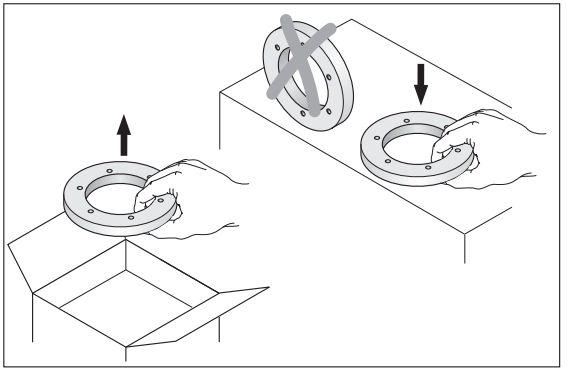
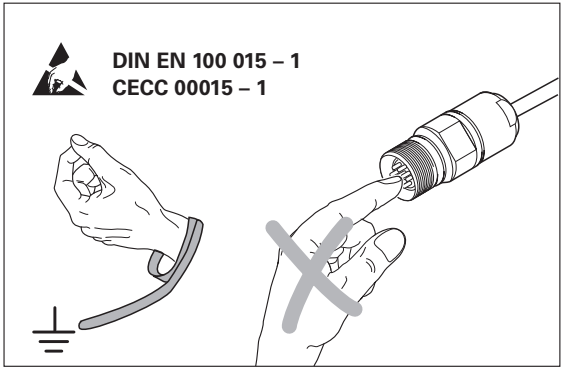
HEIDENHAIN

Montageanleitung
Mounting Instructions
Instructions de montage
Istruzioni di montaggio
Instrucciones de montaje

ERM 120
ERM 121
ERM 180
ERM 181

3/2005

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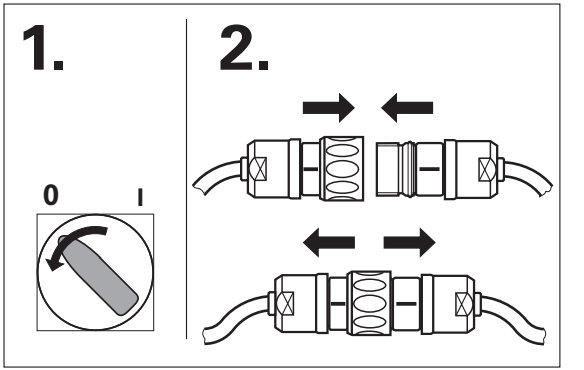
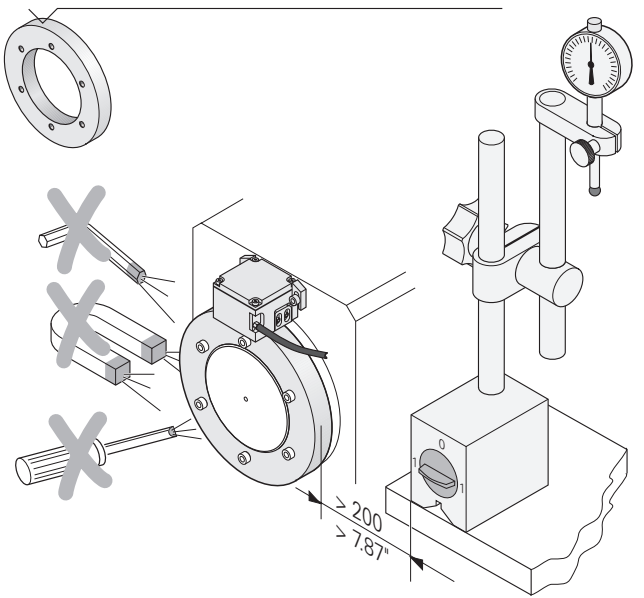
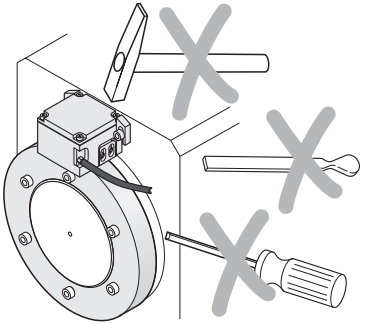
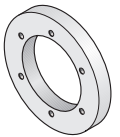

1.
0
I
2.

Zulässige Fremdfelder < 2.5 mT/< 25 Gauß
Permissible external error < 2.5 mT/< 25 gauss
champs étrangers adm. < 2.5 mT/< 25 gauss
massimo campo esterno < 2.5 mT/< 25 Gauß
error externo admisible < 2.5 mT/< 25 Gauss



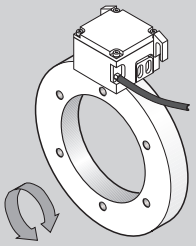


Trommelform · *Type of Scale Drum* · Forme du tambour · *Forma del tamburo* · Forma del tampor

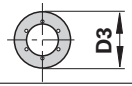


	Id.-Nr.	
A	319 123-xx	**6, 8, 10** ◄ ► **7, 9**
B **D** **PC CF:**	319 125-xx 319 115-xx	**12, 14** ◄ ► **13**
C	332 559-xx	**16, 18** ◄ ► **17**
E	344 256-xx	**20** ◄ ► **21**
F	336 815-xx	**22** ◄ ► **23**
L	341 124-xx	**24** ◄ ► **25**
M	344 257-xx	**26** ◄ ► **27**
K	339 311-xx	**28** ◄ ► **29**

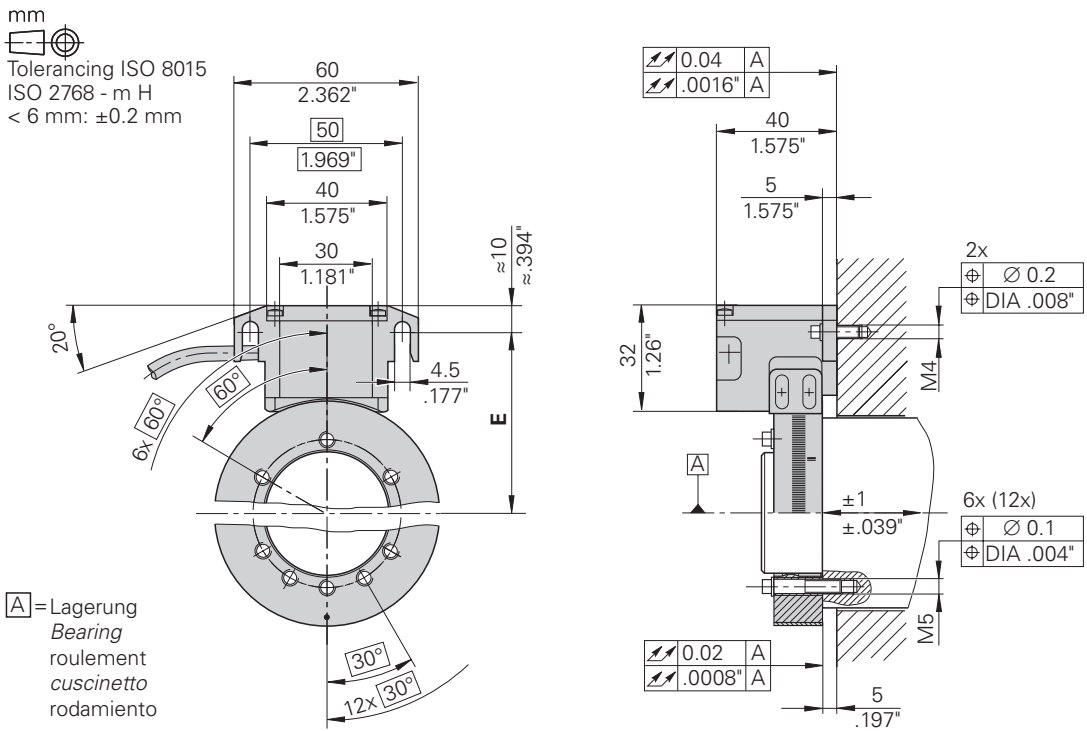
Genauigkeit ohne Exzentrizität
Accuracy without eccentricity
precision sans excentricité
accuratezza senza eccentricità
precisión sin excentricidad

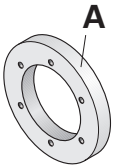


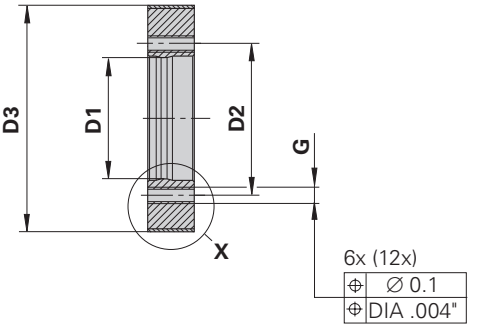
$\Delta\varphi_2$ **(20 °C)**

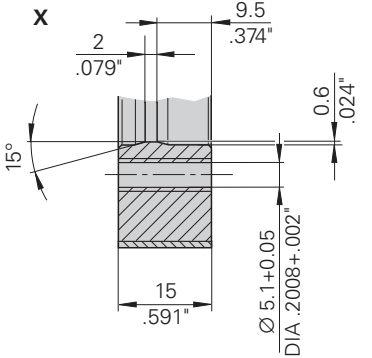


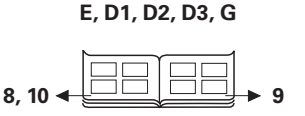
Ø 75.44 DIA 2.97"	$\Delta\varphi_2 \leq \pm$ 35"	
Ø 113.16 DIA 4.455"	$\Delta\varphi_2 \leq \pm$ 20"	
Ø 128.75 DIA 5.069"	$\Delta\varphi_2 \leq \pm$ 20"	**PC CF:** $\Delta\varphi_2 \leq \pm$ 35"
Ø 150.88 DIA 5.94"	$\Delta\varphi_2 \leq \pm$ 20"	
Ø 154.65 DIA 6.089"	$\Delta\varphi_2 \leq \pm$ 20"	
Ø 176 DIA 6.929"	$\Delta\varphi_2 \leq \pm$ 20"	
Ø 257.5 DIA 10.138"	$\Delta\varphi_2 \leq \pm$ 12"	
Ø 270.32 DIA 10.643"	$\Delta\varphi_2 \leq \pm$ 12"	
Ø 326.90 DIA 12.87"	$\Delta\varphi_2 \leq \pm$ 12"	


mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm
60
2.362"
50
1.969"
40
1.575"
30
1.181"
≈10
≈.394"
20°
60°
6x 60°
4.5
.177"
E
30°
12x 30°
A = Lagerung
Bearing
roulement
cuscinetto
rodamiento
0.04 A
.0016" A
40
1.575"
5
1.575"
2x
Ø 0.2
DIA .008"
32
1.26"
M4
A
±1
±.039"
6x (12x)
Ø 0.1
DIA .004"
M5
0.02 A
.0008" A
5
.197"


