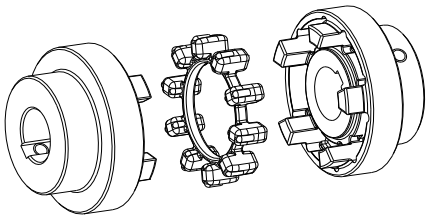
POLY-NORM®

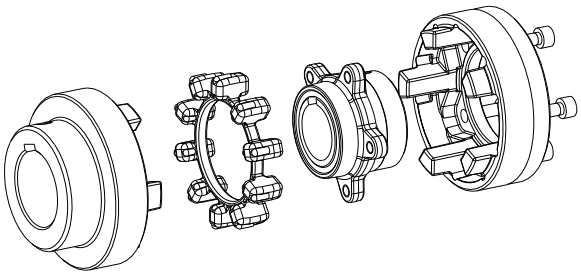
Flexible jaw couplings type

AR, ADR, AVR, AZR,
AR/AZR, AZVR,
AR with taper clamping sleeve
and their combinations

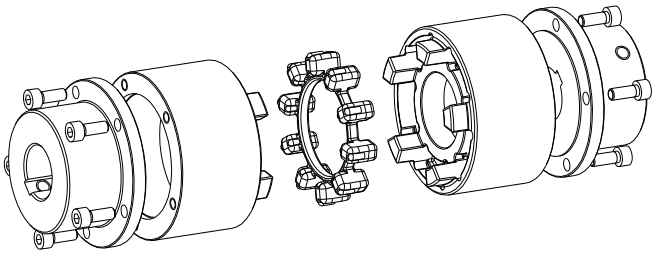
according to directive 2014/34/EU and
UK directive SI 2016 No. 1107



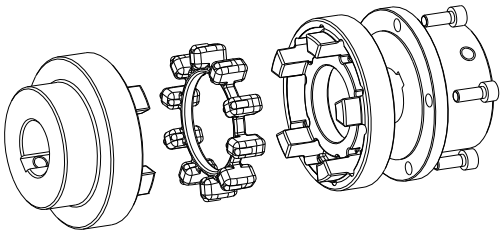
Type AR



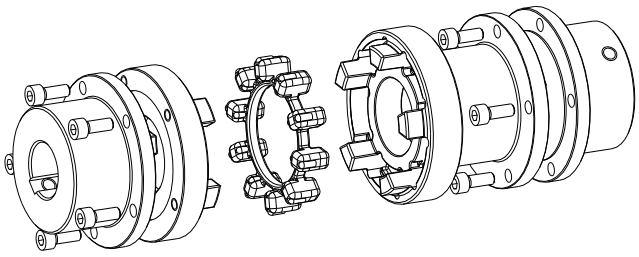
Type ADR, ADR-K and AVR



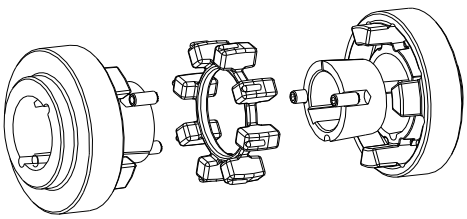
Type AZR and AZR short



Type AR/AZR



Type AZVR



Type AR with taper clamping sleeve

POLY-NORM® is a torsionally flexible jaw coupling. It is able to compensate for shaft misalignment, for example caused by manufacturing inaccuracies, thermal expansion, etc.

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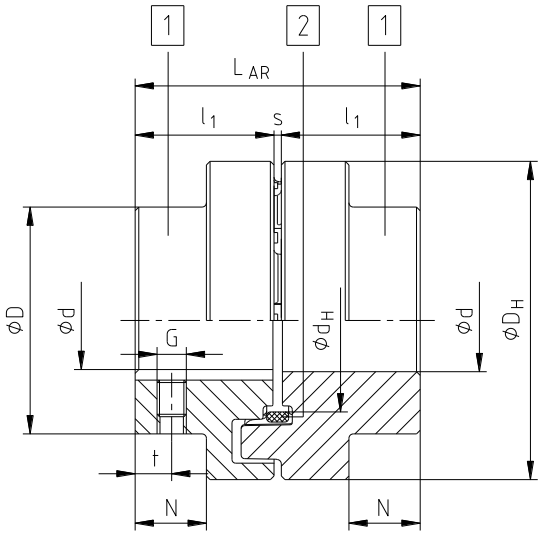
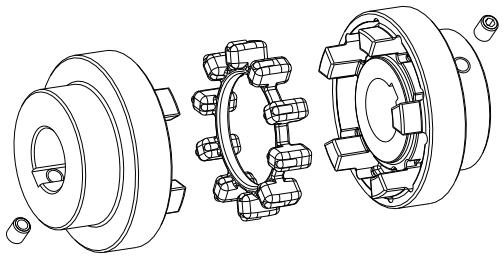


Size 28 to 125



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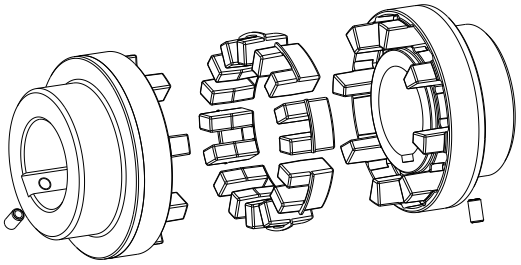


Illustration 1: POLY-NORM® type AR

Table 1: Dimensions and torques - type AR

POLY-NORM® AR Cast iron (EN-GJL-250)													
Size	Elastomer ring [1] (component 2) Torque [Nm]		Dimensions [mm]										Weight [4] [kg]
			Finish bore [2] $d_{max.}$	General							Setscrew [3]		
	T_{KN}	$T_{Kmax.}$		L_{AR}	l_1	s	D_H	D	d_H	N	G	t	
28	40	80	12-30	59	28	3	69	46	36.5	12.0	M5	7	0.77
32	60	120	12-35	68	32	4	78	53	41.5	14.0	M8	7	1.14
38	90	180	19-40	80	38	4	87	62	50.0	19.5	M8	10	1.59
42	150	300	19-45	88	42	4	96	69	55.5	20.0	M8	10	2.17
48	220	440	19-50	101	48	5	106	78	64	24.0	M8	15	3.03
55	300	600	19-60	115	55	5	118	90	73	29.0	M8	14	4.27
60	410	820	19-65	125	60	5	129	97	81	33.0	M8	15	5.32
65	550	1100	19-70	135	65	5	140	105	86	36.0	M10	20	6.86
75	850	1700	32-80	155	75	5	158	123	100	42.5	M10	20	10.25
85	1350	2700	32-90	175	85	5	182	139	116	48.5	M10	25	15.05
90	2000	4000	32-95	185	90	5	200	148	128	49.0	M12	25	19.50
100	2900	5800	42-110	206	100	6	224	165	143	55.0	M12	25	26.98
110	3900	7800	50-120	226	110	6	250	185	158	60.0	M16	30	38.12
125	5500	11000	55-140	256	125	6	280	210	178	70.0	M16	35	54.21
140	7200	14400	65-155	286	140	6	315	235	216	76.5	M20	35	77.28
160	10000	20000	75-175	326	160	6	350	265	246	94.5	M20	45	106.24
180	13400	26800	75-200	366	180	6	400	300	290	111.5	M20	50	155.20
200	19000	38000	85-200	408	200	8	450	335	-	126	M24	50	218.50
220	30000	60000	95-220	448	220	8	500	370	-	140	M24	50	296.10
240	43000	86000	105-240	488	240	8	550	405	-	154	M24	50	390.00
260	55000	110000	115-260	530	260	10	650	440	-	158	M24	60	575.00
280	67000	134000	125-280	570	280	10	700	475	-	172	M24	60	716.00

1) Material Perbunan (NBR) 78 Shore A with size 28 to 180; material T-PUR 84 Shore A with size 200 to 280; with size 140 to 280 use of DZ individual elastomers
2) Bores H7 with keyway to DIN 6885 sheet 1 [JS9] and setscrew on the keyway
3) For tightening torques of setscrews see table 2
4) Weights apply for max. bore diameters with feather keyway according to DIN 6885 sheet 1

Table 2: Setscrew DIN EN ISO 4029

Size	28	32	38	42	48	55	60	65	75	85	90
Dimension G [mm]	M5	M8	M8	M8	M8	M8	M8	M10	M10	M10	M12
Tightening torque T_A [Nm]	2	10	10	10	10	10	10	17	17	17	40

Size	100	110	125	140	160	180	200	220	240	260	280
Dimension G [mm]	M12	M16	M16	M20	M20	M20	M24	M24	M24	M24	M24
Tightening torque T_A [Nm]	40	100	100	140	140	140	240	240	240	240	240

1 Technical data

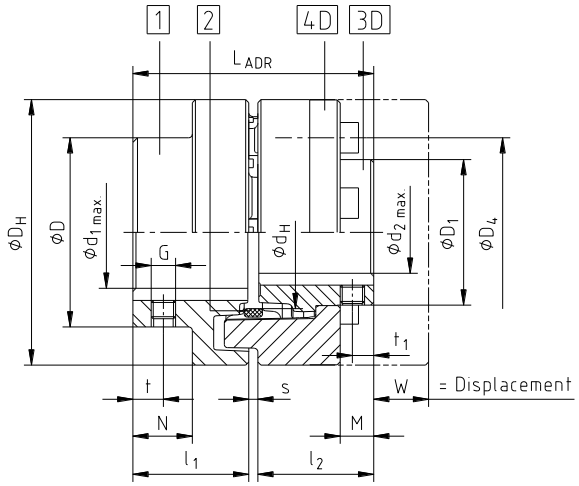


Illustration 2: POLY-NORM® type ADR (three-part)

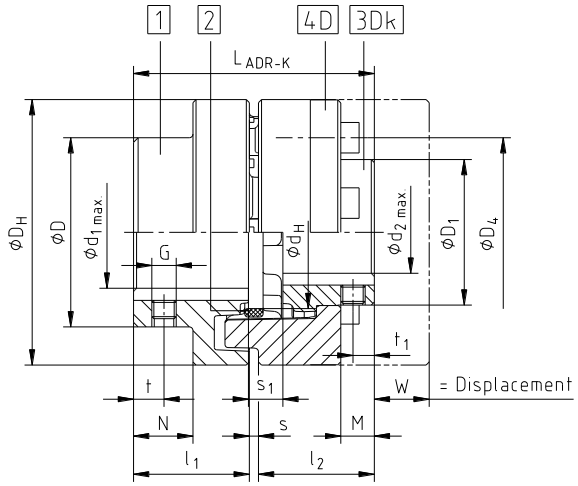


Illustration 3: POLY-NORM® type ADR-K (three-part)

Table 3: Dimensions – type ADR and ADR-K

POLY-NORM® ADR and ADR-K (type AVR corresponding to components 3D and 4D mirrored)
cast iron (EN-GJL-250), component 3D/3Dk flange hub nodular iron (EN-GJS-400-15)

Size	Dimensions [mm]															
	Max. finish bore [1]		General											Setscrew [2]		
	d_1	d_2	L_{ADR}, L_{ADR-K}	l_1, l_2	s	s_1	D_H	D	D_1	d_H	N	M	W	G	t	t_1
38	40	34	80	38	4	12.0	87	62	48	50	19.5	11	12	M8	10	7
42	45	38	88	42	4	14.5	96	69	54	55.5	20.0	12	16	M8	10	7
48	50	44	101	48	5	16.0	106	78	62	64	24.0	13.7	16	M8	15	7
55	60	50	115	55	5	17.0	118	90	72	73	29.0	18.7	15	M8	14	14
60	65	56	125	60	5	18.0	129	97	80	81	33.0	22.2	14	M8	15	15
65	70	60	135	65	5	20.0	140	105	86	86	36.0	26.7	11	M10	20	20
75	80	68	155	75	5	23.5	158	123	98	100	42.5	27.8	16	M10	20	20
85	90	78	175	85	5	27.0	182	139	112	116	48.5	33.7	18	M10	25	25
90	95	85	185	90	5	29.5	200	148	122	128	49.0	31.5	26	M12	25	25
100	110	95	206	100	6	33.0	224	165	136	143	55.0	37.5	28	M12	25	25
110	50-120	105	226	110	6	36.0	250	185	150	158	60.0	39.5	30	M16	30	30
125	55-140	115	256	125	6	39.0	280	210	168	178	70.0	48.0	35	M16	35	35
140	65-155	55-135	286	140	6	-	315	235	195	216	76.5	47.0	59	M20	35	35
160	75-175	65-155	326	160	6	-	350	265	225	246	94.5	65.0	43	M20	45	45
180	75-200	65-175	366	180	6	-	400	300	255	290	111.5	79.0	33	M20	50	50
200	85-200	73-200	408	200	8	-	450	335	290	-	126	95	7	M24	50	50
220	95-220	83-220	448	220	8	-	500	370	320	-	140	103	8	M24	50	50
240	105-240	93-240	488	240	8	-	550	405	350	-	154	119	1	M24	50	50
260	115-260	103-260	530	260	10	-	650	440	380	-	158	109	34	M24	60	60
280	125-280	113-280	570	280	10	-	700	475	410	-	172	109	29	M24	60	60

