:		Qty:		

LETTER	SIZE	Ref.
D		1.
J		2.
JL		3.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX05: Available on all cylinder models (prefix #8 through prefix #3). Metric allowed for "J." All other dimensions in inches.

Purpose: Allows user to specify thread definition and length on a rod of variable length. See Table 4 for boxed dimension definitions.

References

1. D ≥ 0 and D ≤ 6.0
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")
2. J: There are two parts; Size and Threads Per Inch. Choose the thread desired from Table 1. Place the description for the thread size desired in this box. Maximum thread size for your model can be determined by referring to Table.1.

3. JL: Length of the threads
 $JL \leq 6 \times \text{"J" Size (decimal format)}$ and
 If U.S. thread: $JL \leq D - (2.0 \div \text{"J" Pitch})$
 If Metric thread: $JL \leq D - (2.0 \times \text{"J" Pitch converted to inches})$

Minimum U.S. External Thread Length = $3 / \text{"J" Pitch (Threads Per Inch)}$
 Minimum Metric External Thread Length = $3 \times \text{"J" Pitch converted to inches}$
 Example: Desired thread is 5/16-18
 $JL \geq 3 \div 18$ and
 $JL \leq 6.0 \times 5/16$ and
 $JL \leq D - (2.0 \div 18.0)$

(These constraints ensure the following:
 A. Proper pitch can be maintained over the full length of thread.
 B. Thread length will not enter the nose/bearing of front head.
 C. Thread length will leave room for proper turn diameter including chamfer.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX06
Customer Name:		Contact Person:		PO#		
Ship To Address:		Requested Ship Date:				
		Model, Type, Stroke, and Options:				Qty:

LETTER	SIZE	Ref.
D		1.
J		2.
JL		3.
FD		4.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX06: Not available on model #8. Metric allowed for "J." All other dimensions are to be in inches.

Purpose: Allows user to specify thread definition, and a wrench flat location on a rod of variable length. The DX06 option is most like the Humphrey standard cylinder rod end. See Table 4 for boxed dimension definitions.

References

1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")

2. J: There are two parts; Size and Threads Per Inch. Choose the thread desired from Table 1. Place the description for the thread size desired in this box. Maximum thread size for your model can be determined by referring to Table 1.

3. JL: Length of the threads
 $JL \leq 6 \times \text{"J" Size (decimal format) and}$
 If U.S. thread: $JL \leq D - (2.0 \div \text{"J" Pitch})$
 If Metric thread: $JL \leq D - (2.0 \times \text{"J" Pitch converted to inches} \oplus)$

Minimum U.S. External Thread Length = $3 \div \text{"J" Pitch (Threads Per Inch)}$, Minimum Metric External Thread Length = $3 \times \text{"J" Pitch converted to inches} \oplus$
 Example: Desired thread is 5/16-18

$$JL \geq 3 \div 18 \text{ and}$$

$$JL \leq 6.0 \times 5/16 \text{ and}$$

$$JL \leq D - (2.0 \div 18.0)$$

(These constraints ensure the following:

- A. Proper pitch can be maintained over the full length of thread.
- B. thread length will not enter the nose/bearing of front head.
- C. Thread length will leave room for proper turn diameter including chamfer.)

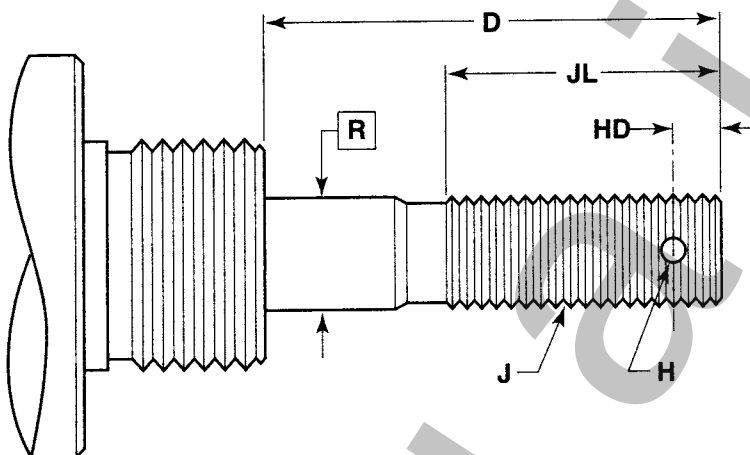
4. $FD \leq D$ and $FD \geq FA$ and
 If $F \geq \text{"J" Size Then}$
 If U.S. threads Then
 $FD \geq (FA \div 2) + JL + (2 \div \text{"J" Pitch})$
 Else (Metric Threads)
 $FD \geq (FA \div 2) + JL + (2 \times \text{"J" Pitch converted to inches} \oplus)$

(These constraints ensure the following:

- A. The wrench flat cannot enter the nose and/or the bearing.
- B. The rod will contain the entire wrench flat.
- C. When the thread size is smaller than the wrench flat width, at least half of the wrench flat must be located on the rod diameter.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX07
Customer Name:		Contact Person:		PO#		
Ship To Address:		Requested Ship Date:				
		Model, Type, Stroke, and Options:		Qty:		



LETTER	SIZE	Ref.
D		1.
HD		2.
H		3.
J		4.
JL		5.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX07: Available on all cylinder models (prefix #8 through #3). Metric allowed for "J" size. All other dimensions are to be in inches.