A


D3
D1
D2
G
X
6x (12x)
⌖ ∅ 0.1
⌖ DIA .004"

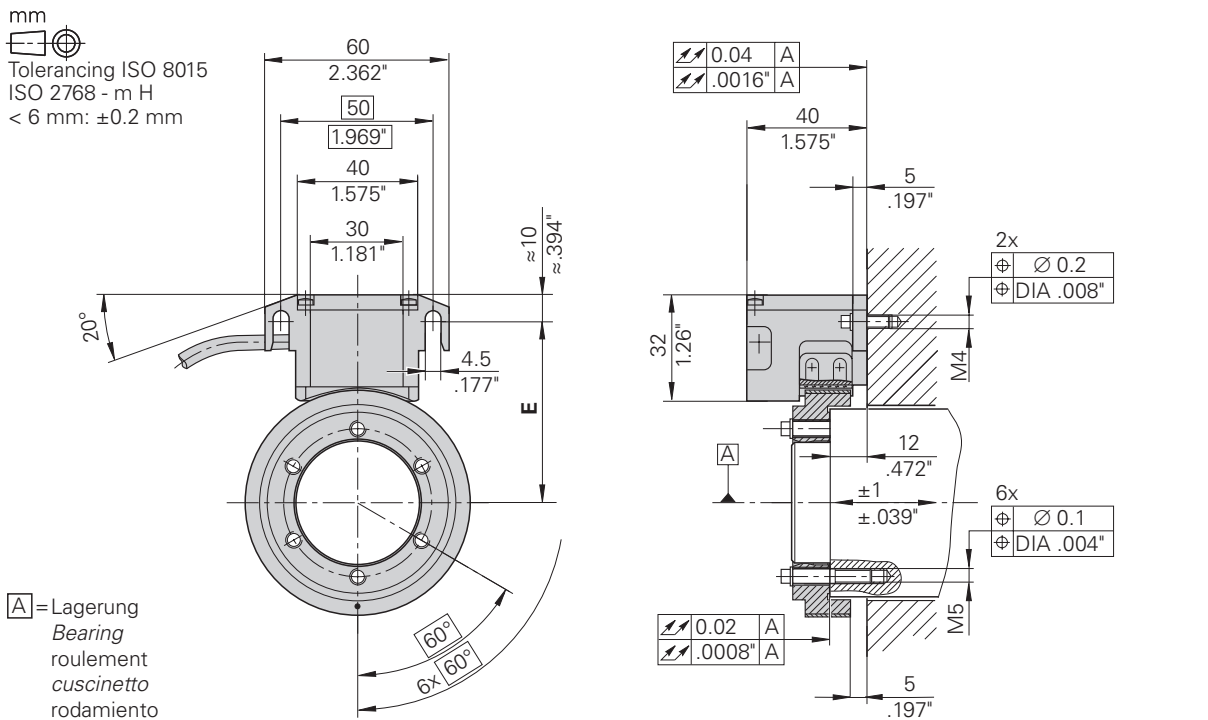

X
9.5
.374"
2
.079"
0.6
.024"
15°
15
.591"
∅ 5.1+0.05
DIA .2008+.002"

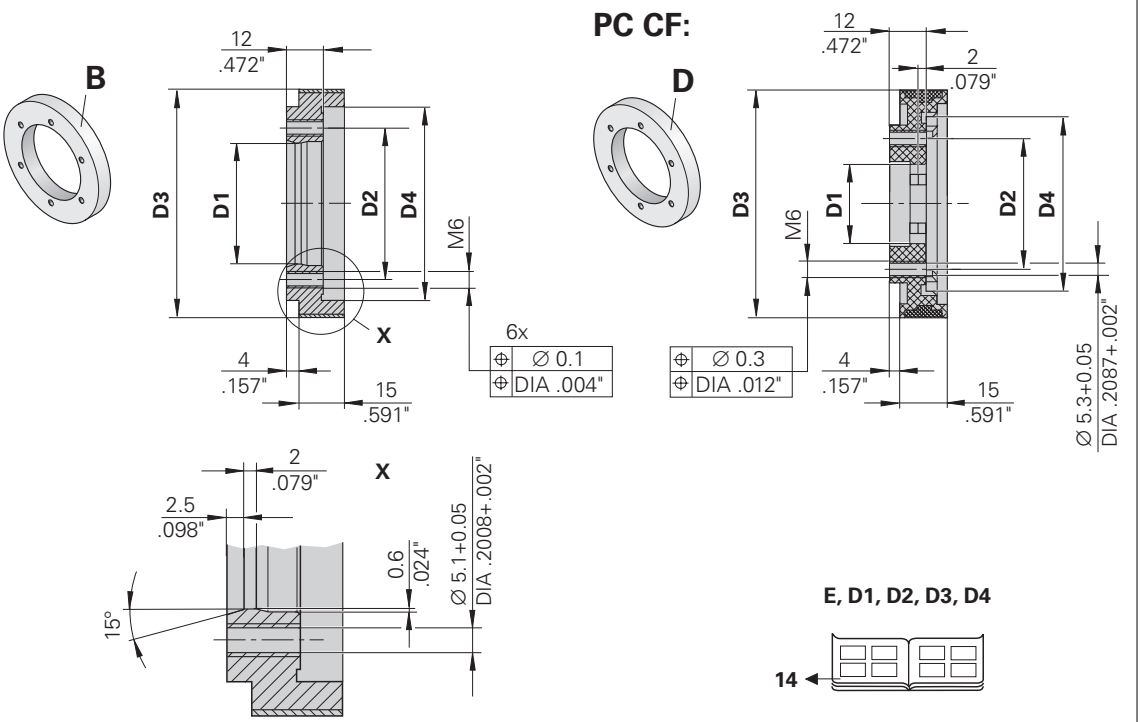

E, D1, D2, D3, G
8, 10
9

	D1	D2	D3	E	G	n ≤
A 01	∅ 40 –0.001/ –0.008 DIA 1.5748 –.00004/ –.0003"	∅ 50 DIA 1.969"	∅ 75.44 DIA 2.97"	58 2.284"	6x M6	24 000 min^{-1}
A 02	∅ 80 –0.001/ –0.008 DIA 3.1496 –.00004/ –.0003"	∅ 95 DIA 3.74"	∅ 128.75 DIA 5.069"	85 3.346"	6x M6	18 000 min^{-1}
A 03	∅ 120 –0.001/ –0.008 DIA 4.724 –.00004/ –.0003"	∅ 135 DIA 5.315"	∅ 150.88 DIA 5.94"	96 3.78"	6x M6	12 000 min^{-1}
A 04	∅ 180 –0.001/ –0.008 DIA 7.0866 –.00004/ –.0003"	∅ 195 DIA 7.677"	∅ 257.50 DIA 10.138"	149 5.866"	6x M6	8 000 min^{-1}
A 05	∅ 70 –0.001/ –0.008 DIA 2.7559 –.00004/ –.0003"	∅ 85 DIA 3.346"	∅ 113.16 DIA 4.455"	77 3.032"	6x M6	20 000 min^{-1}
A 06	∅ 80 –0.001/ –0.008 DIA 3.1496 –.00004/ –.0003"	∅ 95 DIA 3.74"	∅ 150.88 DIA 5.940"	96 3.78"	6x M6	12 000 min^{-1}
A 07	∅ 105 –0.001/ –0.008 DIA 4.134 –.00004/ –.0003"	∅ 120 DIA 4.724"	∅ 150.88 DIA 5.940"	96 3.78"	6x M6	12 000 min^{-1}
A 08	∅ 220 –0.001/ –0.008 DIA 8.661 –.00004/ –.0003"	∅ 235 DIA 9.252"	∅ 257.50 DIA 10.138"	149 5.866"	6x M6	8 000 min^{-1}
A 09	∅ 110 –0.001/ –0.008 DIA 4.331 –.00004/ –.0003"	∅ 152 DIA 5.984"	∅ 257.50 DIA 10.138"	149 5.866"	6x M6	8 000 min^{-1}
A 10	∅ 80 –0.001/ –0.008 DIA 3.1496 –.00004/ –.0003"	∅ 95 DIA 3.74"	∅ 128.75 DIA 5.069"	85 3.346"	6x ∅ 6.6 DIA .26"	18 000 min^{-1}