Table 4: Torques and weights - type ADR and ADR-K

Size		38	42	48	55	60	65	75	85	90	100
Elastomer ring [3] (component 2) Torque [Nm]	T_{KN}	90	150	220	300	410	550	850	1350	2000	2900
	$T_{Kmax.}$	180	300	440	600	820	1100	1700	2700	4000	5800
Weight [4] [kg]	ADR	1.75	2.34	3.23	4.41	5.43	7.10	10.50	15.29	20.06	27.83
	ADR-K	1.70	2.26	3.12	4.24	5.24	6.67	10.01	14.44	19.02	26.28

Size		110	125	140	160	180	200	220	240	260	280
Elastomer ring [3] (component 2) Torque [Nm]	T_{KN}	3900	5500	7200	10000	13400	19000	30000	43000	55000	67000
	$T_{Kmax.}$	7800	11000	14400	20000	26800	38000	60000	86000	110000	134000
Weight [4] [kg]	ADR	38.95	55.67	80.30	108.00	155.00	215	294	380	593	728
	ADR-K	37.31	53.26	77.90	104.70	150.30	207	280	-	-	-

1) Bores H7 with keyway to DIN 6885 sheet 1 [JS9] and setscrew on the keyway
2) For tightening torques of setscrews see table 2
3) Material Perbunan (NBR) 78 Shore A with size 28 to 180; material T-PUR 84 Shore A with size 200 to 280; with size 140 to 280 use of DZ individual elastomers
4) Weights apply for max. bore diameters with feather keyway according to DIN 6885 sheet 1

1 Technical data

Type ADR and ADR-K:

Table 5: Assignment of cap screws DIN EN ISO 4762 - 12.9

Size	38	42	48	55	60	65	75	85	90	100
Screw size M	M6	M8	M8	M8	M8	M10	M10	M12	M16	M16
Screw length l	16	16	20	20	20	20	25	25	30	30
Number z [5)]	5	5	6	6	6	6	6	6	6	6
Dimension D_4	62	69	78	88	98	104	120	138	149	163
Tightening torque T_A [Nm]	10	25	25	25	25	49	49	86	210	210

Size	110	125	140	160	180	200	220	240	260	280
Screw size M	M16	M20	M20	M20	M20	M20	M24	M27	M30	M30
Screw length l	40	40	50	55	60	60	70	70	90	90
Number z [5)]	8	8	8	9	10	10	10	10	10	10
Dimension D_4	183	202	237	267	304	342	378	416	480	520
Tightening torque T_A [Nm]	210	410	410	410	410	580	1000	1500	2000	2000

5) per flange hub

1 Technical data

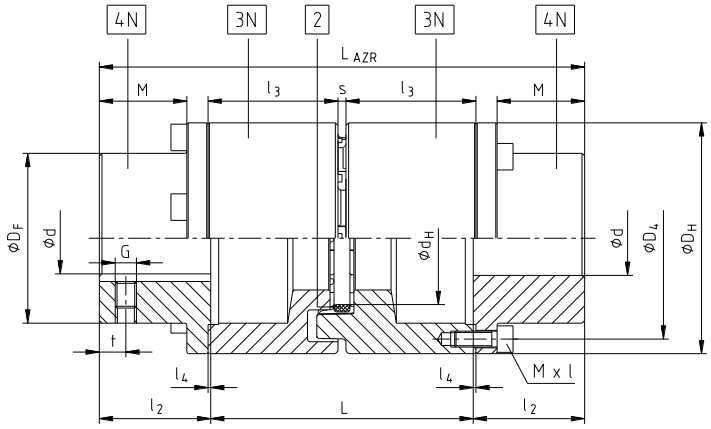


Illustration 4:
POLY-NORM® type AZR

Table 6: Dimensions and torques - type AZR

POLY-NORM® AZR cast iron (EN-GJL-250), component 4N steel (S355J2)																
Size	Drop-out center length L [mm]	Elastomer ring [1] (component 2) Torque [Nm]		Dimensions [mm]												Weight [4] [kg]
				Finish bore [2]	General									Setscrew [3]		
		T_{KN}	$T_{Kmax.}$	$d_{max.}$	L_{AZR}	l_2	l_3	s	l_4	D_H	D_F	d_H	M	G	t	
28	100	40	80	34	170	35	49.5	3	1	69	46	36.5	26	M5	7	2.33
	140				210		69.5									2.91
32	100	60	120	38	170	35	49	4	1	78	53	41.5	26	M8	7	2.86
	140				210		69									3.50
38	100	90	180	45	184	42	49	4	1	87	62	50	33	M8	10	3.78
	140				224		69									4.57
42	100	150	300	50	190	45	49	4	1	96	69	55.5	35	M8	10	4.56
	140				230		69									5.41
48	100	220	440	55	204	52	49	5	1.5	106	78	64	41.5	M8	15	6.03
	140				244		69									6.98
55	100	300	600	65	210	55	49	5	1.5	118	88	73	43.5	M8	14	7.81
	140				250		69									9.21
	180				290		89									10.57
60	100	410	820	70	220	60	49	5	1.5	129	97	81	47.5	M8	15	9.49
	140				260		69									11.05
	180				300		89									12.61
65	100	550	1100	75	230	65	49	5	1.5	140	105	86	51.5	M10	20	11.85
	140				270		69									13.61
	180				310		89									15.37
75	140	850	1700	90	290	75	69	5	1.5	158	123	100	60.5	M10	20	19.71
	180				330		89									22.15
	250				400		124									26.18
85	140	1350	2700	100	310	85	69	5	1.5	182	139	116	69.5	M10	25	27.57
	180				350		89									30.65
	250				420		124									36.22
90	140	2000	4000	110	320	90	69	5	1.5	200	148	128	73.5	M12	25	32.00
	180				360		89									35.35
	250				430		124									41.22
100	140	2900	5800	120	340	100	69	6	2	224	165	143	83	M12	25	42.31
	180				380		89									46.44
	250				450		124									53.67

Table 7: Assignment of cap screws DIN EN ISO 4762 - 12.9

Size	28	32	38	42	48	55	60	65	75	85	90	100
Screw size M	M6	M6	M6	M6	M6	M8	M8	M8	M10	M10	M12	M12
Screw length l	18	18	20	20	20	25	25	25	30	30	35	35
Dimension D_4	58	67	76	85	95	103	114	124	141	160	180	200
Number z [5]	4	4	5	5	6	6	6	6	6	6	6	6
Tightening torque T_A [Nm]	14	14	14	14	14	35	35	35	69	69	120	120

1) Material Perbunan (NBR) 78 Shore A
2) Bores H7 with keyway to DIN 6885 sheet 1 [JS9] and setscrew on the keyway
3) For tightening torques of setscrews see table 2
4) Weights apply for max. bore diameters with feather keyway according to DIN 6885 sheet 1
5) Per flange connection

1 Technical data

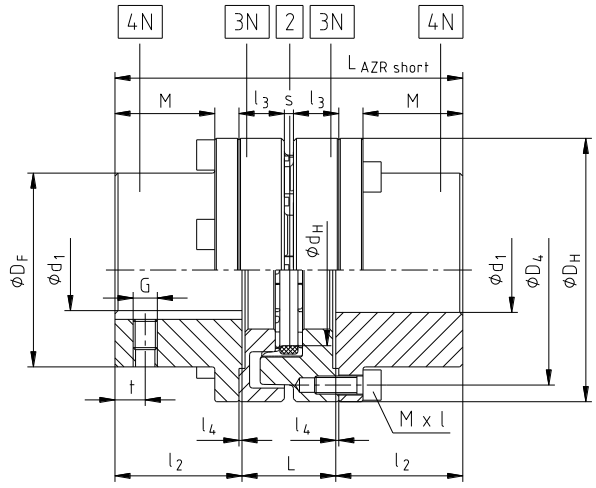


Illustration 5: POLY-NORM® type AZR short

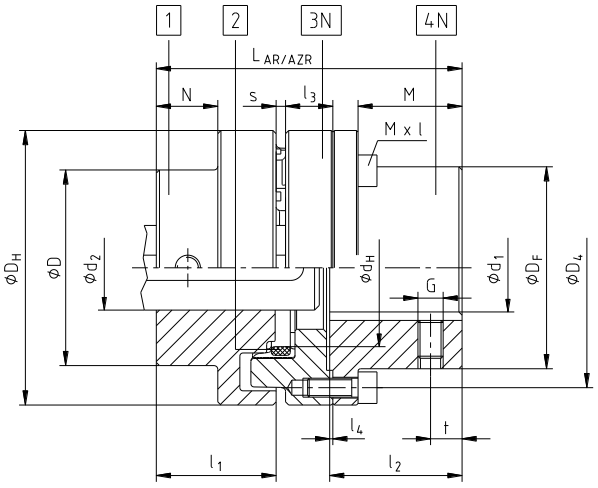


Illustration 6: POLY-NORM® type AR/AZR

Table 8: Dimensions - type AZR short and AR/AZR

POLY-NORM® AZR short and AR/AZR cast iron (EN-GJL-250), component 4N steel (S355J2)														
Size	Dimensions [mm]													
	General												Setscrew [1]	
	$L_{AZR\ short}$	$L_{AR/AZR}$	l_1	l_2	l_3	s	l_4	L	D_H	D, D_F	d_H	N	M	G	t
28	101	80	28	35	15	3	1	31	69	46	36.5	12	26	M5	7
32	102	85	32	35	15	4	1	32	78	53	41.5	14	26	M8	7
38	116	98	38	42	15	4	1	32	87	62	50	19.5	33	M8	10
42	128	108	42	45	18	4	1	38	96	69	55.5	20	35	M8	10
48	144	122.5	48	52	19	5	1.5	40	106	78	64	24	41.5	M8	15
55	154	134.5	55	55	21	5	1.5	44	118	90/88	73	29	43.5	M8	14
60	166	145.5	60	60	22	5	1.5	46	129	97	81	33	47.5	M8	15
65	180	157.5	65	65	24	5	1.5	50	140	105	86	36	51.5	M10	20
75	206	108.5	75	75	27	5	1.5	56	158	123	100	42.5	60.5	M10	20
85	234	204.5	85	85	31	5	1.5	64	182	139	116	48.5	69.5	M10	25
90	252	218.5	90	90	35	5	1.5	72	200	148	128	49	73.5	M12	25
100	280	243	100	100	39	6	2	80	224	165	143	55	83	M12	25

Table 9: Torques and finish bores - type AZR short and AR/AZR

Size		28	32	38	42	48	55	60	65	75	85	90	100
Elastomer ring [2] (component 2) Torque [Nm]	T_{KN}	40	60	90	150	220	300	410	550	850	1350	2000	2900
	$T_{Kmax.}$	80	120	180	300	440	600	820	1100	1700	2700	4000	5800
Max. finish bore [3] [mm]	d_1	30	35	40	45	50	60	65	70	80	90	100	110
	d_2	30	35	40	45	50	60	65	70	80	90	95	110
Weight [4] [kg]	AZR short	1.24	1.57	2.20	2.98	4.07	5.18	6.76	8.11	11.34	20.06	24.43	34.16
	AR/AZR	1.01	1.35	1.89	2.57	3.55	4.72	6.04	7.48	10.79	17.54	21.94	30.56

Table 10: Assignment of cap screws DIN EN ISO 4762 - 12.9

Size	28	32	38	42	48	55	60	65	75	85	90	100
Screw size M	M6	M6	M6	M6	M6	M8	M8	M8	M10	M10	M12	M12
Screw length l	16	16	16	20	20	25	25	25	30	30	35	35
Dimension D_4	58	67	76	85	95	103	114	124	141	160	180	200
Number z [5]	4	4	5	5	6	6	6	6	6	6	6	6
Tightening torque T_A [Nm]	14	14	14	14	14	35	35	35	69	69	120	120