Purpose: Allows user to specify a thread definition, plus a cotter pin cross hole, on a rod of varying length. See Table 4 for boxed dimension definitions.

References

1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")
2. $HD \geq (1/2 \times H) + .030$ (minimum wall thickness around hole) and $HD \leq D - (1/2 \times H)$ and
If U.S. Threads Then
HD must be less than or equal to $JL + (2 \div "J" \text{ Pitch}) - (1/2 \times H)$ or
HD must be greater than $JL + (2 \div "J" \text{ Pitch}) + (1/2 \times H) + .030$ (min. wall thick. around hole)
Else (Metric threads)
HD must be less than or equal to $JL + (2 \times "J" \text{ Pitch converted to inches}) - (1/2 \times H)$ or
HD must be greater than $JL + (2 \times "J" \text{ Pitch converted to inches}) + (1/2 \times H) + .030$ (min. wall thick. around hole)
(This constraint ensures that the cross-drilled hole will not break out of the end of the rod or enter nose and/or rod bearing and that the hole does not appear on the step-down angle for the threaded area.)
3. $H = .078$ or $.141$ depending on the model and thread size. See Table 3 for hole sizes.

If $HD < JL + (1/2 \times H) + [(2 \div "J" \text{ Pitch})]$ if U.S. Threads, $(2 \times "J" \text{ Pitch converted to inches})$ if Metric Threads] Then
H must be less than or equal to $.4 \times "J" \text{ Size}$
(A smaller than standard thread size may prohibit inclusion of the larger hole.)

4. J: There are two parts; Size and Threads Per Inch. Choose the thread desired from Table 1. Place the description for the thread size desired in this box. Maximum thread size for your model can be determined by referring to Table 1.

JL: Length of the threads

$JL \leq 6 \times "J" \text{ Size (decimal format) and}$

If U.S. thread: $JL \leq D - (2.0 \div "J" \text{ Pitch})$

If Metric thread: $JL \leq D - (2.0 \times "J" \text{ Pitch converted to inches})$

Minimum U.S. External Thread Length = $3 \div "J" \text{ Pitch (Threads Per inch)}$

Minimum Metric External Thread Length = $3 \times "J" \text{ Pitch converted to inches}$

Example: Desired thread is 5/16-18

$JL \geq 3/18$ and

$JL \leq 6.0 \times 5/16$ and

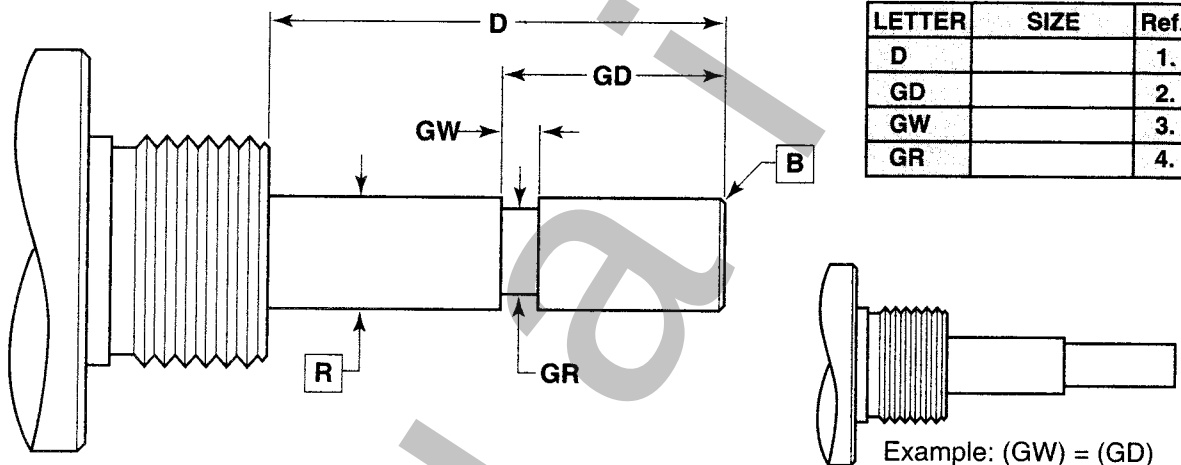
$JL \leq D - (2.0 \div 18.0)$

(These constraints ensure the following:

- A. Proper pitch can be maintained over the full length of thread
- B. Thread length will not enter the nose/bearing of front head
- C. Thread length will leave room for proper turn diameter including chamfer.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX08
Customer Name:		Contact Person:		PO#		
Ship To Address:		Requested Ship Date:				
		Model, Type, Stroke, and Options:		Qty:		



LETTER	SIZE	Ref.
D		1.
GD		2.
GW		3.
GR		4.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX08: Available on all cylinder models (prefix #8 through prefix #3). All dimensions are to be in inches.

Purpose: Allows user to specify the location and width of a groove on a rod of varying length. See Table 4 for boxed dimension defections. If $GD = GW$ the rod will simply contain a step down. See above example.

References

1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and Less than or equal to 6.00")
2. $GD \geq .030$ (minimum groove width) and $GD \leq D$
(This constraint ensures that the groove will not enter the nose and/or the rod bearing.)
3. $GW \geq .030$ (minimum groove width) and $GW \leq GD$
(This constraint ensures proper width of the groove and that the groove width remains within GD.)
4. $GR \geq .6 \times R$ and $GR < R$
(For proper strength of the rod in the groove area, 60% of the original rod diameter must remain.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX09
Customer Name:		Contact Person:		PO#		
Ship To Address:			Requested Ship Date:			
			Model, Type, Stroke, and Options:		Qty:	

LETTER	SIZE	Ref.
D		1.
GR		2.
GD		3.
GW		4.
J		5.
JL		6.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX09: Available on all cylinder models (prefix #8 through prefix #3.) Metric allowed for "J". All other dimensions are to be in inches.

Purpose: Allows user to specify the location and width of a groove, along with the ability to specify thread information (length and type), plus specify the overall length of the rod. See Table 4 for boxed dimension definitions.

References

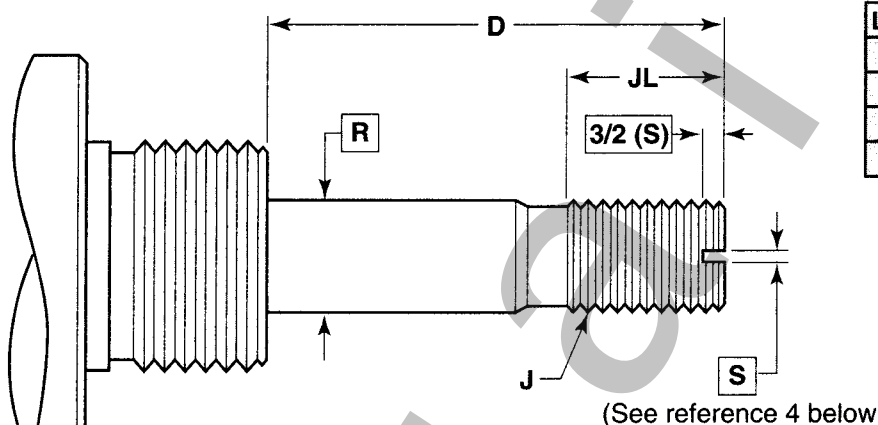
1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")
2. $GR \geq .6 \times R$ and $GR < R$
(For proper strength of the rod in the groove area, 60% of the original rod diameter must remain.)
3. $GD \leq D$ and
If U.S. Threads Then
GD must be greater than or equal to $JL + GW + (2 \div "J" \text{ Pitch})$
Else (Metric threads)
GD must be greater than or equal to $JL + GW + (2 \times "J" \text{ Pitch converted to inches})$
(This constraint prohibits the groove from entering nose and/or bearing and also ensures enough room for run-out of thread and chamfer before entering groove width area.)
4. $GW \geq .030$ (minimum groove width) and
If "J" Size > GR Then

- If U.S. Threads Then
GW must be less than equal to $GD - JL - (2 \div "J" \text{ Pitch})$
Else (Metric Threads)
GW must be less than equal to $GD - JL - (2 \times "J" \text{ Pitch converted to inches})$
(Ensures that if the thread diameter is larger than the groove width diameter, the groove may not enter the threaded area.)
5. J: There are two parts: Size and Threads Per Inch. Choose the thread desired from Table 1. Place the description of the thread size desired in this box. Maximum thread size for a model can be determined by referring to Table 1.
 6. JL: Length of the threads
 $JL \leq 6 \times "J" \text{ Size (decimal format) and}$
If U.S. thread: $JL \leq D - (2.0 \div "J" \text{ Pitch})$
If Metric thread: $JL \leq D - (2.0 \times "1" \text{ Pitch converted to inches})$