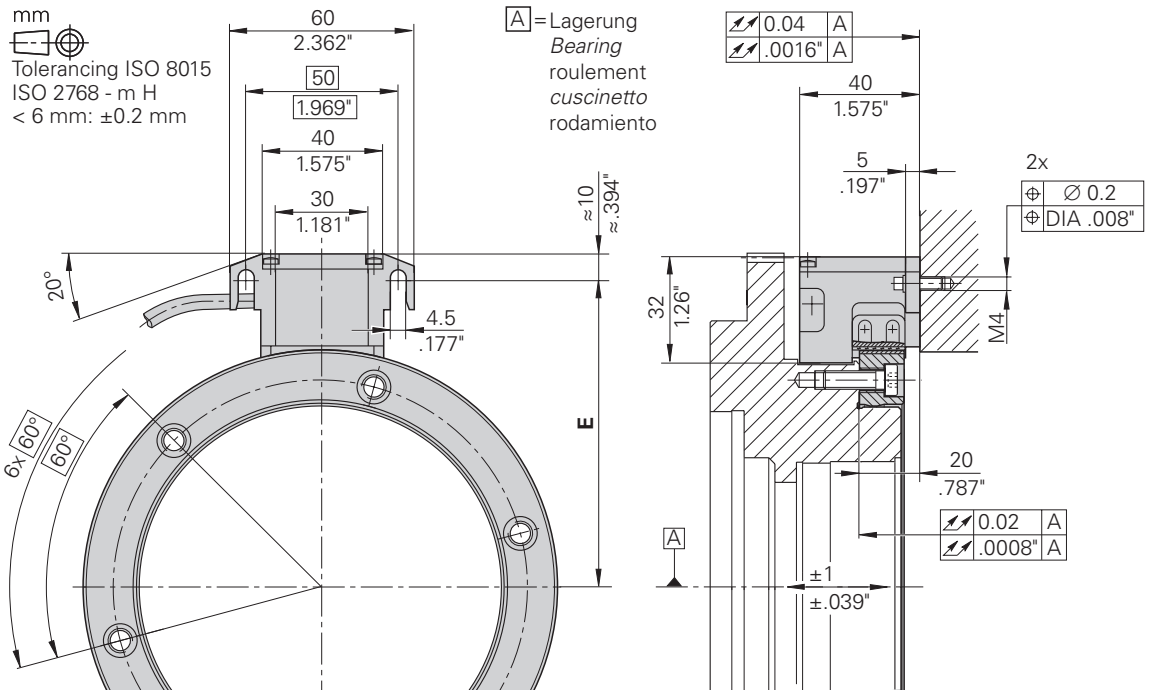
	D1	D2	D3	E	G	n ≤
A 11	∅ 60 –0.001/ –0.008 DIA 2.3622 –.00004/ –.0003"	∅ 75 DIA 2.95"	∅ 128.75 DIA 5.069"	85 3.346"	6x M6	18 000 min^{-1}
A 12	∅ 130 –0.001/ –0.008 DIA 5.1181 –.00004/ –.0003"	∅ 145 DIA 5.709"	∅ 176 DIA 6.929"	108 4.252"	6x M6	10 000 min^{-1}
A 14	∅ 95 –0.001/ –0.008 DIA 3.7402 –.00004/ –.0003"	∅ 110 DIA 4.331"	∅ 128.75 DIA 5.069"	85 3.346"	6x M6	18 000 min^{-1}
A 15	∅ 65 –0.001/ –0.008 DIA 2.5591 –.00004/ –.0003"	∅ 80 DIA 3.15"	∅ 128.75 DIA 5.069"	85 3.346"	6x M6	18 000 min^{-1}
A 16	∅ 90 –0.001/ –0.008 DIA 3.5433 –.00004/ –.0003"	∅ 105 DIA 4.134"	∅ 128.75 DIA 5.069"	85 3.346"	6x M6	18 000 min^{-1}
A 17	∅ 295 –0.001/ –0.008 DIA 11.6142 –.00004/ –.0003"	∅ 310 DIA 12.205"	∅ 326.9 DIA 12.87"	185 7.284"	6x M6	5 000 min^{-1}
A 18	∅ 110 –0.001/ –0.008 DIA 4.3307 –.00004/ –.0003"	∅ 125 DIA 4.921"	∅ 150.88 DIA 5.94"	96 3.78"	6x M6	12 000 min^{-1}
A 19	∅ 140 –0.001/ –0.008 DIA 5.5118 –.00004/ –.0003"	∅ 155 DIA 6.102"	∅ 257.5 DIA 10.138"	149 5.866"	6x M6	8 000 min^{-1}
A 20	∅ 95 –0.001/ –0.008 DIA 3.7402 –.00004/ –.0003"	∅ 110 DIA 4.331"	∅ 150.88 DIA 5.94"	96 3.78"	6x M6	12 000 min^{-1}
A 21	∅ 70 –0.001/ –0.008 DIA 2.7559 –.00004/ –.0003"	∅ 95 DIA 3.74"	∅ 128.75 DIA 5.069"	85 3.346"	6x M6	18 000 min^{-1}

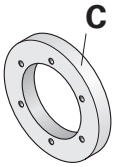
	D1	D2	D3	E	G	n ≤
A 22	Ø 40 –0.001/ –0.008 DIA 1.5748 –.00004/ –.0003"	Ø 50 DIA 1.969"	Ø 75.44 DIA 2.97"	58 2.284"	12x Ø 5.1 DIA .201"	24 000 min^{-1}
A 23	Ø 120 –0.001/ –0.008 DIA 4.724 –.00004/ –.0003"	Ø 135 DIA 5.315"	Ø 257.5 DIA 10.138"	149 5.866"	6x M6	8 000 min^{-1}

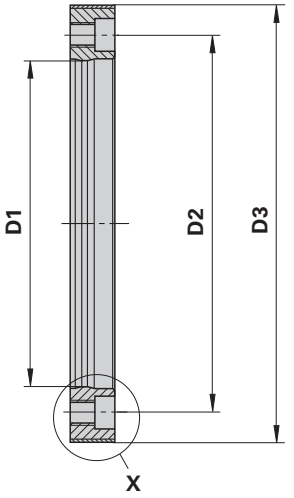

mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm
60
2.362"
50
1.969"
40
1.575"
30
1.181"
≈10
≈.394"
20°
4.5
.177"
E
60°
6x 60°
A = Lagerung
Bearing
roulement
cuscinetto
rodamiento
0.04 A
.0016" A
40
1.575"
5
.197"
2x
Ø 0.2
DIA .008"
32
1.26"
M4
A
12
.472"
±1
±.039"
6x
Ø 0.1
DIA .004"
M5
0.02 A
.0008" A
5
.197"

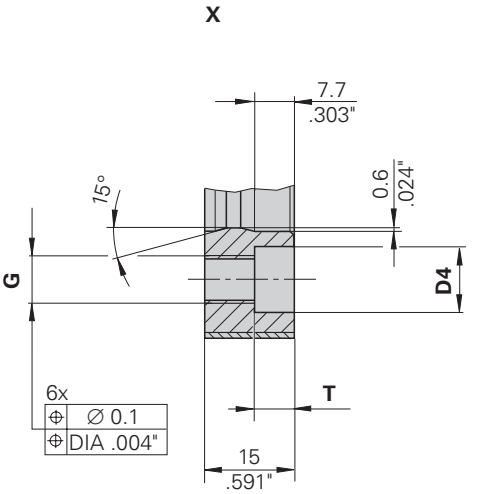

B
12
.472"
D3
D1
D2
D4
M6
X
6x
⌖ Ø 0.1
⌖ DIA .004"
4
.157"
15
.591"
PC CF:
D
12
.472"
2
.079"
D3
M6
D1
D2
D4
⌖ Ø 0.3
⌖ DIA .012"
4
.157"
15
.591"
Ø 5.3+0.05
DIA .2087+.002"
2
.079"
X
2.5
.098"
0.6
.024"
15°
Ø 5.1+0.05
DIA .2008+.002"
E, D1, D2, D3, D4
14

	D1	D2	D3	D4	E	n ≤
B 01	∅ 40 –0.001/ –0.008 DIA 1.5748 –.00004/ –.0003"	∅ 50 DIA 1.969"	∅ 75.44 DIA 2.97"	∅ 64 DIA 2.52"	60 2.362"	24 000 min^{-1}
B 02	∅ 80 –0.001/ –0.008 DIA 3.1496 –.00004/ –.0003"	∅ 95 DIA 3.74"	∅ 128.75 DIA 5.069"	∅ 112 DIA 4.409"	85 3.346"	18 000 min^{-1}
B 03	∅ 120 –0.001/ –0.008 DIA 4.724 –.00004/ –.0003"	∅ 140 DIA 5.512"	∅ 176 DIA 6.929"	∅ 162 DIA 6.378"	110 4.331"	10 000 min^{-1}
B 04	∅ 180 –0.001/ –0.008 DIA 7.0866 –.00004/ –.0003"	∅ 200 DIA 7.874"	∅ 257.5 DIA 10.138"	∅ 232 DIA 9.134"	145 5.709"	8 000 min^{-1}
B 05	∅ 270 –0.001/ –0.008 DIA 10.6299 –.00004/ –.0003"	∅ 290 DIA 11.417"	∅ 326.90 DIA 12.87"	∅ 312 DIA 12.283"	185 7.283"	5 000 min^{-1}
D 01	**PC CF:** ∅ 80 –0.001/ –0.014 DIA 3.1496 –.00004/ –.00055"	∅ 95 DIA 3.74"	∅ 128.75 DIA 5.069"	∅ 112 DIA 4.409"	85 3.346"	3 000 min^{-1}


mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm
60
2.362"
50
1.969"
40
1.575"
30
1.181"
20°
≈10
≈.394"
4.5
.177"
E
6x 60°
60°
A = Lagerung
Bearing
roulement
cuscinetto
rodamiento
0.04 A
.0016" A
40
1.575"
5
.197"
2x
∅ 0.2
DIA .008"
32
1.26"
M4
20
.787"
0.02 A
.0008" A
A
±1
±.039"