1) For tightening torques of setscrews see table 2
2) Material Perbunan (NBR) 78 Shore A
3) Bores H7 with keyway to DIN 6885 sheet 1 [JS9] and setscrew on the keyway
4) Weights apply for max. bore diameters with feather keyway according to DIN 6885 sheet 1
5) Per flange connection

1 Technical data

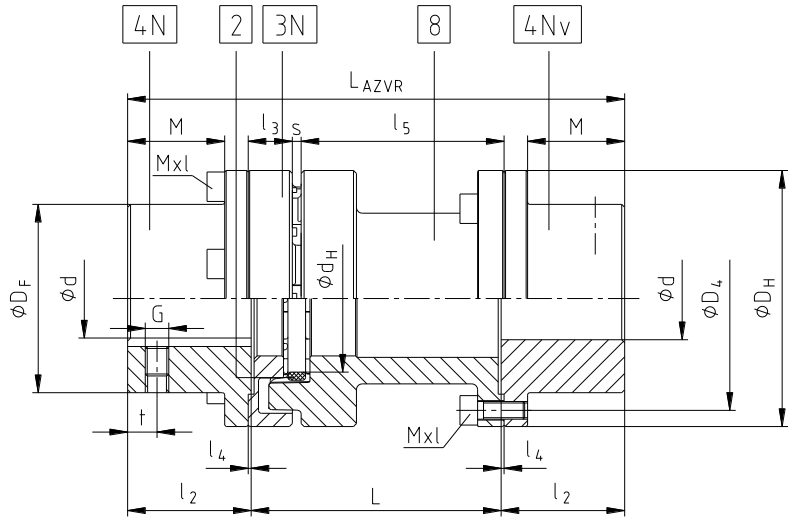


Illustration 7: POLY-NORM® type AZVR

Table 11: Dimensions - type AZVR

POLY-NORM® AZVR cast iron (EN-GJL-250), component 4N and 4Nv steel (S355J2)														
Size	Dimensions [mm]													Weight [2] [kg]
	General											Setscrew [1]		
	L_{AZVR}	l_2	l_3	s	l_4	l_5	L	D_H	D_F	d_H	M	G	t	
38	224	42	69	4	1	69	140	87	62	50	33	M8	10	4.33
42	230	45	69	4	1	69	140	96	69	55.5	35	M8	10	5.25
48	244	52	69	5	1.5	69	140	106	78	64	41.5	M8	15	6.83
55	250	55	49	5	1.5	89	140	118	88	73	43.5	M8	14	8.59
	290		89				180							9.97
60	260	60	49	5	1.5	89	140	129	97	81	47.5	M8	15	10.66
	300		89				180							12.22
65	270	65	49	5	1.5	89	140	140	105	86	51.5	M10	20	12.74
	310		89				180							14.50
75	330	75	89	5	1.5	89	180	158	123	100	60.5	M10	20	21.34
	450		209				300							28.58
85	350	85	89	5	1.5	89	180	182	139	116	69.5	M10	25	29.91
	470		209				300							39.25

Table 12: Torques and finish bores - type AZVR

Size		38	42	48	55	60	65	75	85
Elastomer ring [3] (component 2) Torque [Nm]	T_{KN}	90	150	220	300	410	550	850	1350
	$T_{Kmax.}$	180	300	440	600	820	1100	1700	2700
Finish bore [4] [mm]	$d_{max.}$	40	45	50	60	65	70	80	90

Table 13: Assignment of cap screws DIN EN ISO 4762 - 12.9

Size	38	42	48	55	60	65	75	85
Screw size M	M6	M6	M6	M8	M8	M8	M10	M10
Screw length l	20	20	20	25	25	25	30	30
Dimension D_4	76	85	95	103	114	124	141	160
Number z [5]	5	5	6	6	6	6	6	6
Tightening torque T_A [Nm]	14	14	14	35	35	35	69	69

1) For tightening torques of setscrews see table 2
2) Weights apply for max. bore diameters with feather keyway according to DIN 6885 sheet 1
3) Material Perbunan (NBR) 78 Shore A
4) Bores H7 with keyway to DIN 6885 sheet 1 [JS9] and setscrew on the keyway
5) Per flange connection

1 Technical data

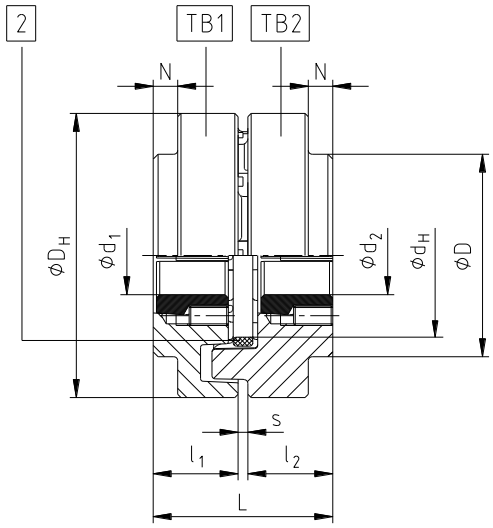


Illustration 8: POLY-NORM® type with taper clamping sleeve

Table 14: Dimensions - type with taper clamping sleeve

POLY-NORM® with taper clamping sleeve hub TB1 and TB2 cast iron (EN-GJL-250)													
Size	Elastomer ring [1] (component 2) Torque [Nm]		Speed $n_{max.}$ [rpm]	Finish bore [2] d_1, d_2		Dimensions [mm] General						Taper clamping sleeve	Weight [3] [kg]
	T_{KN}	$T_{Kmax.}$		Min.	Max.	l_1, l_2	s	L	D	D_H	N		
32	60	120	7300	10	25	25.5	4	55	53	78	7.5	1108	1.05
42	150	300	6000	11	32	31.0	4	66	69	96	9.0	1210	1.98
48	220	440	5400	14	40	30.0	5	65	78	106	6.0	1610	2.35
						42.5		90			18.5	1615	2.96
60	410	820	4400	14	50	38.5	5	80	97	129	10.5	2012	4.16
65	550	1100	4100	16	60	62.5	5	130	105	140	-	2517	9.13
75	850	1700	3600	16	60	52.5	5	110	123	158	20.0	2517	8.54
85	1350	2700	3150	16	60	46.5	5	98	139	132	10.0	2517	11.60
				35	75	82.0		169		182		3030	14.81
90	2000	4000	2900	25	75	52.0	5	109	148	200	11.0	3020	14.88
100	2900	5800	2600	35	90	98.0	6	202	165	224	53.0	3535	27.41
125	5500	11000	2050	40	100	111.5	6	229	210	280	56.5	4040	48.70

1) Material Perbunan (NBR) 78 Shore A
2) Bores H7 with keyway to DIN 6885 sheet 1 [JS9]
3) Weights apply for max. bore diameters with feather keyway according to DIN 6885 sheet 1

POLY-NORM® couplings with attachments that can generate heat, sparks and static charging (e. g. combinations with brake drums, brake disks, overload systems such as torque limiters, fan impellers etc.) are <u>not</u> permitted for the use in potentially explosive atmospheres.
A separate analysis must be performed.

2 Advice

2.1 General advice

Please read through these operating/assembly instructions carefully before you start up the coupling.
Please pay special attention to the safety instructions!

The **POLY-NORM®** coupling is suitable and approved for the use in potentially explosive atmospheres. When using the coupling in potentially explosive atmospheres, observe the special advice and instructions regarding safety in enclosure A.

The operating/assembly instructions are part of your product. Please store them carefully and close to the coupling. The copyright for these operating/assembly instructions remains with KTR.

2 Advice

2.2 Safety and advice symbols

	**Warning of potentially explosive atmospheres**	This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death caused by explosion.
	**Warning of personal injury**	This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death.
	**Warning of product damages**	This symbol indicates notes which may contribute to preventing material or machine damage.
	**General advice**	This symbol indicates notes which may contribute to preventing adverse results or conditions.
	**Warning of hot surfaces**	This symbol indicates notes which may contribute to preventing burns with hot surfaces resulting in light to serious bodily injuries.

2.3 General hazard warnings

With assembly, operation and maintenance of the coupling it has to be made sure that the entire drive train is secured against accidental switch-on. You may be seriously hurt by rotating parts. Make absolutely sure to read through and observe the following safety indications.

- All operations on and with the coupling have to be performed taking into account "safety first".
- Make sure to switch off the power pack before you perform your work on the coupling.
- Secure the power pack against accidental switch-on, e. g. by providing warning signs at the place of switch-on or removing the fuse for current supply.
- Do not reach into the operating area of the coupling as long as it is in operation.
- Secure the coupling against accidental contact. Provide for the necessary protection devices and covers.

2.4 Proper use

You may only assemble, operate and maintain the coupling if you

- have carefully read through the operating/assembly instructions and understood them
- are technically qualified and specifically trained (e. g. safety, environment, logistics)
- are authorized by your company

The coupling may only be used in accordance with the technical data (see chapter 1). Unauthorized modifications on the coupling design are not admissible. We will not assume liability for any damage that may arise. In the interest of further development we reserve the right for technical modifications.
The **POLY-NORM®** described in here corresponds to the state of the art at the time of printing of these operating/assembly instructions.

2 Advice

2.5 Coupling selection

For a permanent and failure-free operation of the coupling it must be selected according to the selection instructions (according to DIN 740 part 2) for the particular application (see catalogue drive technology "POLY-NORM®").
If the operating conditions (performance, speed, modifications on engine and machine) change, the coupling selection must be reviewed.
Make sure that the technical data regarding torque refer to the elastomer part only. The transmittable torque of the shaft-hub-connection must be reviewed by the customer and is subject to his responsibility.

For drives subject to torsional vibrations (drives with cyclic stress due to torsional vibrations) it is necessary to perform a torsional vibration calculation to ensure a reliable selection. Typical drives subject to torsional vibrations are e. g. drives with diesel engines, piston pumps, piston compressors etc. If requested, KTR will perform the coupling selection and the torsional vibration calculation.

2.6 Reference to EC Machinery Directive 2006/42/EC

The couplings supplied by KTR should be considered as components, not machines or partly completed machines according to EC Machinery Directive 2006/42/EC. Consequently KTR does not have to issue a declaration of incorporation. For details about safe assembly, start-up and safe operation refer to the present operating/assembly instructions considering the warnings.

3 Storage, transport and packaging

3.1 Storage

The coupling hubs are supplied in preserved condition and can be stored in a dry and roofed place for 6 - 9 months.
The features of the elastomer rings/DZ individual elastomers remain unchanged for up to 5 years with favourable storage conditions.

The storage rooms must not include any ozone-generating devices like e. g. fluorescent light sources, mercury-vapour lamps or electrical high-voltage appliances.
Humid storage rooms are not suitable.
Make sure that condensation is not generated. The best relative air humidity is less than 65 %.

3.2 Transport and packaging

In order to avoid any injuries and any kind of damage always make use of proper transport and lifting equipment.

The couplings are packed differently each depending on size, number and kind of transport. Unless otherwise contractually agreed, packaging will follow the in-house packaging specifications of KTR.

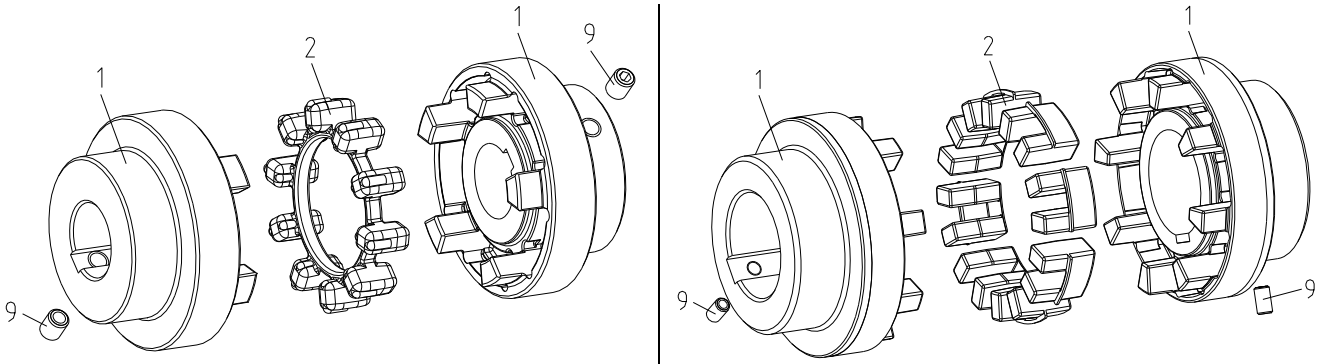
4 Assembly

The coupling is generally supplied in individual parts. Before assembly the coupling has to be inspected for completeness.