Minimum U.S. External Thread Length = $3 \div "J" \text{ Pitch (Threads Per Inch)}$
Minimum Metric External Thread Length = $3 \times "J" \text{ Pitch converted to inches}$
Example: Desired thread is 5/16-18
 $JL \geq 3 \div 18$ and
 $JL \leq 6.0 \times 5/16$ and
 $JL \leq D - (2.0 \div 18.0)$
(These constraints ensure the following:
A. Proper pitch can be maintained over the full length of thread.
B. Thread length will not enter the nose/bearing of front head.
C. Thread length will leave room for proper turn diameter including chamfer.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX10
Customer Name:		Contact Person:		PO#		
Ship To Address:			Requested Ship Date:			
			Model, Type, Stroke, and Options:		Qty:	



Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX10: Available on all cylinder models (prefix #8 through prefix #3). Metric allowed for "J." All other dimensions are to be in inches.

Purpose: Allows user to specify thread definition and length on a rod of variable length, and to have a screw driver slot placed on the end. See Table 4 for boxed dimension definitions except S which appears below in reference 4.

References

1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")
2. J: There are two parts; Size and Threads Per Inch. Choose the thread desired from Table 1. Place the description for the thread size desired in this box. Maximum thread size for your model can be determined by referring to Table 1.
3. JL: Length of threads
 $JL \leq 6 \times \text{"J" Size (decimal format)}$ and
If U.S. thread: $JL \leq D - (2.0 \div \text{"J" Pitch})$
If Metric thread: $JL \leq D - (2.0 \times \text{"J" Pitch converted to inches} \oplus)$

Minimum U.S. External Thread Length = $3 \div \text{"J" Pitch}$
Minimum Metric External Thread Length = $3 \times \text{"J" Pitch converted to inches} \oplus$

Example: Desired thread is 5/16-18

$$JL \geq 3 \div 18 \text{ and}$$

$$JL \leq 6.0 \times 5/16 \text{ and}$$

$$JL \leq D - (2.0 \div 18.0)$$

(These constraints ensure the following:

- A. Proper pitch can be maintained over the full length of thread.
- B. Thread length will not enter the nose/bearing of front head
- C. Thread length will leave room for proper turn diameter including chamfer.)

4. S = .047 if "J" Size $\leq 5/16$ (U.S. Threads) or M8 (Metric Threads)

S = .094 if "J" Size $> 5/16$ (U.S. Threads) or M8 (Metric Threads)

(Use this constraint to determine available screwdriver slot width.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX11
Customer Name:		Contact Person:		PO#		
Ship To Address:			Requested Ship Date:			
			Model, Type, Stroke, and Options:		Qty:	

LETTER	SIZE	Ref.
D		1.
GR		2.
GD		3.
GW		4.
J		5.
JL		6.
FD		7.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX11: Not available on model 8. Metric allowed for "J". All other dimensions are to be in inches.

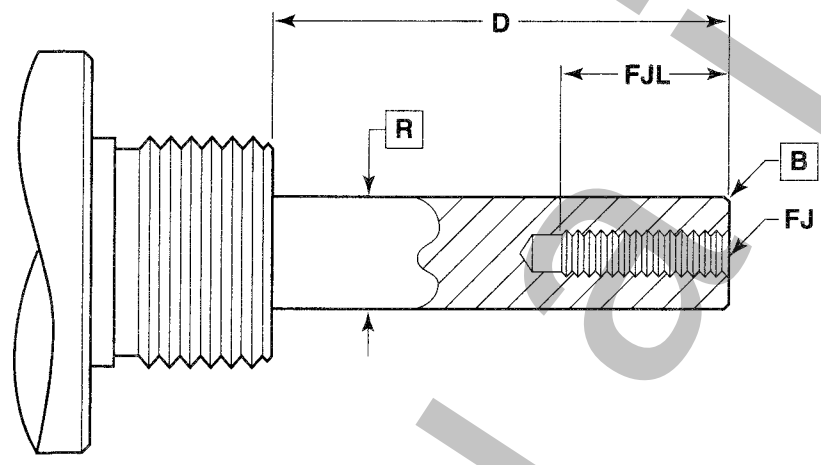
Purpose: Allows user to specify the location of a wrench flat, the location and width of a groove, and the definition of a desired thread all on a rod of variable length. See Table 4 for boxed dimension definitions.