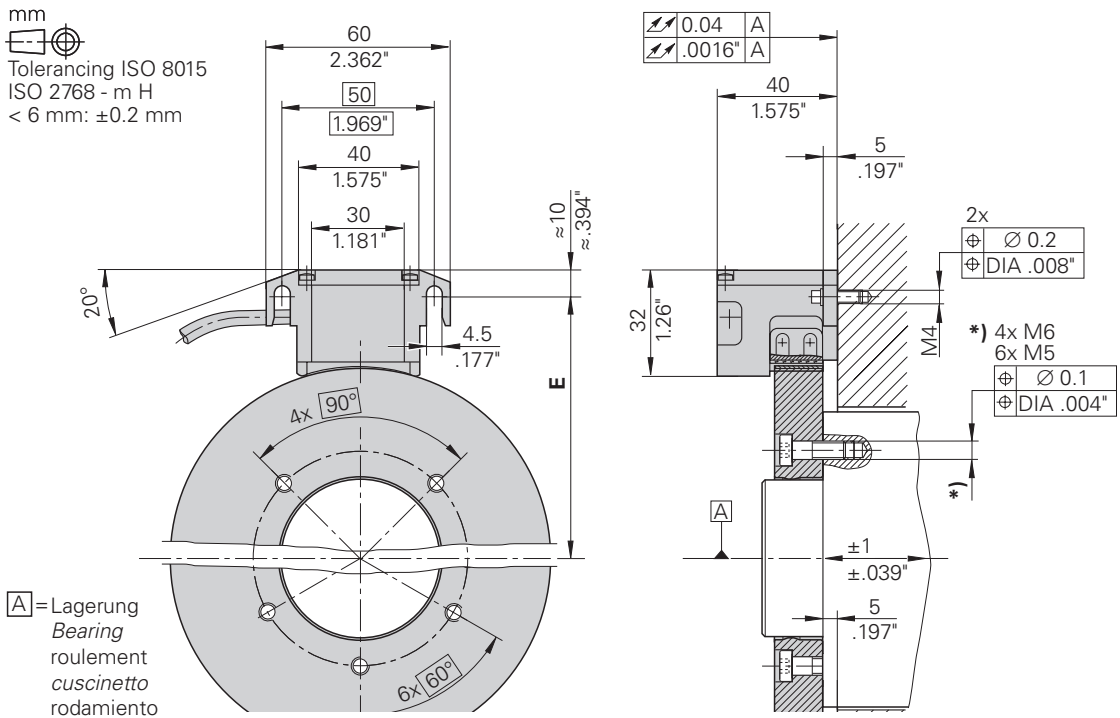




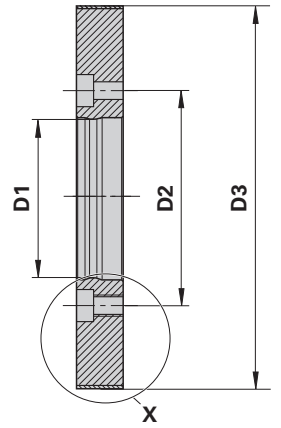
E, D1, D2, D3, D4, G, T

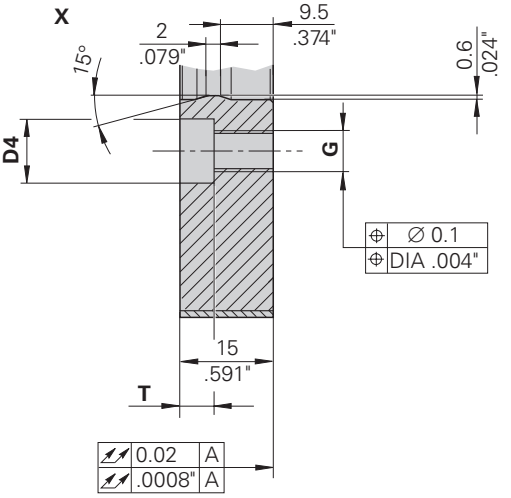
18

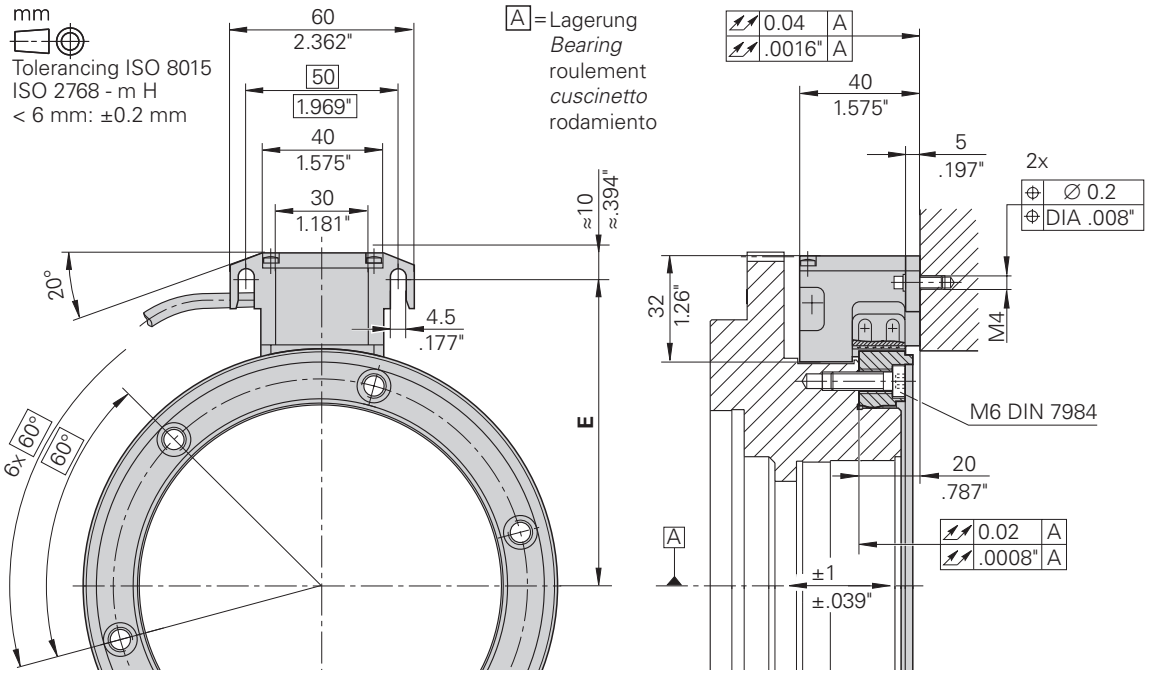
	D1	D2	D3	D4	E	T	G	n ≤
C 01	∅ 118 –0.001/ –0.008 DIA 4.6457 –.00004/ –.0003"	∅ 135 DIA	∅ 154.65 DIA 6.088"	∅ 11 DIA .433"	98 3.858"	6.8 .268"	M8	12 000 min^{-1}
C 02	∅ 118 –0.001/ –0.008 DIA 4.6457 –.00004/ –.0003"	∅ 135 DIA	∅ 150.88 DIA 5.94"	∅ 11 DIA .433"	96 3.78"	6.8 .268"	M8	12 000 min^{-1}
C 03	∅ 80 –0.001/ –0.008 DIA 3.1496 –.00004/ –.0003"	∅ 95 DIA 3.74"	∅ 150.88 DIA 5.94"	∅ 9 DIA .354"	96 3.78"	5.6 .22"	M6	12 000 min^{-1}
C 04	∅ 130 –0.001/ –0.008 DIA 5.1181 –.00004/ –.0003"	∅ 145 DIA 5.709"	∅ 176 DIA 6.929"	∅ 9 DIA .354"	108 4.252"	5.6 .22"	M6	10 000 min^{-1}
C 05	∅ 180 –0.001/ –0.008 DIA 7.0866 –.00004/ –.0003"	∅ 195 DIA 7.48"	∅ 257.5 DIA 10.138"	∅ 9 DIA .354"	149 5.587"	5.6 .22"	M6	8 000 min^{-1}


mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm
60
2.362"
50
1.969"
40
1.575"
30
1.181"
≈10
≈.394"
20°
4.5
.177"
E
4x 90°
6x 60°
A = Lagerung
Bearing
roulement
cuscinetto
rodamiento
0.04 A
.0016" A
40
1.575"
5
.197"
2x
∅ 0.2
DIA .008"
32
1.26"
M4
*) 4x M6
6x M5
∅ 0.1
DIA .004"
*)
A
±1
±.039"
5
.197"

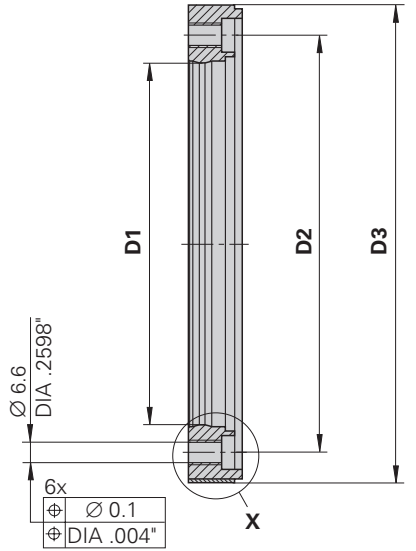
	D1	D2	D3	D4	E	T	G	n ≤
E 01	∅ 54 –0.001/ –0.008 DIA 2.126 –.00004/ –.0003"	∅ 68 DIA 2.677"	∅ 128.75 DIA 5.07"	∅ 11 DIA .433"	85 3.347"	6.8 .268"	4x M8	18 000 min^{-1}
E 02	∅ 120 –0.001/ –0.008 DIA 4.724 –.00004/ –.0003"	∅ 135 DIA 5.315"	∅ 150.88 DIA 5.94"	∅ 10 DIA .394"	96 3.78"	5.4 .216"	6x M6	12 000 min^{-1}
E 03	∅ 220 –0.001/ –0.008 DIA 8.661 –.00004/ –.0003"	∅ 235 DIA 9.252"	∅ 257.50 DIA 10.138"	∅ 10 DIA .394"	149 5.866"	5.4 .216"	6x M6	8 000 min^{-1}