4.1 Components of the coupling

Components of POLY-NORM® type AR

Component	Quantity	Description	Material	Balancing condition
1	2	Hub	EN-GJL-250	According to customer specification
2	1	Elastomer ring/DZ individual elastomers	NBR (Perbunan) from size 200 T-PUR	
9	2	Setscrews DIN EN ISO 4029	Steel	

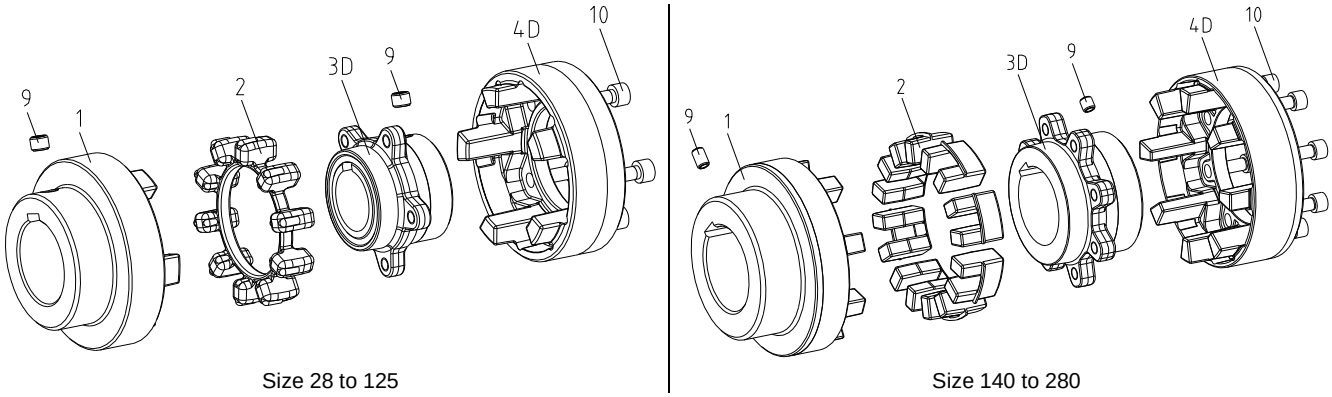


Size 28 to 125 Size 140 to 280

Illustration 9: POLY-NORM® type AR

Components of POLY-NORM® type ADR (three-part) type AVR corresponding to components of 3D and 4D mirrored

Component	Quantity	Description	Material	Balancing condition
1	1	Hub	EN-GJL-250	According to customer specification
2	1	Elastomer ring/DZ individual elastomers	NBR (Perbunan) from size 200 T-PUR	
3D	1	Flange hub	EN-GJS-400-15 from size 200 steel (S355J2)	According to customer specification
4D	1	Cam ring	EN-GJL-250	
9	2	Setscrews DIN EN ISO 4029	Steel	
10	see table 5	Cap screws DIN EN ISO 4762	Steel	



Size 28 to 125 Size 140 to 280

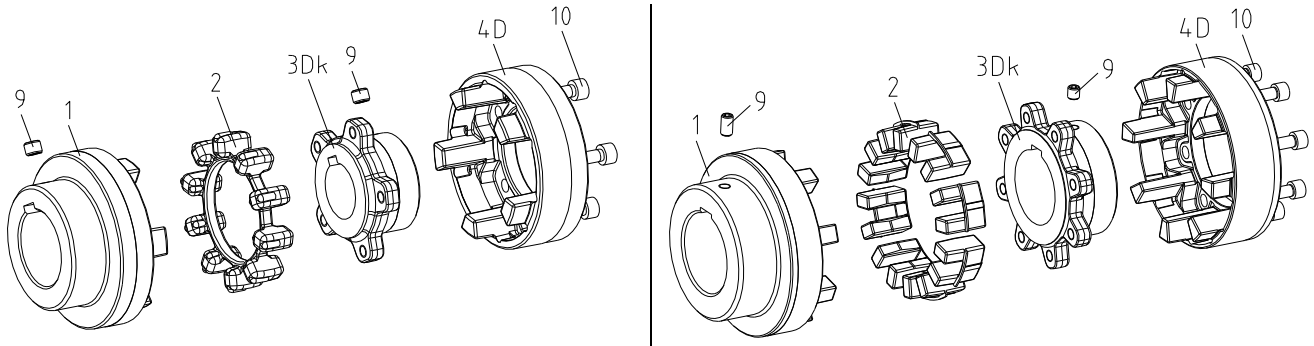
Illustration 10: POLY-NORM® type ADR (three-part)

4 Assembly

4.1 Components of the coupling

Components of POLY-NORM® type ADR-K (three-part)

Component	Quantity	Description	Material	Balancing condition
1	1	Hub	EN-GJL-250	According to customer specification
2	1	Elastomer ring/DZ individual elastomers	NBR (Perbunan) from size 200 T-PUR	
3Dk	1	Flange hub K	EN-GJS-400-15 from size 200 steel (S355J2)	According to customer specification
4D	1	Cam ring	EN-GJL-250	
9	2	Setscrews DIN EN ISO 4029	Steel	
10	see table 5	Cap screws DIN EN ISO 4762	Steel	



Size 28 to 125 Size 140 to 280

Illustration 11: POLY-NORM® type ADR-K (three-part)

Components of POLY-NORM® type AZR and AZR short

Component	Quantity	Description	Material	Balancing condition
2	1	Elastomer ring	NBR (Perbunan)	
3N	2	Driving flange	EN-GJL-250	According to customer specification
4N	2	Coupling flange	EN-GJL-250 / S355J2	
9	2	Setscrews DIN EN ISO 4029	Steel	
10	see table 7 and 10	Cap screws DIN EN ISO 4762	Steel	

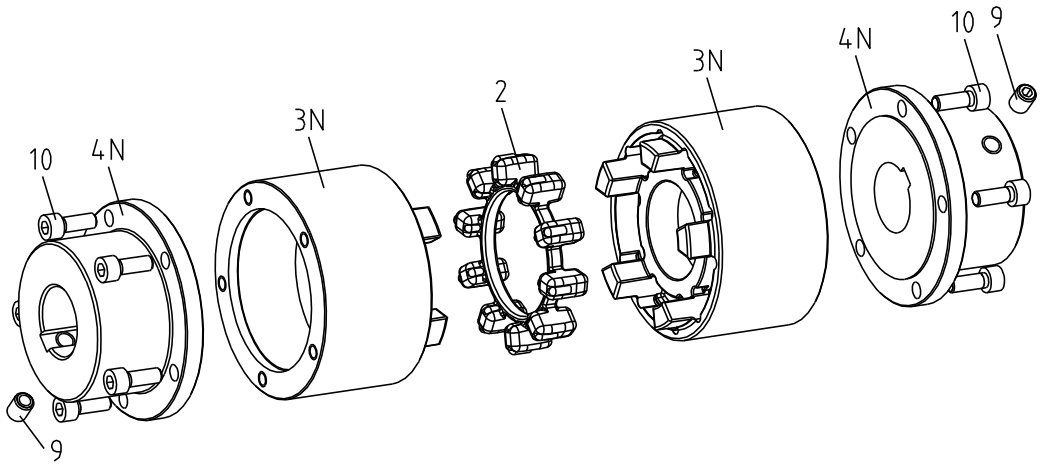


Illustration 12: POLY-NORM® type AZR and AZR short

4 Assembly

4.1 Components of the coupling

Components of POLY-NORM® type AR/AZR

Component	Quantity	Description	Material	Balancing condition
1	1	Hub	EN-GJL-250	According to customer specification
2	1	Elastomer ring	NBR (Perbunan)	
3N	1	Driving flange	EN-GJL-250	According to customer specification
4N	1	Coupling flange	EN-GJL-250 / S355J2	
9	2	Setscrews DIN EN ISO 4029	Steel	
10	see table 10	Cap screws DIN EN ISO 4762	Steel	

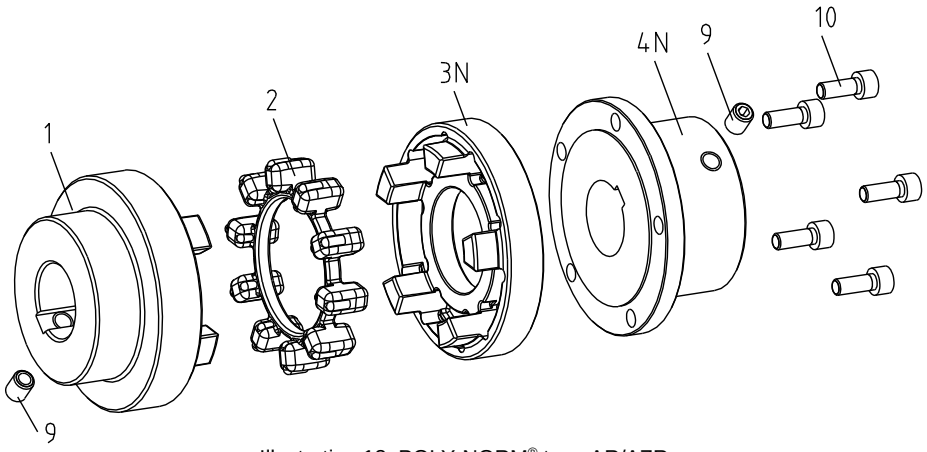


Illustration 13: POLY-NORM® type AR/AZR

Components of POLY-NORM® type AZVR

Component	Quantity	Description	Material	Balancing condition
2	1	Elastomer ring	NBR (Perbunan)	
3N	1	Driving flange	EN-GJL-250	According to customer specification
4N	1	Coupling flange	EN-GJL-250 / S355J2	
4Nv	1	Coupling flange AZVR		
8	1	Driving flange AZVR	EN-GJL-250	
9	2	Setscrews DIN EN ISO 4029	Steel	
10	see table 13	Cap screws DIN EN ISO 4762	Steel	

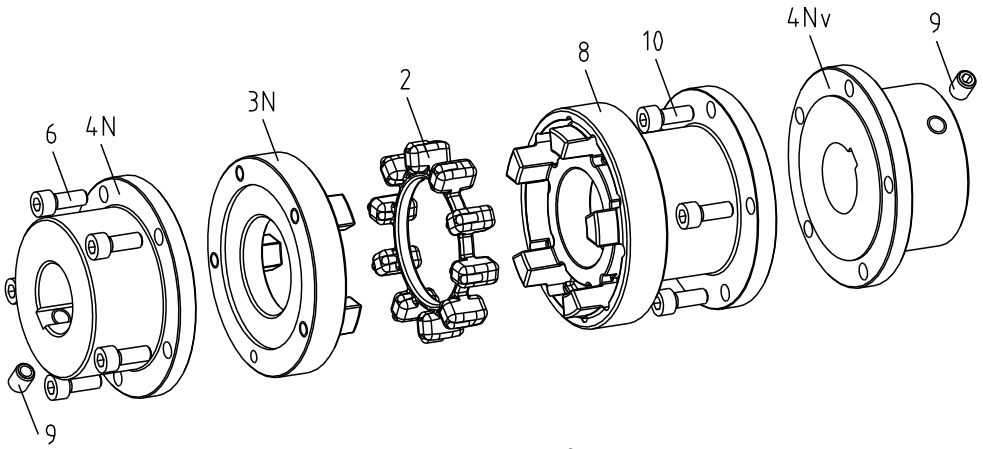


Illustration 14: POLY-NORM® type AZVR

4 Assembly

4.1 Components of the coupling

Components of POLY-NORM® type with taper clamping sleeve

Component	Quantity	Description	Material	Balancing condition
2	1	Elastomer ring	NBR (Perbunan)	
9	2 1)	Setscrew	Steel	
TB1	2	Hub for taper clamping sleeve	EN-GJL-250	According to customer specification
11	2	Taper clamping sleeve	EN-GJL-250	

1) For each taper clamping sleeve from size 100, 3-off setscrews are needed.