References

- $D \geq 0$ and
 $D \leq 6.0$
 (Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")
- $GR \geq .6 \times R$ and
 $GR \leq R$
 (For proper strength of the rod in the groove area, 60% of the original rod diameter must remain.)
- $GD \leq D$ and
 $(GD \geq FD + .075 \text{ (Flat Radius)} + GW \text{ or } GD \leq FD - .075 \text{ (Flat Radius)} - FA \text{ and } \text{If U.S. Threads Then } GD \text{ must be greater than or equal to } JL + GW + (2 \div "J" \text{ Pitch}) \text{ Else (Metric threads) } GD \text{ must be greater than or equal to } JL + GW + (2 \times "J" \text{ Pitch converted to inches}) \text{ (This constraint keeps the groove from entering the thread run-out and chamfer area and eliminates the potential for the wrench flat to enter into the groove area.)}$
- $GW \geq .030$ (minimum groove width) and
 If "J" Size > GR Then
 If U.S. Threads Then
 $GW \text{ must be less than equal to } GD - JL - (2 \div "J" \text{ Pitch})$
 Else (Metric Threads)
 $GW \text{ must be less than or equal to } GD - JL - (2 \times "J" \text{ Pitch converted to inches})$
 (Ensures that if the thread diameter is larger than the groove width diameter, the groove may not enter the threaded area.)
- J: There are two parts; Size and Threads Per Inch. Choose the thread desired from Table 1. Place the description for the thread size in this box.
 Maximum thread size for a model can be determined by referring to Table 1.
- JL: Length of the threads
 $JL \leq 6 \times "J" \text{ Size (decimal format) and } \text{If U.S. thread: } JL \leq D - (2.0 \div "J" \text{ Pitch}) \text{ If Metric thread: } JL \leq D - (2.0 \times "J" \text{ Pitch converted to inches})$
 Minimum U.S. External Thread Length = $3 \div "J" \text{ Pitch (Threads Per Inch)}$
 Minimum Metric External Thread Length = $3 \times "J" \text{ (Pitch converted to inches)}$
 Example: Desired thread is 5/16-18
 $JL \geq 3 \div 18$ and
 $JL \leq 6.0 \times 5/16$ and
 $JL \leq D - (2.0 \div 18.0)$
 (These constraints ensure the following:
 A. Proper pitch can be maintained the full Length of thread.
 B. Thread Length will not enter the nose/bearing of front head.
 C. Thread length will leave room for proper turn diameter including chamfer.)
- $FD \leq D$ and
 $FD \geq FA$ and
 If $F \geq "J" \text{ Size Then } \text{If U.S. Threads Then } FD \text{ must be greater than equal to } (FA \div 2) + JL + (2 \div "J" \text{ Pitch}) \text{ Else (Metric Threads) } FD \text{ must be greater than equal to } (FA \div 2) + JL + (2 \times "J" \text{ Pitch converted to inches})$
 (These constraints ensure the following:
 A. The wrench flat cannot enter the nose and/or the bearing.
 B. The rod will contain the entire wrench flat.
 C. When the thread size is smaller than the wrench flat width at least half of the wrench flat must be located on the rod diameter.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX12
Customer Name:		Contact Person:		PO#		
Ship To Address:		Requested Ship Date:				
		Model, Type, Stroke, and Options:		Qty:		



LETTER	SIZE	Ref.
D		1.
FJ		2.
FJL		3.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX12: Not available on models 7 and 8. All dimensions are to be in inches.

Purpose: Allows user to specify a threaded hole in the end of a rod of varying length. See Table 1 for boxed dimension definitions.

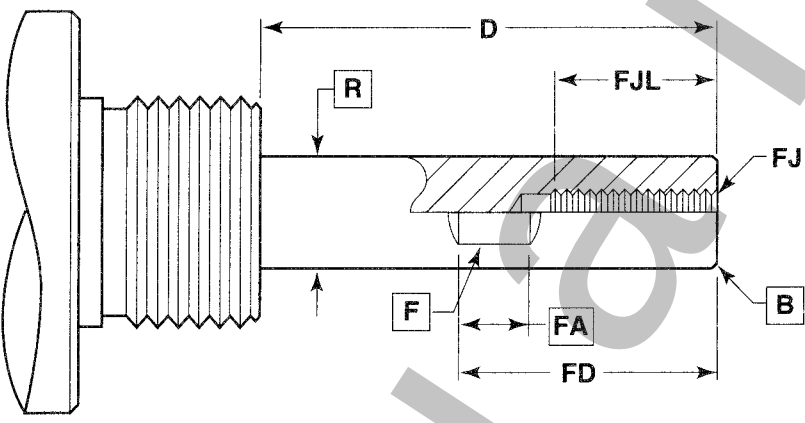
References

1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")
2. FJ: Contains two parts the diameter of the thread and the pitch (number of threads per inch). Choose the thread desired from Table 2. Place the description for the thread size in this box. Maximum thread size for your model can be determined by referring to Table 2.