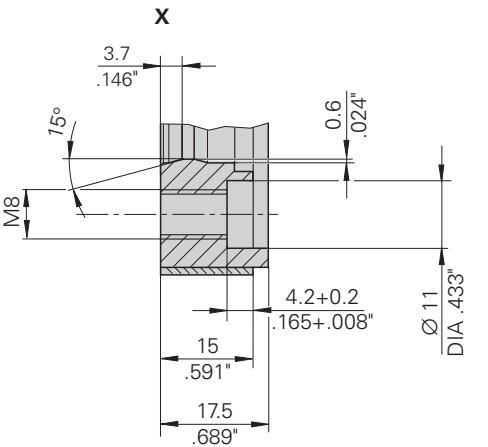


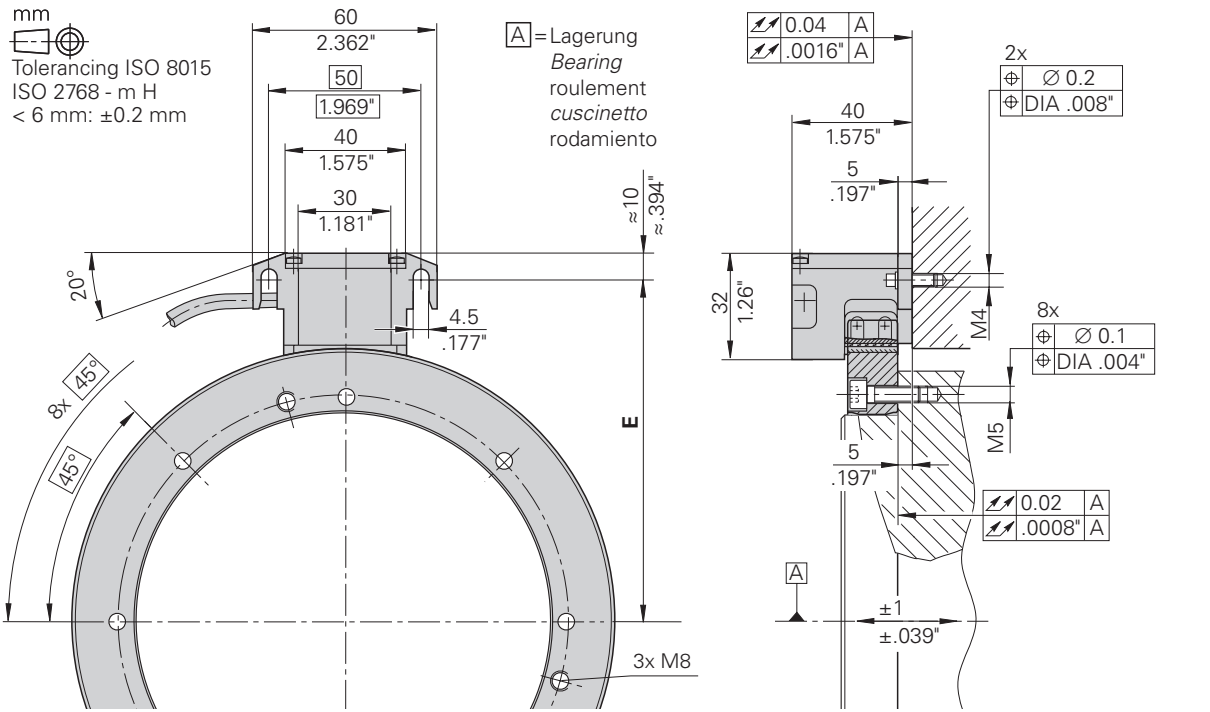



mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm
60
2.362"
50
1.969"
40
1.575"
30
1.181"
20°
≈10
≈.394"
4.5
.177"
E
6x 60°
60°
A = Lagerung
Bearing
roulement
cuscinetto
rodamiento
0.04 A
.0016" A
40
1.575"
5
.197"
2x
∅ 0.2
DIA .008"
32
1.26"
M4
M6 DIN 7984
20
.787"
A
0.02 A
.0008" A
±1
±.039"

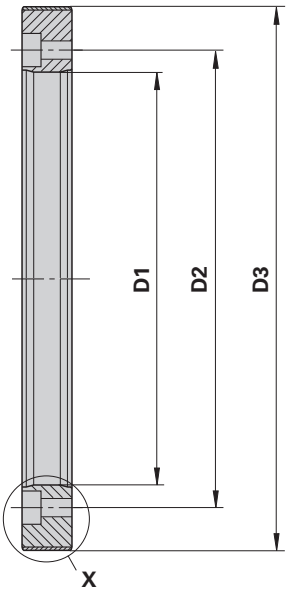
	D1	D2	D3	E	n ≤
F 01	∅ 118 –0.001/ –0.008 DIA 4.6457 –.00004/ –.0003"	∅ 135 DIA 5.315"	∅ 154.65 DIA 6.088"	98 3.858"	12 000 min^{-1}
F 02	∅ 118 –0.001/ –0.008 DIA 4.6457 –.00004/ –.0003"	∅ 135 DIA 5.315"	∅ 150.88 DIA 5.94"	96 3.78"	12 000 min^{-1}

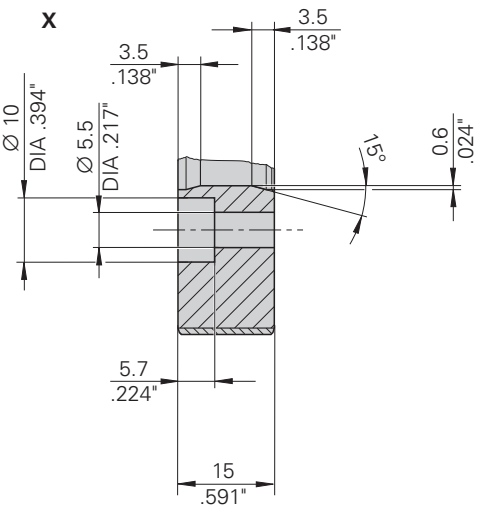


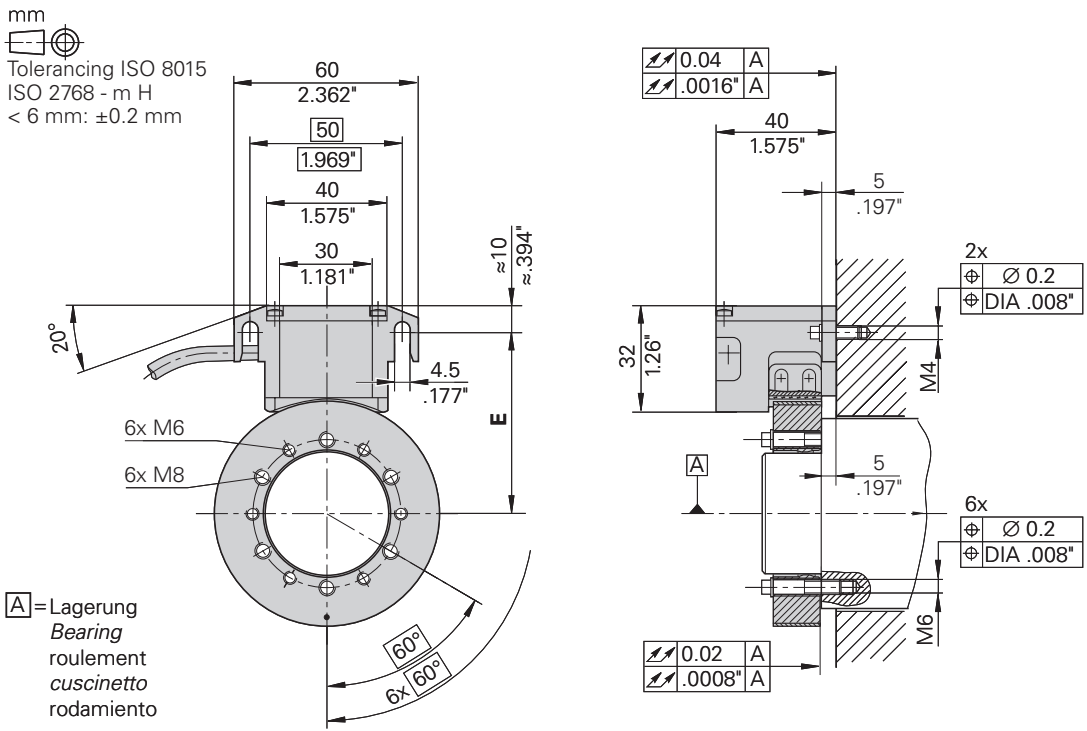



mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm
60
2.362"
50
1.969"
40
1.575"
30
1.181"
A = Lagerung
Bearing
roulement
cuscinetto
rodamiento
≈10
≈.394"
20°
4.5
.177"
8x 45°
45°
E
3x M8
0.04 A
.0016" A
2x
∅ 0.2
DIA .008"
40
1.575"
5
.197"
32
1.26"
M4
8x
∅ 0.1
DIA .004"
M5
5
.197"
0.02 A
.0008" A
A
±1
±.039"

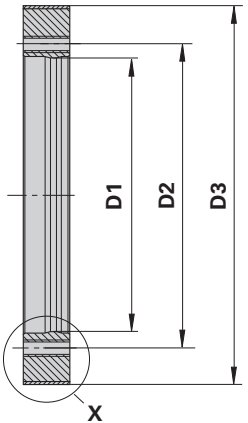
	D1	D2	D3	E	n ≤
L 01	∅ 224 –0.001/ –0.008 DIA 8.819 –.00004/ –.0003"	∅ 236 DIA 9.291"	∅ 270.32 DIA 10.643"	156 6.142"	8 000 min–1

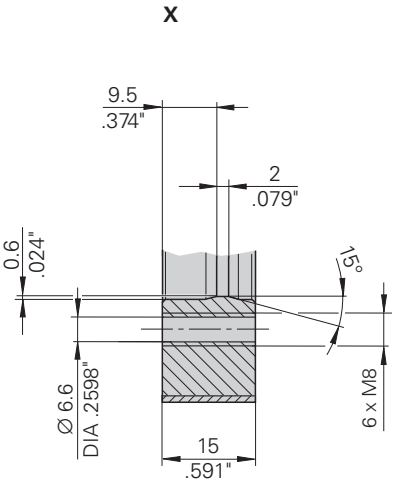


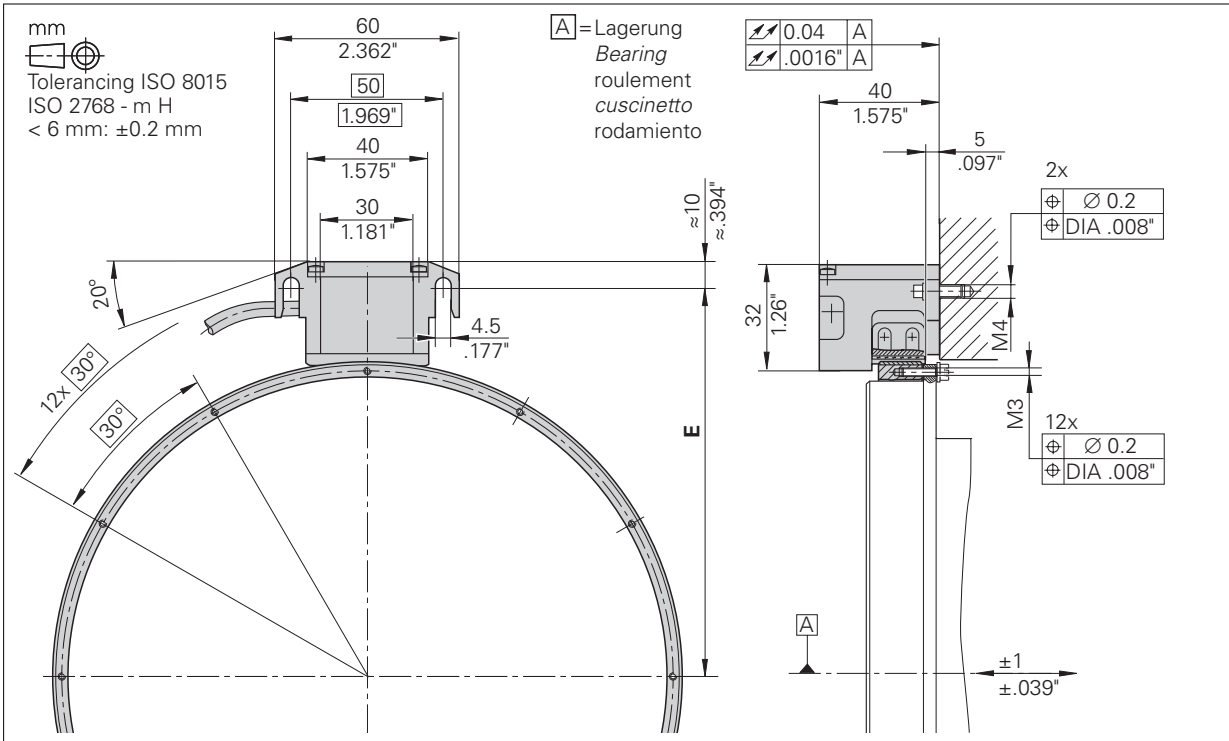



mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm
60
2.362"
50
1.969"
40
1.575"
30
1.181"
≈10
≈.394"
20°
4.5
.177"
E
6x M6
6x M8
60°
6x 60°
A = Lagerung
Bearing
roulement
cuscinetto
rodamiento
0.04 A
.0016" A
40
1.575"
5
.197"
2x
Ø 0.2
DIA .008"
32
1.26"
M4
A
5
.197"
6x
Ø 0.2
DIA .008"
M6
0.02 A
.0008" A