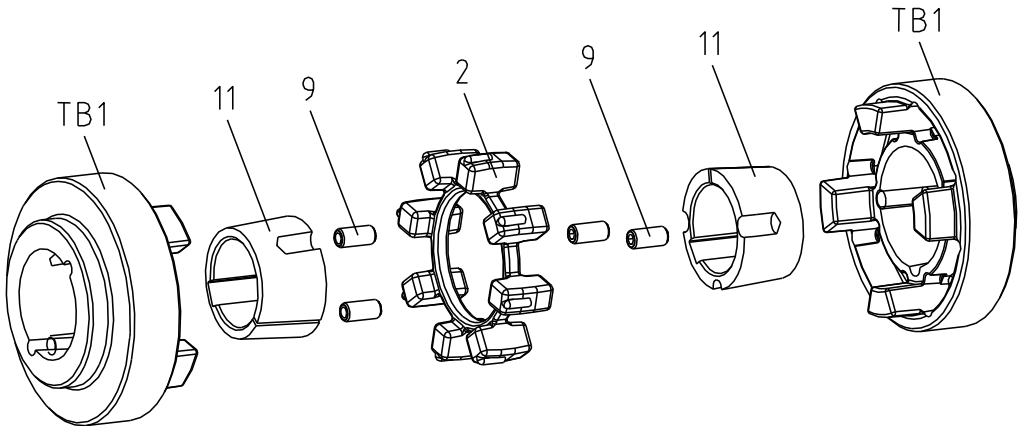


Illustration 15: POLY-NORM® type with taper clamping sleeve

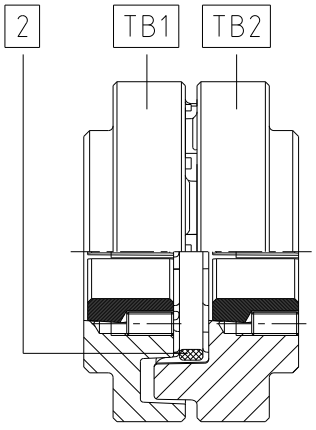


Illustration 16: Type with taper clamping sleeve hub design TB1 and TB2

Coupling design:

TB1 Screw connection on cam side
TB2 Screw connection on collar side

Various combinations of types TB1 and TB2 are available.

Taper clamping sleeves used without a feather key are not permitted in potentially explosive atmospheres and are thus not provided with a relevant explosion protection marking.

4 Assembly

4.2 Advice for finish bore

The maximum permissible bore diameters d (see chapter 1 - technical data) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause danger to life.

- Hub bores machined by the customer have to observe concentricity resp. axial runout (see illustration 17).
- Make absolutely sure to observe the figures for Ød.
- Carefully align the hubs when the finish bores are drilled.
- Provide for a setscrew according to DIN EN ISO 4029 with a cup point or an end plate to fasten the hubs axially. For dimensions G and t resp. t_1 see the respective table of the particular type (see chapter 1).

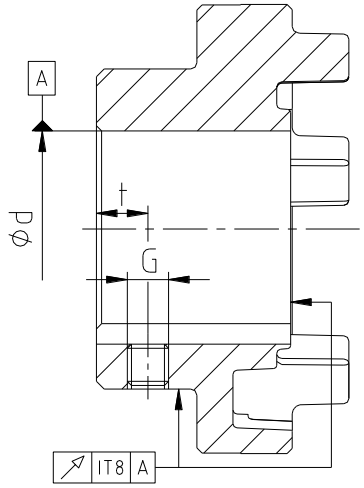


Illustration 17: Concentricity and axial runout

The customer bears the sole responsibility for all machining processes performed subsequently on unbored or pilot bored as well as finish machined coupling components and spare parts. KTR does not assume any warranty claims resulting from insufficient remachining.

KTR supplies unbored or pilot bored coupling components and spare parts only upon explicit request of the customer. These parts are additionally marked with the symbol Ⓤ.

Reference to unbored resp. pilot bored coupling components with explosion protection marking:
Basically the company KTR Systems GmbH supplies couplings resp. coupling hubs with explosion protection marking as an unbored or pilot bored type only on explicit request of the customer. The prerequisite is a declaration of exemption submitted by the customer assuming any responsibility and liability for respective remachining performed on the product of KTR Systems GmbH.

Table 15: Recommended fit pairs acc. to DIN 748/1

Bore [mm]		Shaft tolerance	Bore tolerance
above	up to		
	50	k6	H7 (KTR standard)
50		m6	

If a feather keyway is intended to be used in the hub, it should correspond to the tolerance ISO JS9 (KTR standard) with standard operating conditions or ISO P9 with sophisticated operating conditions (frequently alternating torsional direction, shock loads, etc.). The keyway should preferably be located between the cams. With axial fastening by the setscrew the tapped hole should be located on the keyway.

The transmittable torque of the shaft-hub-connection must be reviewed by the customer and is subject to his responsibility.

4 Assembly

4.3 Assembly of the coupling (general)

We recommend to inspect bores, shaft, keyway and feather key for dimensional accuracy before assembly.

Heating the hubs, coupling flanges or flange hubs lightly (approx. 80 °C) allows for an easier mounting on the shaft.

Please pay attention to the ignition risk in potentially explosive atmospheres!

Touching the heated hubs causes burns.
Please wear safety gloves.

With assembly make sure that the dimension s resp. L (see table 1 to 14 of the different types) is observed so that the hubs are not in contact with each other during the operation. Disregarding this advice may cause damage to the coupling.

If used in potentially explosive atmospheres the setscrews to fasten the hubs as well as all screw connections must be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).

4.4 Assembly of type AR

- Mount the hubs on the shaft of driving and driven side (see illustration 18).
- Insert the elastomer ring respectively DZ individual elastomers in the cam section of the hub on the driving or driven side (see illustration 19.1 and 19.2).

Insert the DZ individual elastomers with the web in the cam section of the hub first (see illustration 19.2).

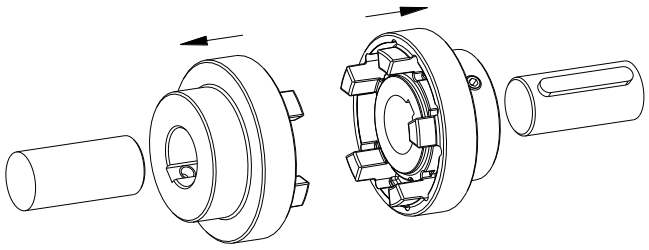


Illustration 18: Assembly of hub

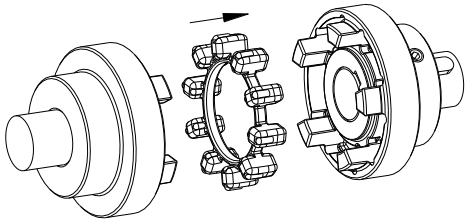


Illustration 19.1: Assembly of elastomer ring

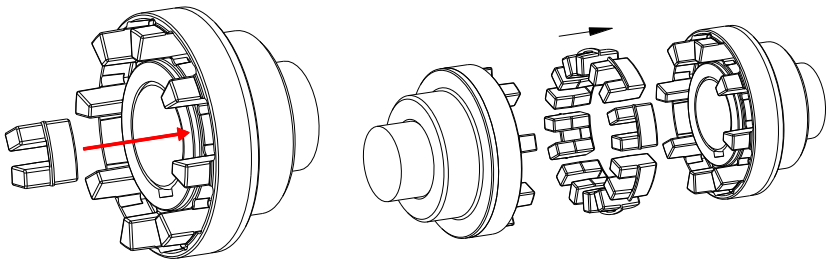


Illustration 19.2: Assembly of DZ individual elastomers

- Shift the power packs in axial direction until the distance dimension s is achieved (see illustration 20).
- If the power packs are already firmly assembled, shifting the hubs axially on the shafts allows for adjusting dimension s (see illustration 20).
- Fasten the hubs by tightening the setscrews DIN EN ISO 4029 with a cup point (tightening torque see table 2).

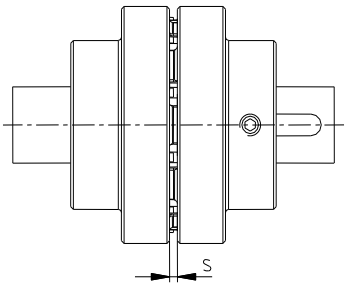


Illustration 20: Assembly of coupling

4 Assembly

4.5 Assembly of type ADR, ADR-K and AVR

- Plug the flange hub and the cam ring together (see illustration 21).
- Hand-tighten the components first.
- Mount the hub and flange hub with cam ring on the shaft of driving and driven side (see illustration 22).
- Tighten the screws at the tightening torques T_A specified in table 5 by means of a suitable torque key.
- Insert the elastomer ring resp. DZ individual elastomers in the cam section of the hub on the driving or driven side respectively cam ring (see illustration 23.1 and 23.2).

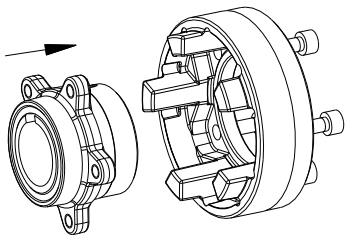


Illustration 21: Assembly of flange hub with cam ring

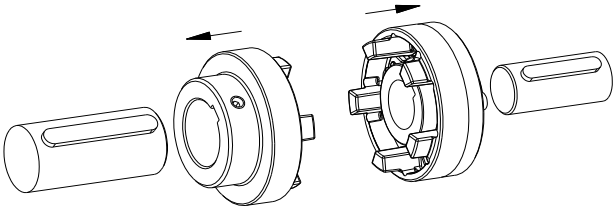


Illustration 22: Assembly of hub and flange hub with cam ring

Insert the DZ individual elastomers with the web in the cam section of the hub resp. cam ring first (see illustration 23.2).

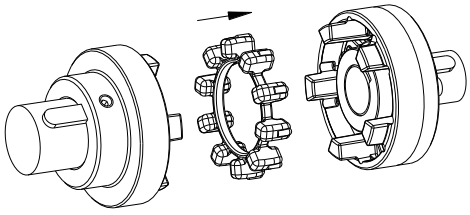


Illustration 23.1: Assembly of elastomer ring

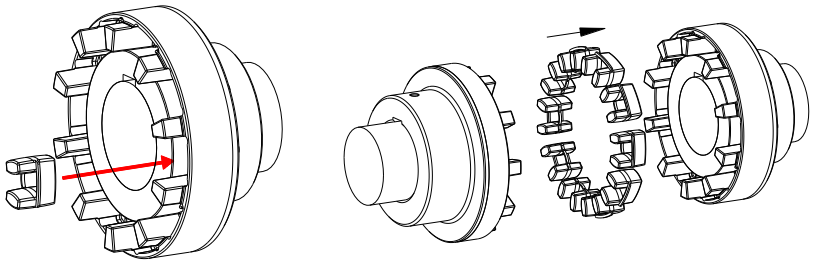


Illustration 23.2: Assembly of DZ individual elastomers

To facilitate the assembly of the elastomer ring when the power packs are already firmly assembled, we recommend to separate the elastomer ring up to size 65 in one position between the dampers (see illustration 24).
From size 75 on we recommend to separate the elastomer ring between every second damper to facilitate the assembly (see illustration 25).

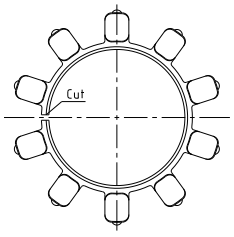


Illustration 24: Mounting aid of elastomer ring up to size 65

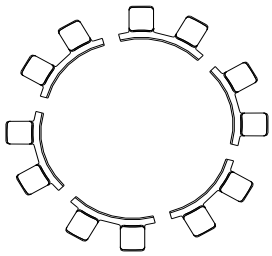


Illustration 25: Mounting aid of elastomer ring from size 75

- Shift the power packs in axial direction until the distance dimension s is achieved (see illustration 26).
- If the power packs are already firmly assembled, shifting the hubs axially on the shafts allows for adjusting dimension s (see illustration 26).
- Fasten the hub or flange hubs by tightening the setscrews DIN EN ISO 4029 with a cup point (tightening torque see table 2).