3. FJL: Length of the threads
 $FJL \leq 3.0 \times FJ \text{ Size (thread diameter)}$
 $FJL \geq 3.0 \div FJ \text{ Pitch (threads per inch)}$
 Example: Desired thread is 5/16-18
 $FJL \leq 3.0 \times 5/16$ and
 $FJL \geq 3.0 \div 18.0$
 (In this example, maximum thread depth is .9375". Minimum thread depth is .1666". These are present manufacturing capabilities.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX13
Customer Name:		Contact Person:		PO#		
Ship To Address:			Requested Ship Date:			
		Model, Type, Stroke, and Options:			Qty:	



LETTER	SIZE	Ref.
D		1.
FJ		2.
FJL		3.
FD		4.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX13: Not available on models 7 and 8. All dimensions are to be in inches.

Purpose: Allows user to specify the location of a wrench flat plus a threaded hole in the end of a rod of variable length. See Table 4 for boxed dimension definitions.

References

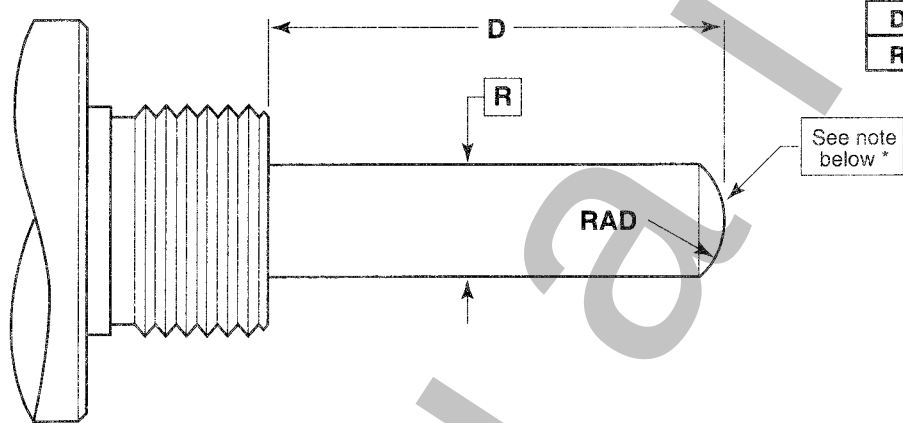
1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")
2. FJ: Contains two parts the diameter of the thread and the pitch (number of threads per inch). Choose the thread desired from Table 2. Place the description for the thread size desired in this box. Maximum thread size for your model can be determined by referring to Table 2.

3. FJL: Length of the threads
 $FJL \leq 3.0 \times FJ \text{ Size (thread diameter)}$
 $FJL \geq 3.0 \div FJ \text{ Pitch (threads per inch)}$
 Example: Desired thread is 5/16-18
 $FJL \leq 3.0 \times 5/16$ and
 $FJL \geq 3.0 \div 18$
 (In this example, maximum thread depth is .9375". Minimum thread depth is .1666". These are present manufacturing capabilities.)

4. $FD \geq FA$ and $FD \leq D$
 (These constraints ensure the following:
 A. The wrench flat cannot enter the nose and/or the bearing.
 B. The rod will include the entire wrench flat.

DX Deluxe Rod™ Cylinders Program

Distributor Name:		Contact Person:		PO#		DX14
Customer Name:		Contact Person:		PO#		
Ship To Address:		Requested Ship Date:				
		Model, Type, Stroke, and Options:		Qty:		



LETTER	SIZE	Ref.
D		1.
RAD		2.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX14: Available on all cylinder models (prefix #8 through prefix #3). All dimensions are to be in inches.

Purpose: Allows user to specify a spherical radius run out on the end of a variable length rod end. See Table 4 for boxed dimension definitions.

* Note: .030 Diameter (maximum) flat may occur at the end of the rod due to manufacturing processes.

References:

1. $D \geq 0$ and

$D \leq 6.0$

(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")

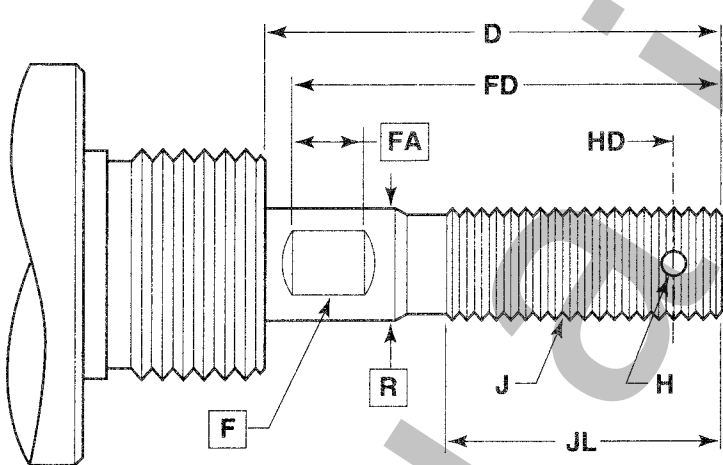
2. $RAD \geq 1/2 R$ and

$RAD \leq 10.0$

(The maximum radius of 10.00 has very little radius at all on the rod end. The minimum radius (1/2 of the rod diameter) provides the greatest rounding on the rod end.)