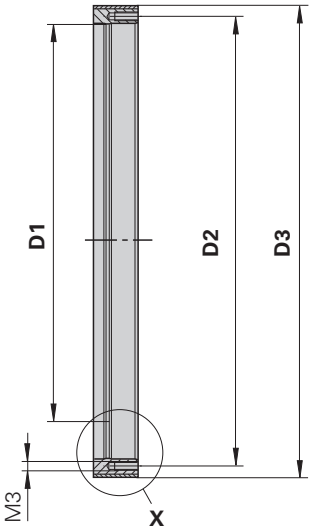
	D1	D2	D3	E	n ≤
M 01	∅ 92 –0.001/ –0.008 DIA 3.622 –.00004/ –.0003"	∅ 105 DIA 4.134"	∅ 128.75 DIA 5.07"	85 3.342"	18 000 min^{-1}

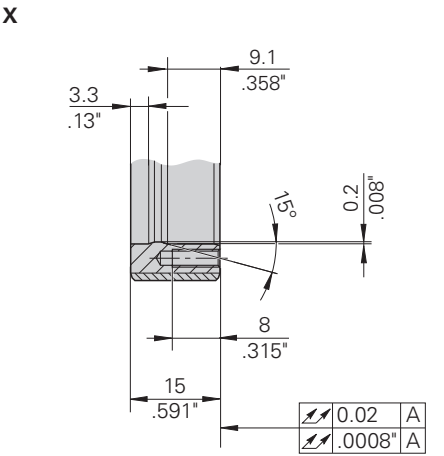





mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm
60
2.362"
50
1.969"
40
1.575"
30
1.181"
A = Lagerung
Bearing
roulement
cuscinetto
rodamiento
0.04 A
.0016" A
40
1.575"
5
.097"
2x
∅ 0.2
DIA .008"
≈10
≈.394"
20°
4.5
.177"
12x 30°
30°
E
32
1.26"
M4
M3
12x
∅ 0.2
DIA .008"
A
±1
±.039"

	D1	D2	D3	E	n ≤
K 01	∅ 245 –0.001/ –0.008 DIA 9.646 –.00004/ –.0003"	∅ 250 DIA 9.843"	∅ 257.5 DIA 10.138"	149 5.866"	8 000 min–1





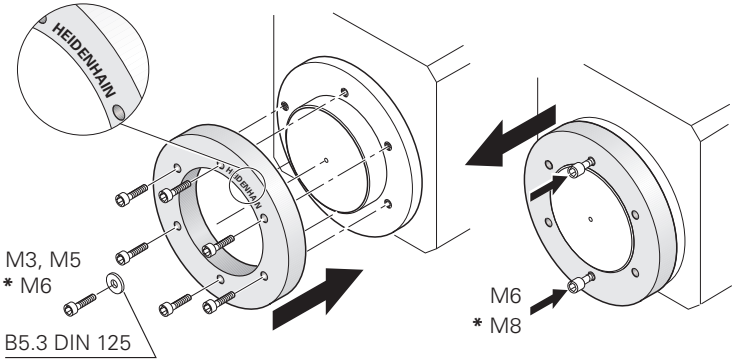
Die Schrauben sind abwechselnd, kreuzweise mit dem Anzugsdrehmoment gemäß Tabelle festzuschrauben und gegen unbeabsichtigtes Lösen zu sichen.

Tighten the screws alternatingly (crosswise) with the tightening torque according to the table below, and secure them against unintentional loosening.

Serrer les vis conformément au tableau, l'une après l'autre, de manière croisée, avec un couple constant et s'assurer qu'elles ne puissent pas être desserrées malencontreusement.

Le viti devono venire serrate alternativamente in modo incrociato con un momento torcente definito secondo tabella, assicurandosi che non possano svitarsi inavvertitamente.

Los tornillos deben ser fijados alternativamente en cruz con un par de apriete segun tabla y asegurados frente a destornillamiento involuntario.



A	M5 = $\mathbf{M_d} \leq$ 6 Nm M6 = $\mathbf{M_d} \leq$ 10.5 Nm
K	M3 = $\mathbf{M_d} \leq$ 1.4 Nm
B,C,L	M5 = $\mathbf{M_d} \leq$ 6 Nm
D	M5 = $\mathbf{M_d} \leq$ 3 Nm
E,M,F	M6 = $\mathbf{M_d} \leq$ 10.5 Nm

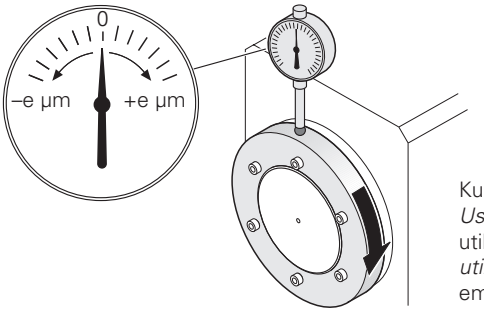
Alternativ kann die Teilungstrommel auf eine Welle geschrumpft werden. **Keine Induktionsheizquelle verwenden!** Dazu die Teilungstrommel vor der Montage langsam über einen Zeitraum von 10 min auf eine Temperatur von max. 100° C (PC CF max. 50° C) erwärmen. Maximale Temperaturdifferenz Heizplatte zur ERM-Teilungstrommel 20 K.

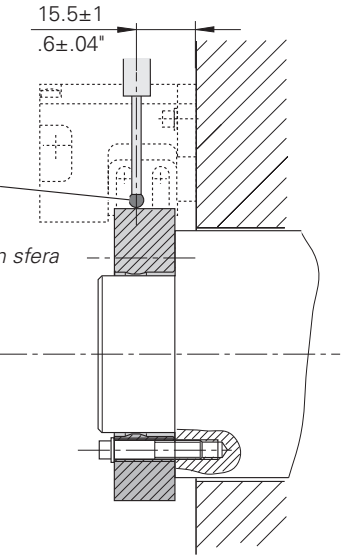
As an alternative, the scale drum can be shrunk onto a shaft. ***Do not use an inductive heat source!*** *Before mounting, slowly warm the scale drum over a period of 10 minutes to a temperature of max. 100 °C (PC CF: max. 50 °C). Max. temperature difference between heating plate and ERM scale drum: 20 K*

En alternative, le tambour gradué peut être rétréci sur un arbre. **Ne pas utiliser de source de chaleur par induction!** Pour cela, avant le montage, réchauffer lentement le tambour gradué pendant une durée de 10 min. à une température de 100 °C max. (PC CF 50 °C max.). Différence de température max. entre la plaque chauffante et le tambour gradué de l'ERM: 20 K.

In alternativa il tamburo graduato può essere montato a caldo su un albero. ***Non utilizzare una fonte di calore a induzione!*** *Prima del montaggio riscaldare lentamente il tamburo, portandolo a 100 °C (PC CF 50 °C) in 10 minuti. Max differenza di temperatura tra piastra di riscaldamento e tamburo dell'ERM: 20 K.*

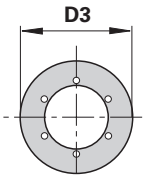
Como alternativa, el tambor graduado puede ser ajustado al eje por contracción. **¡No utilizar ninguna fuente de calor inductiva!** Antes del montaje, calentar lentamente el tambor graduado durante 10 minutos a una temperatura máxima de 100 °C (PC CF máx. 50 °C). Máxima diferencia de temperatura entre la placa de calentamiento y el tambor graduado del ERM: 20 K.



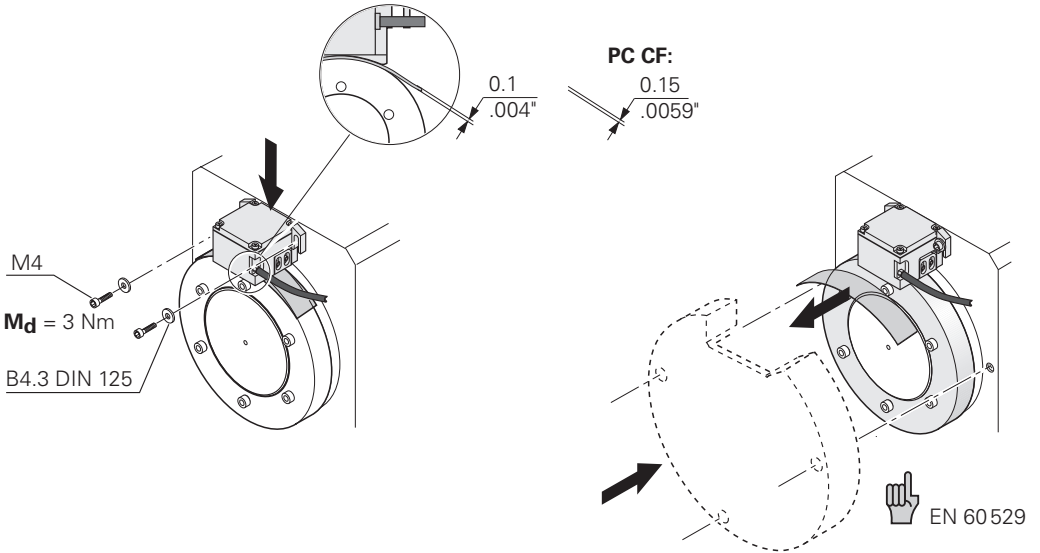


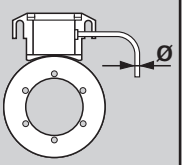
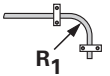
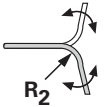
Kugel verwenden
Use a rounded tip
utiliser une bille
utilizzare solo stilo con sfera
emplear bola esférica

$$\Delta\varphi_1 = \pm \frac{412 \cdot e}{\mathbf{D3}}$$

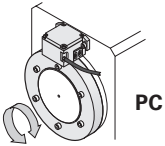


$\Delta\varphi_1$ = Messabweichung in Winkelsekunden durch Exzentrizität
$\Delta\varphi_1$ = *Measuring error in arc seconds due to eccentricity*
$\Delta\varphi_1$ = écart de mesure en secondes d'arc due à l'excentricité
$\Delta\varphi_1$ = *errori di misura in secondi d'arco a causa dell'eccentricità*
$\Delta\varphi_1$ = desviación de la medida en segundos angulares debido a excentricidad