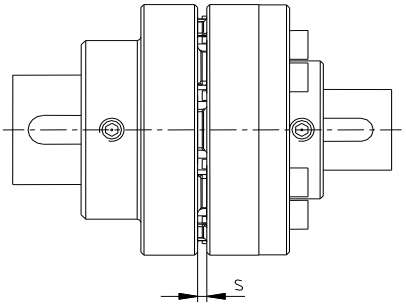


Illustration 26: Assembly of coupling

Having started up the coupling, the wear of the elastomer ring has to be inspected at regular maintenance intervals and the elastomer ring has to be replaced, if necessary.

4 Assembly

4.6 Assembly of type AZR, AZR short and AZVR

- Mount the coupling flanges on the shaft of driving and driven side (see illustration 27).
  The internal sides of the coupling flanges must be flush with the front sides of the shafts.
- Shift the power packs in axial direction until the distance dimension L is achieved (see illustration 4).
- Fasten the coupling flanges by tightening the setscrews DIN EN ISO 4029 with a cup point (tightening torque see table 2).

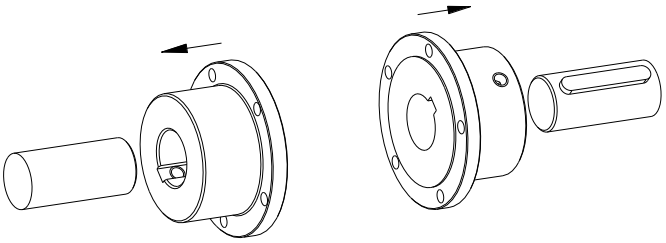


Illustration 27: Assembly of coupling flanges

- Plug the driving flanges and the elastomer ring together (see illustration 28).

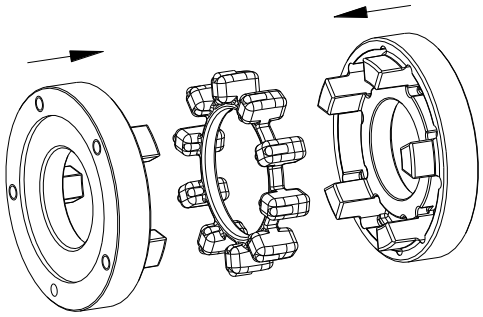


Illustration 28: Assembly of driving flanges with elastomer ring

- Put the components plugged together between the coupling flanges (see illustration 29).
- Hand-tighten the components first.
- Tighten the screws to the tightening torques T_A specified in table 7, 10 and 13 by means of a suitable torque key.
- Check the dimension s or L (see table 6, 8 and 11).
- If the power packs are already firmly assembled, shifting the coupling flanges axially on the shafts allows for adjusting dimension s or L (see illustration 29).

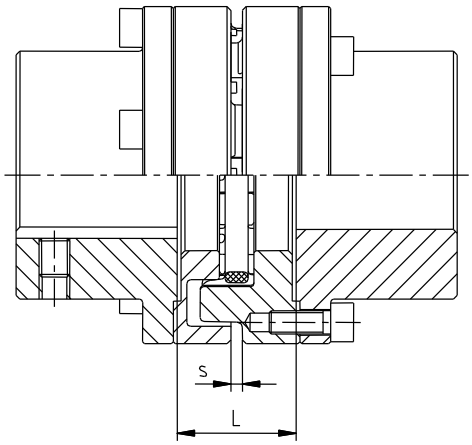


Illustration 29: Assembly of coupling

Having started up the coupling, the wear of the elastomer ring has to be inspected at regular maintenance intervals and the elastomer ring has to be replaced, if necessary.

4 Assembly

4.7 Assembly of type AR/AZR

- Mount the coupling flange on the shaft of driving or driven side (see illustration 30).
  The internal side of the coupling flange must be flush with the faces of the shafts.

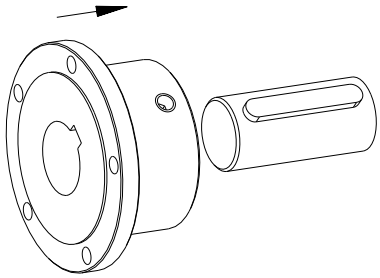


Illustration 30: Assembly of coupling flange

- Plug the hub, the elastomer ring and the driving flange together (see illustration 31).

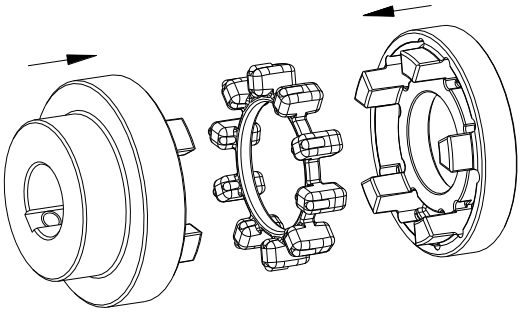


Illustration 31: Assembly of hub, elastomer ring and driving flange

- Assemble the components plugged together on the other shaft end (see illustration 32).
- Fasten the hub and coupling flange by tightening the setscrews DIN EN ISO 4029 with a cup point (tightening torques see table 2).

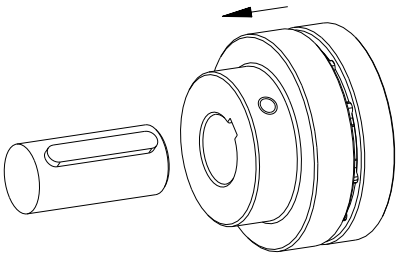


Illustration 32: Assembly of component assembly

- Position the machine such that the driving flange and coupling flange can be screwed together. Hand-tighten the components for the time being and tighten the screws to the tightening torque T_A specified in table 10 by means of a suitable torque key
- Review the dimension s (see illustration 33).

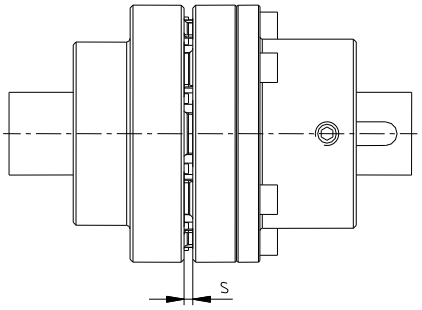


Illustration 33: Assembly of coupling

Having started up the coupling, the wear of the elastomer ring has to be inspected at regular maintenance intervals and the elastomer ring has to be replaced, if necessary.

4 Assembly

4.8 Assembly of taper clamping sleeve

Assembly of taper clamping sleeve:

Clean the contact surfaces of the taper clamping sleeves and of shaft and hub and afterwards apply thin oil lightly (e. g. Ballistol Universal oil or Klüber Quietsch-Ex).
The taper clamping sleeves have got axially parallel, cylindrical and smooth tapped blind holes. Only half of these holes are located in the material of the sleeve. The other half located in the hub has got threads.
Fit the coupling element and the taper clamping sleeve into each other, make sure that the bores cover each other and tighten the setscrews lightly. Fit the coupling element along with the taper clamping sleeve on the shaft and tighten the setscrews at the tightening torque specified in table 16.
During the screwing process the hub is mounted on the taper sleeve and thus the sleeve is pressed on the shaft. By light blows of the hammer the taper clamping sleeve must be pushed further into the taper bore by means of a suitable sleeve. Afterwards re-tighten the setscrews at the tightening torque specified in table 16. This process must be performed at least once.
Having operated the drive under load for a short while inspect if the setscrews are released.
Axial fixing of the Taper Lock hub (coupling hub with taper clamping sleeve) is obtained by proper assembly only.

If used in potentially explosive atmospheres the setscrews to fasten the taper clamping sleeves have to be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).
Taper clamping sleeves used without a feather key are not permitted in potentially explosive atmospheres and are thus not provided with a relevant explosion protection marking.

Oils and greases with molybdenum disulphide or high-pressure additives, additives of Teflon and silicone as well as internal lubricants reducing the coefficient of friction significantly must not be used.

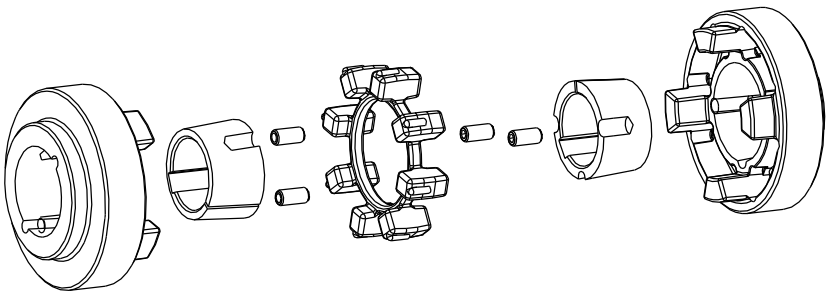


Illustration 34: POLY-NORM® type with taper clamping sleeve

Disassembly of taper clamping sleeve:

The taper clamping sleeve is released by removing the setscrews. Afterwards one of the setscrews used as forcing screw is screwed in the thread of the sleeve and tightened.
The coupling hub untightened that way can be manually removed from the shaft with the taper clamping sleeve.

Table 16:

Taper clamping sleeve	Screw dimensions				Number
	G [inch]	L [inch]	SW [mm]	T_A [Nm]	
1108	1/4	1/2	3	5.7	2
1210	3/8	5/8	5	20	2
1610	3/8	5/8	5	20	2
1615	3/8	5/8	5	20	2
2012	7/16	7/8	6	31	2
2517	1/2	7/8	6	49	2
3020	5/8	1 1/4	8	92	2
3030	5/8	1 1/4	8	92	3
3535	1/2	1 1/2	10	115	3
4040	5/8	1 3/4	12	170	3

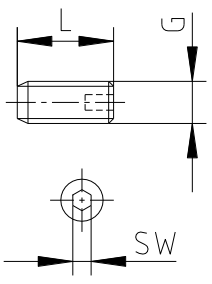


Illustration 35: Withworth setscrew (BSW)

4 Assembly

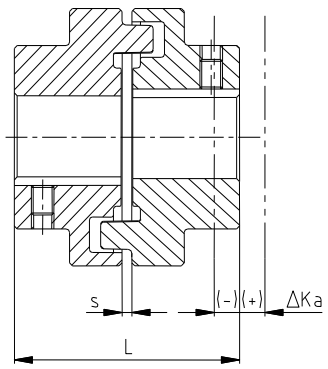
4.9 Displacements - alignment of the coupling

The **POLY-NORM®** compensates for displacements generated by the shafts to be combined as shown in table 17. Excessive misalignment may be generated by inaccurate alignment, production tolerances, thermal expansion, shaft deflection, twisting of machine frames, etc.

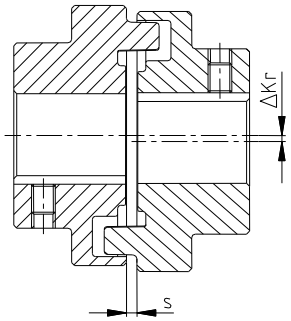
In order to ensure a long service life of the coupling and avoid dangers with the use in potentially explosive atmospheres, the shaft ends must be accurately aligned.
Please absolutely observe the displacement figures specified (see table 17). If the figures are exceeded, the coupling will be damaged.
The more accurate the alignment of the coupling, the longer is its service life.
If used in potentially explosive atmospheres for explosion group IIC, only half of the displacement figures (see table 17) are permissible.

Please note:

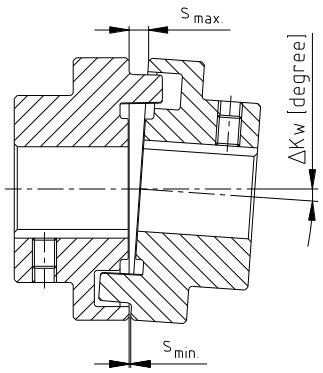
- The displacement figures specified in table 17 are maximum figures which must not arise in parallel. If radial and angular displacement occurs at the same time, the sum of the displacement figures must not exceed ΔK_r or ΔK_w.
- Please inspect with a dial gauge, ruler or feeler gauge whether the permissible displacement figures specified in table 17 can be observed.