DX Deluxe Rod™ Cylinders Program

Distributor Name:	Contact Person:	PO#	DX15
Customer Name:	Contact Person:	PO#	
Ship To Address:	Requested Ship Date:		
	Model, Type, Stroke, and Options:	Qty:	



LETTER	SIZE	Ref.
D		1.
HD		2.
H		3.
FD		4.
J		5.
JL		6.

Below for Humphrey use only:

Entered By:	Date:	Order Number:	Tracking #:	Delivery Date:	Price:
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DX15: Not available on model 8. Metric allowed for "J" size. All other dimensions are to be in inches.

Purpose: Allows user to specify a thread definition, plus a cotter pin cross hole, and locate a wrench flat on a rod of variable length. The cross hole is intended for use with a cotter pin and not a dowel pin. See Table 4 for boxed dimension definitions.

1. $D \geq 0$ and $D \leq 6.0$
(Rod extension must be greater than or equal to 0.00" and less than or equal to 6.00")
2. $HD > (1/2 \times H) + .030$ (minimum wall thickness around hole) and $HD \leq D - (1/2 \times H)$ and If U.S. Thread Then HD must be less than or equal to $JL + (2 \div "J" \text{ Pitch}) - (1/2 \times H)$ or HD must be greater than $JL + (2 \div "J" \text{ Pitch}) + (1/2 \times H) + .030$ (minimum wall thickness around hole) Else (Metric Threads) HD must be less than or equal to $JL + (2 \times "J" \text{ Pitch converted to inches}) - (1/2 \times H)$ or HD must be greater than $JL + (2 \times "J" \text{ Pitch converted to inches}) + (1/2 \times H) + .030$ (minimum wall thickness around hole) (This constraint ensures that the cross-drilled hole will not break out of the end of the rod or enter nose and/or bearing and that the hole does not appear on the step-down angle for the threaded area.)
3. $H = .078$ or $.141$ depending on the model and thread size.
See Table 3 for hole sizes based on models.
If $HD < JL + (1/2 \times H) + (2 \div "J" \text{ Pitch})$ If U.S. Threads, $(2 \times "J" \text{ Pitch converted to inches})$ If Metric threads Then H must be less than equal to $.4 \times "J" \text{ Size}$

(A smaller than standard thread size may prohibit inclusion of the largest available hole.)

4. $FD \leq D$ and $FD \geq FA$ and $(FD \geq FA + .075 \text{ flat Radius}) + (1/2 \times H) + HD$ or $FD \leq HD - (1/2 \times H) - .075 \text{ (Flat Radius)}$ or $FD \geq HD + (1/2 \times H)$ and $FD \leq HD - (1/2 \times H) + FA$) and If $F \geq "J" \text{ Size}$ Then If U.S. Threads Then FD must be greater than equal to $(FA \div 2) + JL + (2 \div "J" \text{ Pitch})$ Else FD must be greater than equal to $(FA \div 2) + JL + (2 \times "J" \text{ Pitch converted to inches})$ (These constraints ensure the following:
 - A. The wrench flat cannot enter the nose and/or the bearing.
 - B. The rod will contain the entire wrench flat.
 - C. When the thread size is smaller than the wrench flat width, at least one half of the wrench flat must be located on the rod diameter.
 - D. The cross-hole does not fall on the rounds of the wrench flat.)
5. J : There are two parts: Size and Threads Per Inch. Choose the thread desired from Table 1. Place the desired description for the thread size desired in this box. Maximum thread size for your model can be determined by referring to Table 1.
6. JL : Length of the threads
 $JL \leq 6 \times "J" \text{ Size (decimal format)}$ and If U.S. thread: $JL \leq D - (2.0 \div "J" \text{ Pitch})$ If Metric thread: $JL \leq D - (2.0 \times "J" \text{ Pitch converted to inches})$
Minimum U.S. External Thread Length = $3 \div "J" \text{ pitch (Threads Per Inch)}$

Minimum Metric External Thread Length = $3 \times "J" \text{ pitch converted to inches}$

Example: Desired thread is 5/16-18

$JL \geq 3 \div 18$ and

$JL \leq 6.0 \times 5/16$ and

$JL \leq D - (2.0 \div 18.0)$

(These constraints ensure the following:

- A. Proper pitch can be maintained over the full length of thread.
- B. Thread length will not enter the nose/bearing of front head.
- C. Thread length will leave room for proper turn diameter including chamfer.)