0.1
.004"
PC CF:
0.15
.0059"
M4
M_d = 3 Nm
B4.3 DIN 125
EN 60529

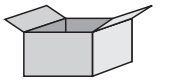
	 $T \geq -40$ °C (–40 °F)	 $T \geq -10$ °C (14 °F)
Ø 4.5 mm DIA .177 in.	$R_1 \geq 10$ mm $R_1 \geq .4$ in.	$R_2 \geq 50$ mm $R_2 \geq 2$ in.
Ø 8 mm DIA .315 in.	$R_1 \geq 40$ mm $R_1 \geq 1.6$ in.	$R_2 \geq 100$ mm $R_2 \geq 4$ in.

°C (°F)

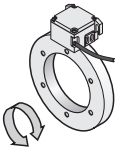


–10 ... 100 °C (14 ... 212 °F)

PC CF: 0 ... 50 °C (32 ... 122 °F)



–20 ... 80 °C (– 4 ... 176 °F)

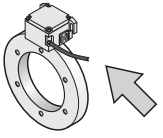


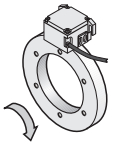
Z = Polpaar-Zahl
Number of pole pairs
paire polaire
numero coppie poli
número de pares de polos

ERM 120/121: $n \leq \frac{300}{Z} \cdot 10^3 \cdot 60\ \text{min}^{-1}$

ERM 180/181: $n \leq \frac{200}{Z} \cdot 10^3 \cdot 60\ \text{min}^{-1}$ (–3dB)

ERM 120/121

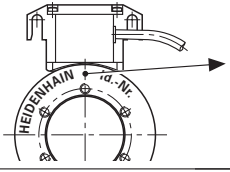


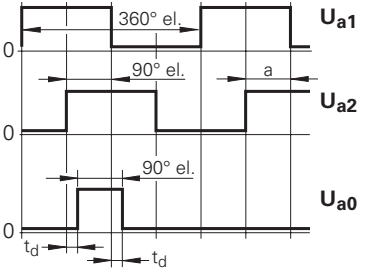


U_{a1}, U_{a2}, U_{a0}
$\overline{U_{a1}}$, $\overline{U_{a2}}$, $\overline{U_{a0}}$, $\overline{U_{aS}}$

U_P = 5 V ± 5%
(max. 150 mA)

EN 50 178/4.98; 5.2.9.5
IEC 364-4-41: 1992; 411(PELV/SELV)
(siehe, *see,* voir, *vedi*, véase
HEIDENHAIN D 231 929)

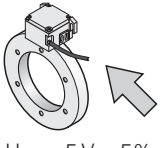


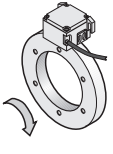


$|t_d| \leq 50$ ns

$a \geq 0.5$ µs

ERM 180/181

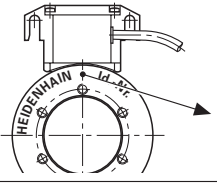


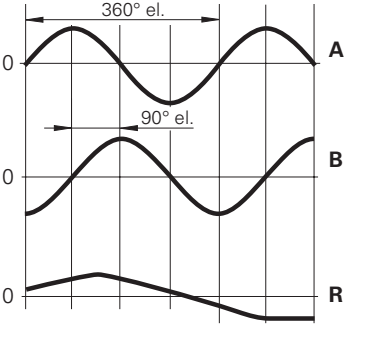


A, B, R

U_P = 5 V ± 5%
(max. 150 mA)

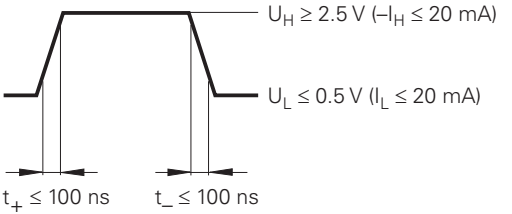
EN 50 178/4.98; 5.2.9.5
IEC 364-4-41: 1992; 411(PELV/SELV)
(siehe, *see,* voir, *vedi*, véase
HEIDENHAIN D 231 929)





ERM 120/121

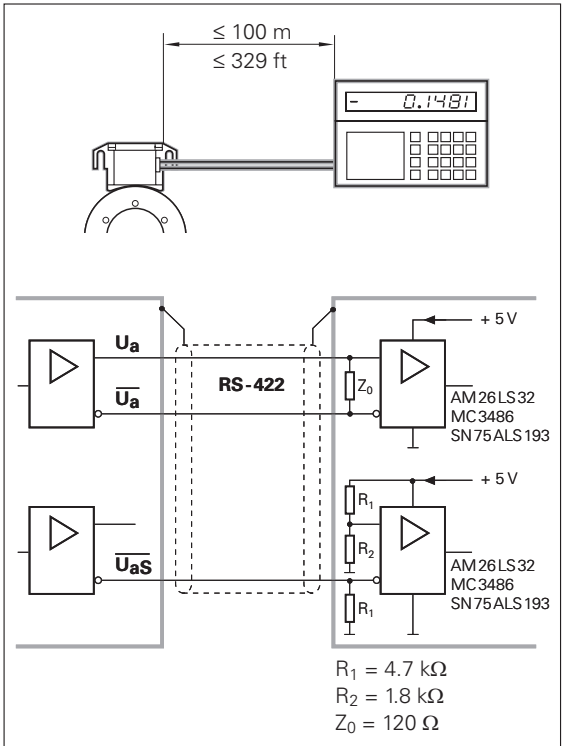
TTL



$\overline{U_{aS}}$: Störungssignal
Fault detection signal
signal de perturbation
segnale di malfunzionamento
señal de avería

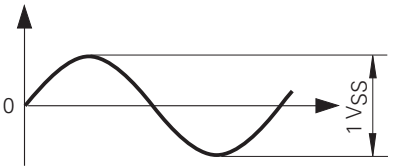
$\overline{U_{aS}}$ = High: ✓

$\overline{U_{aS}}$ = Low: ⚠

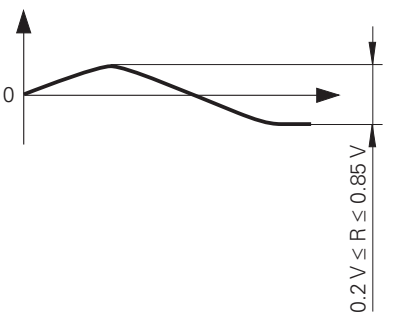


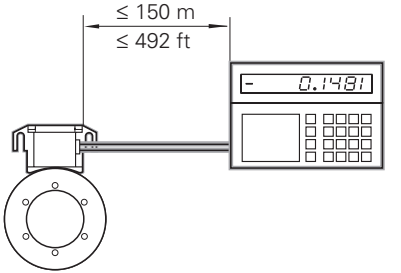
ERM 180/181

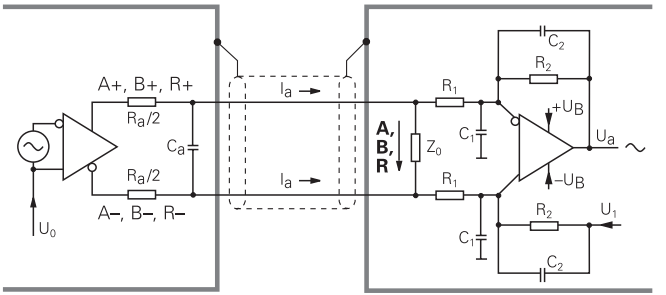
A, B



R







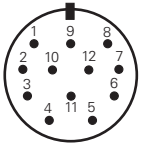
$R_a < 100\ \Omega$
$C_a < 50$ pF
$\Sigma I_a < 1$ mA
$U_0 = 2.5\ V \pm 0.5\ V$

$Z_0 = 120\ \Omega$
$U_1 \approx U_0$

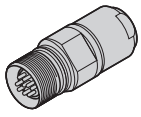
ERM 120/121

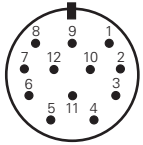
Schirm auf Gehäuse
Shield on housing
blindage sur boîtier
schermo sulla carcassa
blindaje a carcasa