Axial displacements



Radial displacements



Angular displacements

$L_{adm.} = L + \Delta K_a$ [mm]

$\Delta K_w = s_{max.} - s_{min.}$ [mm]

Illustration 36: Displacements

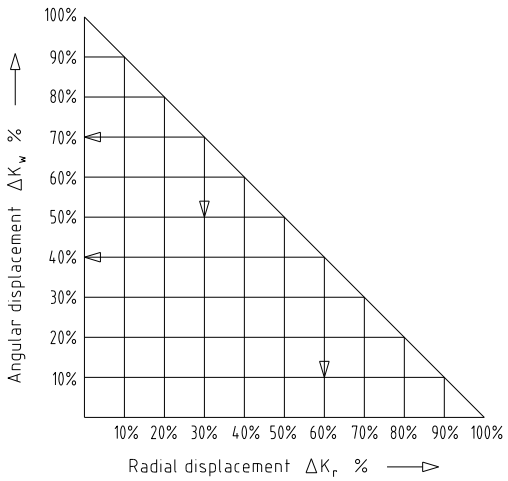
Examples of the displacement combinations specified in illustration 37:

Example 1:
ΔK_r = 30 %
ΔK_w = 70 %

Example 2:
ΔK_r = 60 %
ΔK_w = 40 %

$\Delta K_{total} = \Delta K_r + \Delta K_w \leq 100$ %

Illustration 37: Combinations of displacement



Assembly

4.9 Displacements - alignment of the coupling

Table 17: Displacement figures

Size		28	32	38	42	48	55	60	65	75	85	90
Max. axial displacement ΔK_a [mm]		±1	±1	±1	±1	±1.5	±1.5	±1.5	±1.5	±1.5	±1.5	±1.5
Max. radial displacement ΔK_r [mm] with	1500 rpm	0.2	0.25	0.25	0.25	0.3	0.3	0.3	0.35	0.4	0.4	0.5
	3000 rpm	0.15	0.18	0.18	0.18	0.22	0.22	0.22	0.26	0.3	0.3	0.33
Max. angular displacement ΔK_w [mm]	1500 rpm (1 degree)	1.2	1.4	1.5	1.7	1.8	2.0	2.2	2.4	2.7	3.0	3.4
	3000 rpm (0.5 degree)	0.6	0.7	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.5	1.7

Size		100	110	125	140	160	180	200	220	240	260	280
Max. axial displacement ΔK_a [mm]		±3	±3	±3	±3	±3	±3	±4	±4	±4	±4	±4
Max. radial displacement ΔK_r [mm] with		1500 rpm							1350 rpm	1220 rpm	1030 rpm	960 rpm
		0.5	0.6	0.6	0.6	0.65	0.65	0.65	0.70	0.70	0.85	0.85
	3000 rpm	0.37	-	-	-	-	-	-	-	-	-	-
Max. angular displacement ΔK_w [mm]	1500 rpm (1 degree)	1500 rpm							1350 rpm	1220 rpm	1030 rpm	960 rpm
		3.9	4.3	4.8	5.5	6.1	6.0	7.8	8.7	9.6	11.3	12.2
	3000 rpm (0.5 degree)	1.9	-	-	-	-	-	-	-	-	-	-

5 Start-up

Before start-up of the coupling, inspect the tightening of the setscrews in the hubs, the alignment and the distance dimension E and adjust, if necessary, and also inspect all screw connections for the tightening torques specified.

If used in potentially explosive atmospheres the setscrews to fasten the hubs as well as all screw connections must be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).

Finally the coupling protection against accidental contact must be fitted. It is required in accordance with DIN EN ISO 12100 (Safety of Machinery) and directives 2014/34/EU and SI 2016 No. 1107 and must protect against

- access with the little finger
- falling down of solid foreign objects.

The coupling protection is not part of KTR's scope of delivery and is the customer's responsibility. It must have sufficient distance to the rotating components to avoid contact safely. Depending on the outside diameter DH of the coupling, we recommend the following minimum distance:
ØDH to 50 mm = 6 mm, ØDH 50 mm to 120 mm = 10 mm, ØDH from 120 mm = 15 mm.

Please check if a proper enclosure (ignition protection, coupling protection, contact protection) has been mounted and the operation of the coupling is not affected by the enclosure. The same applies for test runs and rotational direction inspections.

The cover may provide for openings intended for necessary heat dissipation. These openings have to comply with DIN EN ISO 13857.
The cover must be electrically conductive and included in the equipotential bonding. Bellhousings (magnesium share below 7.5 %) made of aluminium and damping rings (NBR) can be used as connecting element between pump and electric motor. The cover may only be taken off with standstill of the unit.

5 Start-up

If the couplings are used in locations subject to dust explosion and in mining the user must make sure that there is no accumulation of dust in a dangerous volume between the cover and the coupling. The coupling must not operate in an accumulation of dust.

For covers with unlocked openings on the top face no light metals must be used if the couplings are used as equipment of equipment group II (*if possible, from stainless steel*). If the couplings are used in mining (equipment group I M2), the cover must not be made of light metal. In addition, it must be resistant to higher mechanical loads than with use as equipment of equipment group II.

During operation of the coupling, please pay attention to

- different operating noise
- vibrations occurring.

If you note any irregularities with the coupling during operation, the drive unit must be switched off immediately. The cause of the breakdown must be specified by means of the table „Breakdowns“ and, if possible, be eliminated according to the proposals. The potential breakdowns specified can be hints only. To find out the cause all operating factors and machine components must be considered.

Coating of coupling:

If coated (priming, paintings, etc.) couplings are used in potentially explosive atmospheres, the requirements on conductibility and coating thickness must be considered. With paintings up to 200 µm electrostatic load does not have to be expected. If thicker paintings resp. coatings up to a layer thickness of a maximum of 2.0 mm are applied, the couplings are not permissible for gases and vapours of category IIC in potentially explosive areas, but only for gases and vapours of category IIA and IIB.
This also applies for multiple coatings exceeding an overall thickness of 200 µm. Make sure with painting or coating that the coupling components are conductively connected with the device/devices to be connected so that the equipotential bonding is not impeded by the paint or coat applied. Basically painting of the elastomer ring is not admitted to ensure an equipotential bonding.
In addition, make sure that the marking of the coupling remains legible.

6 Breakdowns, causes and elimination

The below-mentioned failures can lead to a use of the **POLY-NORM®** coupling other than intended. In addition to the specifications given in these operating/assembly instructions make sure to avoid such failures.
The errors listed can only be clues to search for the failures. When searching for the failure the adjacent components must generally be considered.

If used other than intended the coupling can become a source of ignition.
Directive 2014/34/EU and UK directive SI 2016 No. 1107 require special care by the manufacturer and the user.

6 Breakdowns, causes and elimination

General failures with use other than intended:

- Important data for the coupling selection are not forwarded.
- The calculation of the shaft-hub-connection is not considered.
- Coupling components with damage occurred during transport are assembled.
- If the heated hubs are assembled, the permissible temperature is exceeded.
- The clearance of the components to be assembled is not coordinated with one another.
- Tightening torques have been fallen below/exceeded.
- Components are mixed up by mistake/assembled incorrectly.
- A wrong or no elastomer ring/DZ individual elastomers are inserted in the coupling.
- No original **KTR** components (purchased parts) are used.
- Old/already worn off elastomer rings resp. DZ individual elastomers or those which are stored for too long are used.
- Maintenance intervals are not observed.

Breakdowns	Causes	Hazard notes for potentially explosive atmospheres	Elimination
Different operating noise and/or vibrations occuring	Misalignment		1) Set the unit out of operation 2) Eliminate the reason for the misalignment (e. g. loose foundation bolts, fracture of the engine mount, heat expansion of unit components, modification of the mounting dimension s of the coupling) 3) For inspection of wear see chapter 10.2
	Wear of elastomer ring, short-term torque transmission due to metal contact	Ignition risk due to sparking	1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomer ring 3) Inspect coupling components and replace coupling components that have been damaged 4) Insert elastomer ring, assemble coupling components 5) Inspect alignment, adjust if necessary
	Screws for axial fastening of hubs working loose		1) Set the unit out of operation 2) Inspect alignment of coupling 3) Tighten the screws to fasten the hubs and secure against working loose 4) For inspection of wear see chapter 10.2
Fracture of cams	Wear of elastomer ring, torque transmission due to metal contact		1) Set the unit out of operation 2) Replace complete coupling 3) Inspect alignment
	Fracture of the cams due to high impact energy/overload		1) Set the unit out of operation 2) Replace complete coupling 3) Inspect alignment 4) Find out the reason for overload
	Operating parameters do not meet with the performance of the coupling		1) Set the unit out of operation 2) Review the operating parameters and select a bigger coupling (consider mounting space) 3) Assemble new coupling size 4) Inspect alignment
	Operating error of the unit		1) Set the unit out of operation 2) Replace complete coupling 3) Inspect alignment 4) Instruct and train the service staff

6 Breakdowns, causes and elimination

Breakdowns	Causes	Hazard notes for potentially explosive atmospheres	Elimination
Early wear of elastomer ring	Misalignment		1) Set the unit out of operation 2) Eliminate the reason for the misalignment (e. g. loose foundation bolts, fracture of the engine mount, heat expansion of unit components, modification of the mounting dimension s of the coupling) 3) For inspection of wear see chapter 10.2
	e. g. contact with aggressive liquids/oils, influence by ozone, too high/low ambient temperature etc. causing a physical modification of the elastomer ring	Ignition risk due to sparking with metallic contact of the cams	1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomer ring 3) Inspect coupling components and replace coupling components that have been damaged 4) Insert elastomer ring, assemble coupling components 5) Inspect alignment, adjust if necessary 6) Make sure that other physical modifications of the elastomer ring are excluded
	excessively high ambient/contact temperatures for the elastomer ring, max. permissible -30 °C/+75 °C		1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomer ring 3) Inspect coupling components and replace coupling components that have been damaged 4) Insert elastomer ring, assemble coupling components 5) Inspect alignment, adjust if necessary 6) Inspect and adjust ambient/contact temperature
Early wear of elastomer ring (Hardening/embrittlement of the elastomer cam)	Vibrations of drive		1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomer ring 3) Inspect coupling components and replace coupling components that have been damaged 4) Insert elastomer ring, assemble coupling components 5) Inspect alignment, adjust if necessary 6) Find out the reason for vibrations

When operating with a worn elastomer ring/DZ individual elastomers (see chapter 10.3) proper operation is not ensured.

7 Disposal

In respect of environmental protection we would ask you to dispose of the packaging or products on termination of their service life in accordance with the legal regulations and standards that apply, respectively.

- **Metal**
  Any metal components have to be cleaned and disposed of by scrap metal.
- **Nylon materials**
  Nylon materials have to be collected and disposed of by a waste disposal company.

8 Maintenance and service

POLY-NORM® is a low-maintenance coupling. We recommend to perform a visual inspection on the coupling **at least once a year**. Please pay special attention to the condition of the elastomer rings or DZ individual elastomers of the coupling.

- Since the flexible machine bearings of the driving and driven side settle during the course of load, inspect the alignment of the coupling and re-align the coupling, if necessary.
- The coupling components have to be inspected for damages.
- The screw connections have to be visually inspected.

With the use in potentially explosive atmospheres observe chapter 10.2 "Inspection intervals for couplings in potentially explosive atmospheres".

9 Spares inventory, customer service addresses

We recommend to store major spare parts on site to ensure the readiness for use of the machine in case if a coupling fails.

Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage at www.ktr.com.

KTR does not assume any liability or warranty for the use of spare parts and accessories which are not provided by KTR and for the damages which may incur as a result.

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10 Enclosure A

Advice and instructions regarding the use in potentially explosive atmospheres

Types available:

AR, ADR, ADR-K, AVR, AZR, AR/AZR, AZVR and AR with taper clamping sleeve

Taper clamping sleeves used without a feather key are not permitted in potentially explosive atmospheres and are thus not provided with a relevant explosion protection marking.

10.1 Intended use in potentially explosive atmospheres

Conditions of operation in potentially explosive atmospheres

The **POLY-NORM®** couplings are suitable for the use according to directives 2014/34/EU and SI 2016 No. 1107.

- Protection against hazards arising from lightning must follow the lightning protection concept of the machine or plant. The relevant regulations and policy for lightning protection must be observed.
- The equipotential bonding of the couplings is made by metal contact between coupling hub and shaft. This equipotential bonding must not be affected.

1. Industry (with the exception of mining)

- Equipment group II of category 2 and 3 (*coupling is not approved/not suitable for equipment group 1*)
- Substance group G (*gases, fogs, vapours*), zone 1 and 2 (*coupling is not approved/not suitable for zone 0*)
- Substance group D (*dusts*), zone 21 and 22 (*coupling is not approved/not suitable for zone 20*)
- Explosion group IIC (*gases, fogs, vapours*) *(explosion groups IIA and IIB are included in IIC)* and explosion group IIIC (*dusts*) *(explosion groups IIIA and IIIB are included in IIIC)*

Temperature class:

Temperature class	Ambient or operating temperature T_a 1)	Max. surface temperature 2)
T5	-30 °C to +75 °C	+95 °C
T6	-30 °C to +60 °C	+80 °C

Explanation:
The maximum surface temperatures each result from the maximum permissible ambient or operating temperature T_a plus the maximum temperature increase ΔT of 20 K to be considered. For the temperature class a safety margin subject to standard of 5 K is added.