DX Deluxe Rod™ Cylinders Program

Table 1	
External Threads	
(Thread sizes available on DX options)	
English (Class 2 Fit)	Metric (H6 Fit)
Model 8 #8-32 UNC	Model 8 M3 x .50
Model 7 #8-36 UNF	Model 7 M4 x .7
Model 6 #10-24 UNC	Model 6 M5 x .80
Model 5 #10-32 UNF	Model 5 M6 x 1.00
Model 4 & 3 1/4-20 UNC	Model 4 & 3 M8 x 1.25
Model 4 & 3 1/4-28 UNF	Model 4 & 3 M8 x 1.00
Model 4 & 3 5/16-18 UNC	Model 4 & 3 M10 x 1.50
Model 4 & 3 5/16-24 UNF	Model 4 & 3 M10 x 1.25
Model 4 & 3 3/8-16 UNC	Model 4 & 3 M12 x 1.75
Model 4 & 3 3/8-24 UNF	Model 4 & 3 M12 x 1.50
Model 4 & 3 7/16-14 UNC	Model 4 & 3 M14 x 2.00
Model 4 & 3 7/16-20 UNF	Model 4 & 3 M14 x 1.50
Model 4 & 3 1/2-13 UNC	Model 4 & 3 M15 x 1.00
Model 4 & 3 1/2-20 UNF	Model 4 & 3 M16 x 2.00
Model 4 & 3 9/16-12 UNC	Model 4 & 3 M16 x 1.50
Model 4 & 3 9/16-18 UNF	
Model 4 & 3 5/8-11 UNC	
Model 4 & 3 5/8-18 UNF	

Table 2
Internal Threads
(Internal threads available for the DX options)
(Internal Metric Threads not Available)
(Not Available on Models 8 & 7)
English (Class 2 Fit)
#8-32 UNC
#8-36 UNF
#10-24 UNC maximum internal threads
#10-32 UNF Model 6
1/4-20 UNC
1/4-28 UNF Model 5, 25, & 75
5/16-18 UNC
5/16-24 UNF
3/8-16 UNC
3/8-24 UNF Model 3 & 4

Table 3		
Cross-hole Sizes		
(The size of cross-hole available depends on the model)		
	.078"	.141"
Model 3	•	•
Model 4	•	•
Model 75	•	•
Model 5	•	•
Model 25	•	•
Model 6	•	NA
Model 7	•	NA
Model 8	•	NA
• - Hole available		
If hole falls on threaded portion of rod the hole size must be at most 40% of basic thread size.		
NA - Hole not available for this model		
.078" hole for 1/16" cotter pin		
.141" hole for 1/8" cotter pin		

DX Deluxe Rod™ Cylinders Program

Table 4
Boxed Dimensions

(Definitions of the boxed dimensions on the order sheets)
(Boxed dimensions are determined by cylinder model and are not modifiable under this program.)

B	- Corner Break Size
F	- Width Across Flats (Wrench size)
FA	- Flat Length
R	- Rod Diameter
S	- Screwdriver Slot Size (SEE DX10 for slot sizes)
3/2 (s)	- Depth of Screwdriver Slot

	B	F	FA	R
Model 3	.015	.500	.278	.625
Model 4	.015	.500	.278	.625
Model 75	.015	.438	.278	.500
Model 5	.015	.375	.275	.437
Model 25	.015	.375	.275	.437
Model 6	.015	.250	.188	.312
Model 7	.015	.219	.188	.250
Model 8	.015	NA	NA	.187

Table 5
Standard ("Std") Dimensions

Round Heads

	D	FD	J	JL
Model 8	.50	NA	10-32	.50
Model 7	.50	NA	1/4-28	.50
Model 6	.62	.60	5/16-24	.50
Model 25	1.00	.93	7/16-20	.75
Model 5	1.00	.93	7/16-20	.75
Model 75	1.19	1.14	1/2-20	.88
Model 4	1.25	1.15	1/2-20	.88
Model 3	1.25	1.15	1/2-20	.88

Block Mount Heads

	D	FD	J	JL
Model 8	.50	NA	10-32	.50
Model 7	1.06	1.01	1/4-28	.75
Model 6	1.12	1.01	5/16-24	.75
Model 25	NA	NA	NA	NA
Model 5	1.50	1.43	7/16-20	1.25
Model 75	NA	NA	NA	NA
Model 4	NA	NA	NA	NA
Model 3	NA	NA	NA	NA