01-03

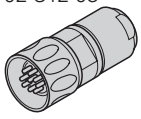


03 S12-03

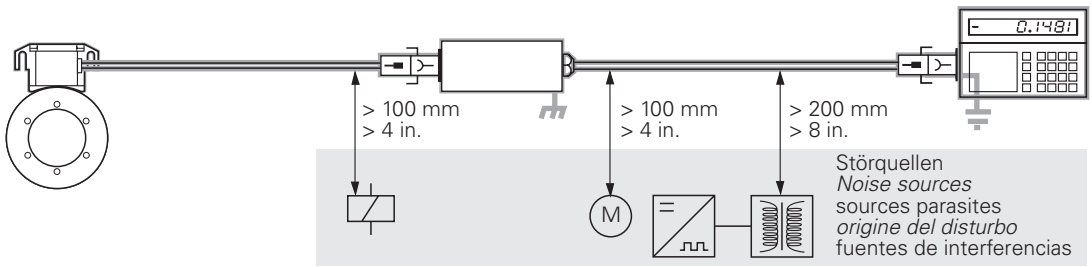


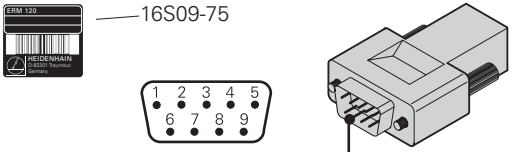


02 S12-03

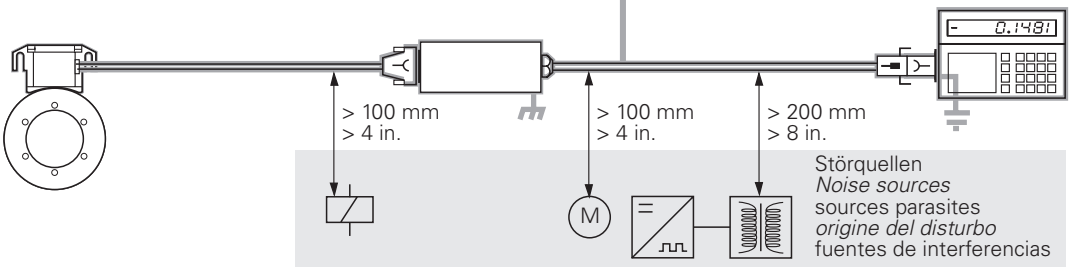


5	6	8	1	3	4	12	10	2	11	7	/	9
U_{a1}	$\overline{U_{a1}}$	U_{a2}	$\overline{U_{a2}}$	U_{a0}	$\overline{U_{a0}}$	5 V U_P	0 V U_N	5 V sensor	0 V sensor	$\overline{U_{aS}}$	/	/
braun *brown* brun *marrone* marrón	grün *green* vert *verde* verde	grau *gray* gris *grigio* gris	rosa *pink* rose *rosa* rosa	rot *red* rouge *rosso* rojo	schwarz *black* noir *nero* negro	braun/grün *brown/green* brun/vert *marrone/verde* marrón/verde	weiß/grün *white/green* blanc/vert *bianco/verde* blanco/verde	blau *blue* bleu *azzurro* azul	weiß *white* blanc *bianco* blanco	violett *violet* violet *viola* violeta	gelb *yellow* jaune *giallo* amarillo	/





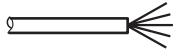
2	3	6	7	8	9		4	5	1
U_{a1}	**$\overline{U_{a1}}$**	**U_{a2}**	**$\overline{U_{a2}}$**	**U_{a0}**	**$\overline{U_{a0}}$**	**Schirm *Shield* blindage *schermo* blindaje**	**5 V U_P**	**0 V U_N**	**0 V sensor**
braun *brown* brun *marrone* marrón	grün *green* vert *verde* verde	grau *gray* gris *grigio* gris	rosa *pink* rose *rosa* rosa	rot *red* rouge *rosso* rojo	schwarz *black* noir *nero* negro		braun/grün *brown/green* brun/vert *marrone/verde* marrón/verde	weiß/grün *white/green* blanc/vert *bianco/verde* blanco/verde	weiß *white* blanc *bianco* blanco

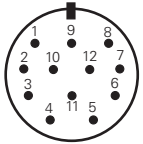


ERM 180/181

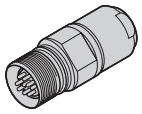
Schirm auf Gehäuse
Shield on housing
blindage sur boîtier
schermo sulla carcassa
blindaje a carcasa

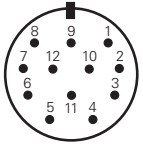
01-03



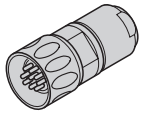


03 S12-03

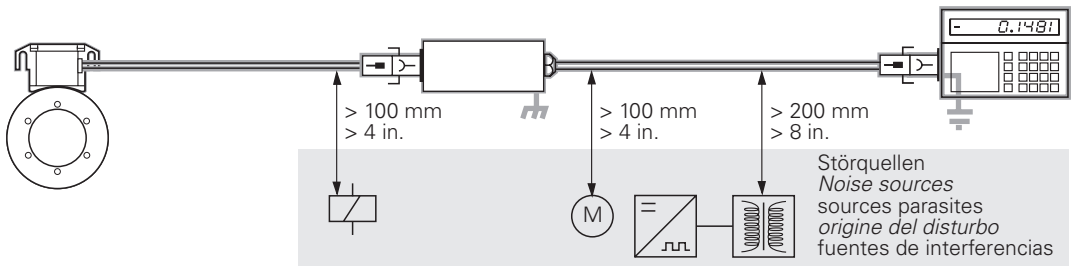


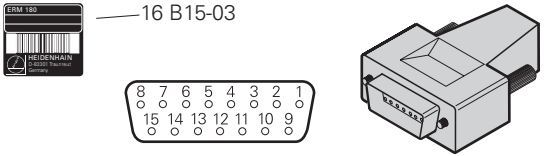


02 S12-03

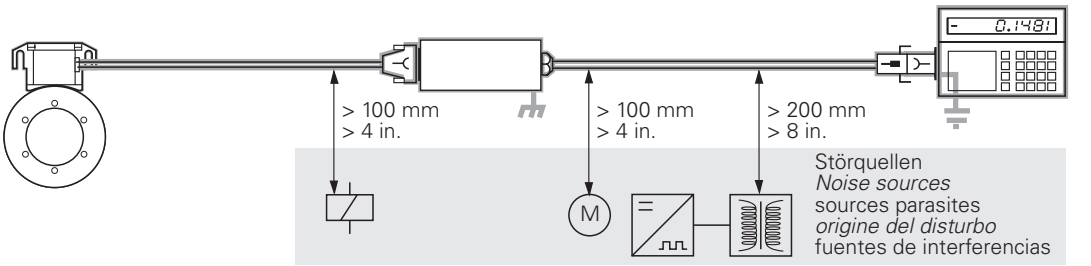


5	6	8	1	3	4	12	10	2	11	9	7	/
A		**B**		**R**		**5 V** U_P	**0 V** U_N	**5 V sensor**	**0 V sensor**	/	/	/
+	–	+	–	+	–							
braun *brown* brun *marrone* marrón	grün *green* vert *verde* verde	grau *gray* gris *grigio* gris	rosa *pink* rose *rosa* rosa	rot *red* rouge *rosso* rojo	schwarz *black* noir *nero* negro	braun/grün *brown/green* brun/vert *marrone/verde* marrón/verde	weiß/grün *white/green* blanc/vert *bianco/verde* blanco/verde	blau *blue* bleu *azzurro* azul	weiß *white* blanc *bianco* blanco	/	violett *violet* violet *viola* violeta	gelb *yellow* jaune *giallo* amarillo

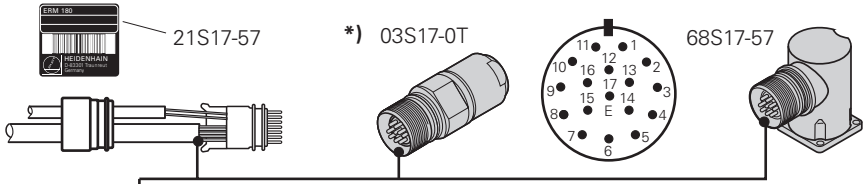




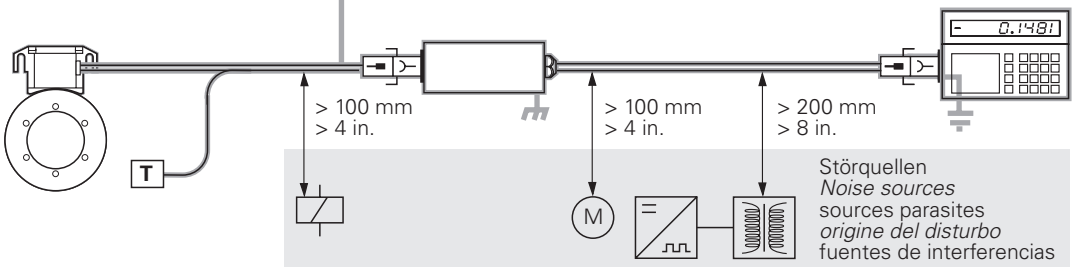
3	4	6	7	10	12	1	2	9	11	14	/
A		**B**		**R**		**5 V** U_P	**0 V** U_N	**5 V sensor**	**0 V sensor**	/	/
+	–	+	–	+	–						
braun *brown* brun *marrone* marrón	grün *green* vert *verde* verde	grau *gray* gris *grigio* gris	rosa *pink* rose *rosa* rosa	rot *red* rouge *rosso* rojo	schwarz *black* noir *nero* negro	braun/grün *brown/green* brun/vert *marrone/verde* marrón/verde	weiß/grün *white/green* blanc/vert *bianco/verde* blanco/verde	blau *blue* bleu *azzurro* azul	weiß *white* blanc *bianco* blanco	violett *violet* violet *viola* violeta	gelb *yellow* jaune *giallo* amarillo



ERM 180/181



7	10		4	5	6	14	15	16
0 V **U_N**	**5 V** **U_P**	**Schirm** ***Shield*** **blindage** ***schermo*** **blindaje**	**/**	**/**	**/**	**/**	**0 V** **sensor**	**5 V** **sensor**
weiß/grün *white/green* blanc/vert *bianco/verde* blanco/verde	braun/grün *brown/green* brun/vert *marrone/verde* marrón/verde						weiß *white* blanc *bianco* blanco	blau *blue* bleu *azzurro* azul



1) Innenschirm Pin 17
Internal shield pin 17
blindage interne pin 17
schermo interno pin 17
blindaje interno pin 17

1	2	11	12	3	13	8	9	17
A		B		R		T		1)
+	–	+	–	+	–	+	–	
grün/schwarz *green/black* vert/noir *verde/nero* verde/negro	gelb/schwarz *yellow/black* jaune/noir *giallo/nero* amarillo/negro	blau/schwarz *blue/black* bleu/noir *azzurro/nero* azul/negro	rot/schwarz *red/black* rouge/noir *rosso/nero* rojo/negro	rot *red* rouge *rosso* rojo	schwarz *black* noir *nero* negro	braun *brown* brun *marrone* marrón	weiß *white* blanc *bianco* blanco	weiß/braun *white/brown* blanc/brun *bianco/marrone* blanco/marrón

*) 8	*) 9	*) 17
/	/	/

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