1) The ambient or operating temperature T_a is limited to +75 °C due to the permissible permanent operating temperature of the elastomers used.
2) The maximum surface temperature of +95 °C applies for the use in locations which are potentially subject to dust explosion.

In potentially explosive atmospheres

- the ignition temperature of dusts generated must at least be 1.5 times the surface temperature to be considered
- the glow temperature must at least be the surface temperature to be considered plus a safety distance of 75 K.
- the gases and vapours generated must amount to the temperature class specified.

2. Mining

Equipment group I of category M2 (*coupling is not approved/not suitable for equipment group M1*).
Permissible ambient temperature -30 °C to +75 °C.

10 Enclosure A

Advice and instructions regarding the use in potentially explosive atmospheres

10.2 Inspection intervals for couplings in potentially explosive atmospheres

Equipment category	Inspection intervals
M2 2G 2D No gases and vapours of explosion group IIC	An inspection of the circumferential backlash and a visual inspection of the elastomer ring/DZ individual elastomers must be performed after 3,000 operating hours for the first time, at the latest after 6 months after start-up of the coupling. If you note insignificant or no wear on the elastomer ring/DZ individual elastomers upon this initial inspection, further inspections can each be performed after 6,000 operating hours or at the latest after 18 months, provided that the operating parameters remain the same. If you note significant wear during the initial inspection so that it would be recommendable to replace the elastomer ring/DZ individual elastomers, find out the cause according to the table „Breakdowns“, if possible. The maintenance intervals must be adjusted to the modified operating parameters without fail.
2G 2D Gases and vapours of explosion group IIC	An inspection of the circumferential backlash and a visual inspection of the elastomer ring/DZ individual elastomers must be performed after 2,000 operating hours for the first time, at the latest after 3 months after start-up of the coupling. If you note insignificant or no wear on the elastomer ring/DZ individual elastomers upon this initial inspection, further inspections can each be performed after 4,000 operating hours or at the latest after 12 months, provided that the operating parameters remain the same. If you note significant wear during the initial inspection so that it would be recommendable to replace the elastomer ring/DZ individual elastomers, find out the cause according to the table „Breakdowns“, if possible. The maintenance intervals must be adjusted to the modified operating parameters without fail.

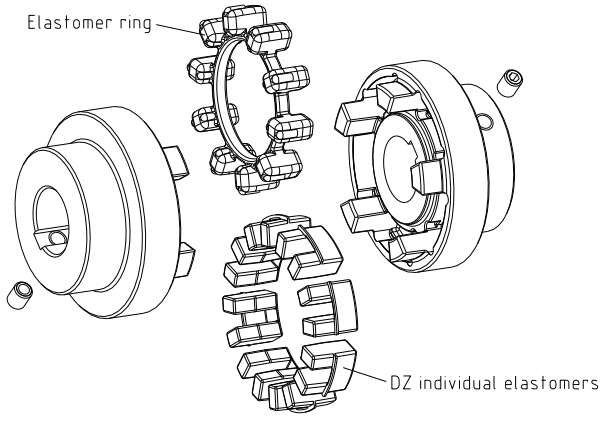

Illustration 38: POLY-NORM® type AR

Inspection of torsional backlash

Here the backlash between the coupling cams and the elastomer teeth must be inspected by means of reversing backlash.
The friction/wear may be 25 % of the original tooth thickness of the elastomer before the elastomer rings/DZ individual elastomers must be replaced.
When reaching the limit of wear and tear $\Delta s_{max.}$, the elastomer rings/DZ individual elastomers must be replaced immediately, irrespective of the inspection intervals.

10 Enclosure A

Advice and instructions regarding the use in potentially explosive atmospheres

10.3 Standard values of wear

Reaching the limits for replacing depends on the operating conditions and the existing operating parameters.

With torsional backlash ≥ $\Delta S_{max.}$ [mm] the elastomer rings/DZ individual elements must be replaced. With wear ≥ 25 % of the original thickness of the elastomer teeth it is necessary to replace the elastomer rings/DZ individual elements.

In order to ensure a long service life of the coupling and avoid dangers with the use in potentially explosive atmospheres, the shaft ends must be accurately aligned. Please absolutely observe the displacement figures specified (see table 17). If the figures are exceeded, the coupling will be damaged.

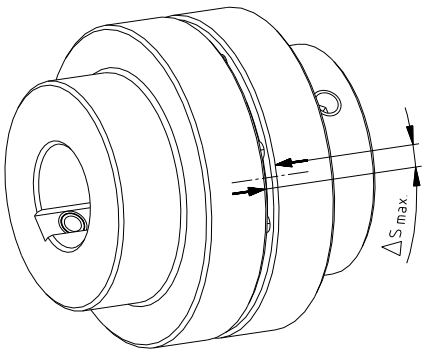

Illustration 39: Inspection of the limit of wear

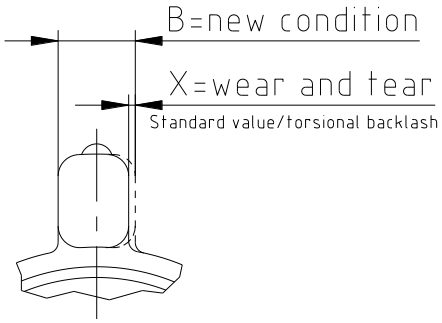

Illustration 40: Wear of elastomer ring

Table 18:

Size	Limits of wear			Size	Limits of wear		
	Thickness of elastomer tooth [mm]	Wear $X_{max.}$ [mm]	Torsional backlash $\Delta S_{max.}$ [mm]		Thickness of elastomer tooth [mm]	Wear $X_{max.}$ [mm]	Torsional backlash $\Delta S_{max.}$ [mm]
28	7.2	1.80	3.0	100	23.0	5.75	9.1
32	8.8	2.20	3.6	110	22.5	5.5	8.0
38	9.0	2.20	3.6	125	24.5	6.0	9.0
42	9.6	2.40	4.0	140	23.8	6.0	9.0
48	10.3	2.55	4.2	160	25.4	6.4	9.6
55	11.9	2.95	4.7	180	26.2	6.6	9.9
60	12.6	3.15	5.1	200	28.0	7.0	13.0
65	13.4	3.35	5.4	220	29.5	7.4	13.4
75	15.6	3.90	6.1	240	32.5	8.1	14.1
85	19.1	4.75	7.4	260	38.0	9.5	15.5
90	20.0	5.00	7.0	280	40.0	10.0	16.0

10 Enclosure A

Advice and instructions regarding the use in potentially explosive atmospheres

10.4 marking of coupling for potentially explosive atmospheres

The explosion protection marking of the POLY-NORM® coupling is applied on the outer sheath or on the front side. The elastomer ring or DZ individual elastomer is not marked.

For the complete marking refer to the operating/assembly instructions and/or the delivery note/package.

Marking is as follows:

	I M2	Ex h	I				Mb	X
	II 2G	Ex h	IIC	T6	…	T5	Gb	X
	II 2D	Ex h	IIIC	T80 °C	…	T95 °C	Db	X
<Year>		-30 °C ≤ T_a ≤		+60 °C	…	+75 °C		

KTR Systems GmbH, Carl-Zeiss-Str. 25, D-48432 Rheine

Short marking:
(A short marking is only made if not possible differently for reason of space or functioning.)

POLY-NORM®
<Year>

Deviating marking applied until 31st October 2019:

Short marking: (standard)

II 2GD c IIC T X/I M2 c X

Complete marking:

II 2G c IIC T6 resp. T5 -30 °C ≤ T_a ≤ +65 °C resp. +80 °C
II 2D c T 100 °C -30 °C ≤ T_a ≤ +80 °C / I M2 c -30 °C ≤ T_a ≤ +80 °C

10 Enclosure A

Advice and instructions regarding the use in potentially explosive atmospheres

10.4 marking of coupling for potentially explosive atmospheres

Comments on marking

Equipment group I	Mining
Equipment group II	Non-mining
Equipment category 2G	Equipment ensuring a high level of safety, suitable for zone 1
Equipment category 2D	Equipment ensuring a high level of safety, suitable for zone 21
Equipment category M2	Equipment ensuring a high level of safety must be able to be switched off when an explosive atmosphere occurs
D	Dust
G	Gases and vapours
Ex h	Nonelectrical explosion protection
IIC	Gases and vapours of class IIC (including IIA and IIB)
IIIC	Electrically conductive dusts of class IIIC (including IIIA and IIIB)
T6 … T5	Temperature class to be considered, depending on the ambient temperature
T80 °C … T95 °C	Maximum surface temperature to be considered, depending on the ambient temperature
-30 °C ≤ T_a ≤ +60 °C … +75 °C or -30 °C ≤ T_a ≤ +75 °C	Permissible ambient temperature from -30 °C to +60 °C resp. -30 °C to +75 °C
Gb, Db, Mb	Equipment protection level, analogous to the equipment category
X	For a safe use of the couplings particular conditions apply

If the symbol Ex was punched in addition to marking U, the coupling component was supplied by KTR as an unbored or pilot bored version (see chapter 4.2 of the present operating/assembly instructions).

10 Enclosure A

Advice and instructions regarding the use in potentially explosive atmospheres

10.5 EU Certificate of conformity

EU Declaration of Conformity resp. Certificate of Conformity

corresponding to EU directive 2014/34/EU dated 26 February 2014
and to the legal regulations adopted for its implementation

The manufacturer - KTR Systems GmbH, Carl-Zeiss-Str. 25, D-48432 Rheine - states that the

POLY-NORM® couplings

in an explosion-proof design described in these assembly instructions are equipment resp. components corresponding to article 2, 1. of directive 2014/34/EU and comply with the general safety and health specifications according to enclosure II of directive 2014/34/EU.
This declaration of conformity resp. certificate of conformity is issued under the sole responsibility of the manufacturer KTR Systems GmbH.

The coupling described in here complies with the specifications of the following standards/rules:

EN ISO 80079-36:2016-12
EN ISO 80079-37:2016-12
EN ISO/IEC 80079-38:2017-10
IEC/TS 60079-32-1:2020-01-24

The POLY-NORM® is in accordance with the specifications of directive 2014/34/EU.

According to article 13 (1) b) ii) of directive 2014/34/EU the technical documentation is deposited with the notified body (type examination certificate IBExU02ATEXB006_05 X):

IBExU
Institut für Sicherheitstechnik GmbH
Identification number: 0637
Fuchsmühlenweg 7

09599 Freiberg

Rheine,	2022-07-01	i. V.	i. V.
Place	Date	Reinhard Wibbeling Engineering/R&D	Michael Brüning Product Manager

10 Enclosure A

Advice and instructions regarding the use in potentially explosive atmospheres

10.6 UK Declaration of conformity

UK Declaration of Conformity resp. Certificate of Conformity

corresponding to UK directive SI 2016 No. 1107 dated 26 February 2014
and to the legal provisions adopted for its implementation

The manufacturer - KTR Systems GmbH, Carl-Zeiss-Str. 25, D-48432 Rheine - states that the

POLY-NORM® couplings

in an explosion-proof design described in these assembly instructions are equipment resp. components corresponding to directive SI 2016 No. 1107 and comply with the general safety and health requirements according to directive SI 2016 No. 1107.
This declaration of conformity resp. certificate of conformity is issued under the sole responsibility of the manufacturer KTR Systems GmbH.

The coupling described in here complies with the specifications of the following standards/rules:

EN ISO 80079-36:2016-12
EN ISO 80079-37:2016-12
EN ISO/IEC 80079-38:2017-10
IEC/TS 60079-32-1:2020-01-24

The POLY-NORM® is in accordance with the specifications respectively the applicable specifications of directive SI 2016 No. 1107.

According to directive SI 2016 No. 1107 the technical documentation is deposited with the notified body:

Eurofins CML
Identification number: 2503

Rheine, Place	2022-07-01 Date	i. V. Reinhard Wibbeling Engineering/R&D	i. V. Michael Brüning Product Manager