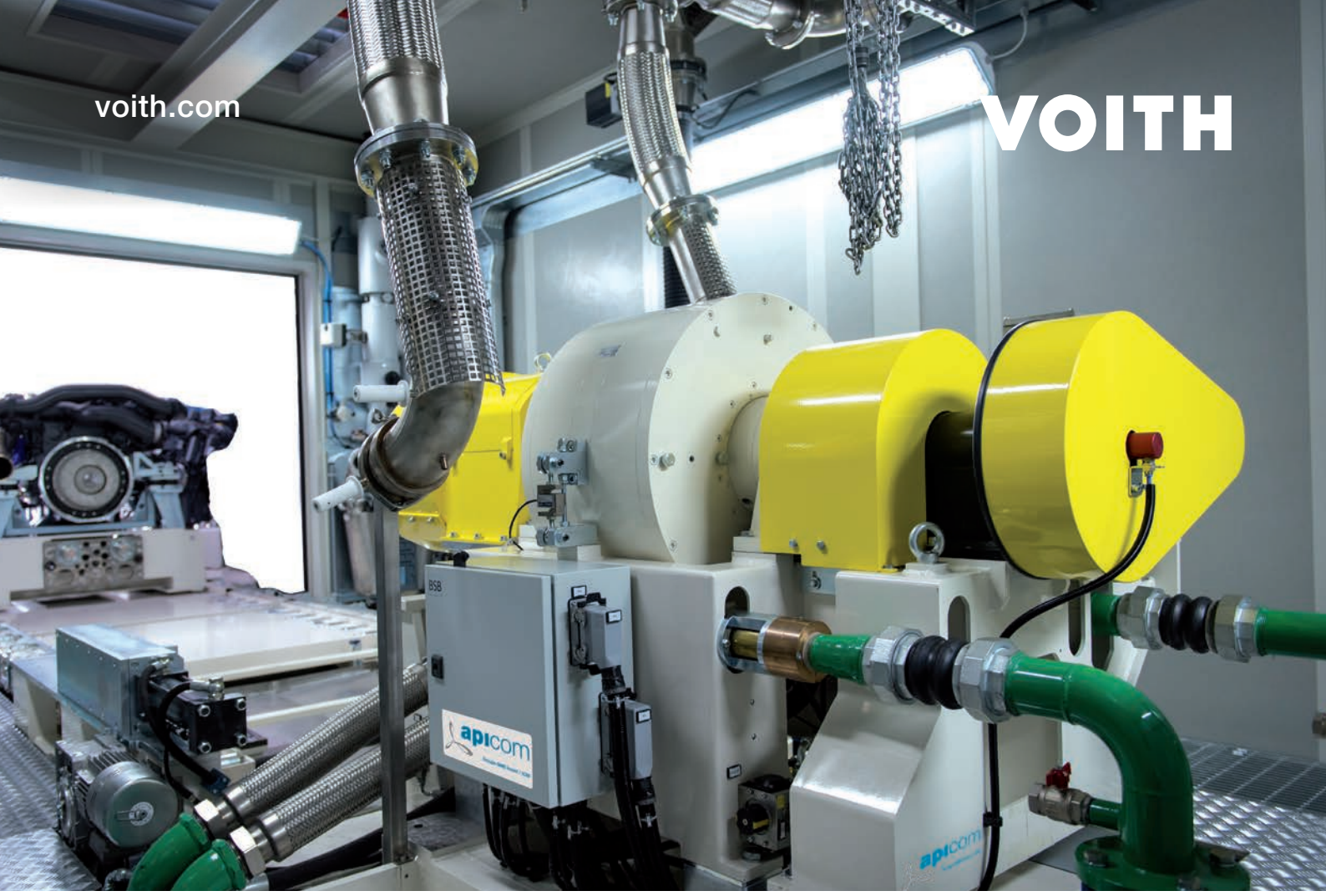
VOITH



Testing internal combustion engines safely

Highly flexible D Couplings

Highly flexible D Couplings are especially well-suited for engine test rigs for testing 1- to 3-cylinder internal combustion engines. D Couplings feature high torsional flexibility and a high torque capacity. Development test rigs, continuous-running test rigs, and end-of-line test rigs operate safely and reliably with this coupling at speeds of up to 10 000 rpm.

The D Coupling‘s modular design enables very flexible integration into all types of engine test rigs. Voith adapts the length of the coupling, the connections, and the torsional rigidity to the test system.

Voith couplings shift a system‘s critical resonance frequencies below the operational speed range. In addition, the couplings dampen undesirable alternating torques. This increases the service life of all the test rig drive components. The test system has a high availability and minimized downtimes.

Advantages and Benefits

+ Reproducing test cycles more precisely
  → particularly accurate test results
+ High-speed engines can be tested up to their maximum speed in most cases
+ Flexible and simple integration into the driveline
  → accurately-fitting and cost-efficient solution
+ Engine and all connected components are relieved by the flexibility of the element
  → lifetime and availability of your test rig is increased and the life cycle costs (LCC) are reduced

General technical data

- Nominal torque up to 2560 Nm
- Speeds up to 10000 rpm
- Available elastomer hardness values: 45, 50 or 60 ShA
- Temperature stability: -40° to +90°C
- Weight reduction by processing of carbon

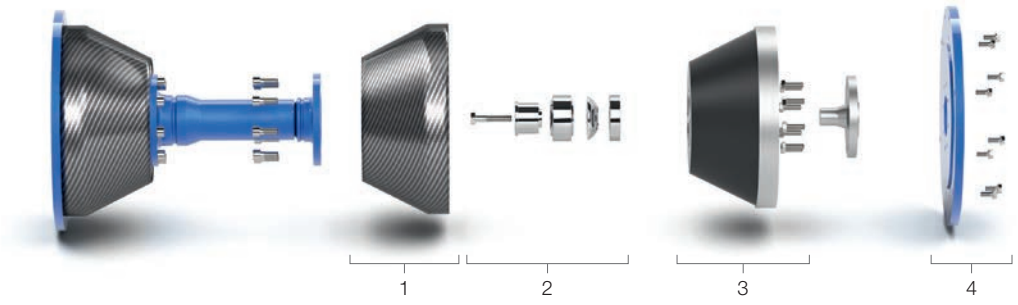
Complete coupling shafts – series BR 191

Highly flexible couplings shafts of type BR 191 are a simply package solution in order to directly and quickly connect combustion engines and dynamometers. The coupling shaft has an integrated spherical bearing and compensates radial and angular misalignment. Voith adapts the connections, length and torsional stiffness to the test system.

BR 191 technical data

Size	Shore hardness	Nominal torque	Maximum torque	Permissible continuous alternating torque	Dynamic torsional stiffness	Permissible power loss	Relative damping	Maximum speed	Continuously permissible angular offset
	A	T_{KN} [Nm]	T_{Kmax} [Nm]	T_{KW} [Nm]	C_{Tdyn} [Nm/rad]	P_{KV} [W]	ψ	N_{max} [rpm]	β_{max} [°]
160	N45	140	280	35	95		0.75		
	N50	160	320	50	160	60	0.75	10000	1.4
	N60	180	360	50	235		0.95		
350	N45	300	600	75	210		0.75		
	N50	350	700	100	350	120	0.75	7500	1.2
	N60	390	780	120	510		0.95		
700	N45	600	1200	150	420		0.75		
	N50	700	1400	210	700	230	0.75	6100	0.9
	N60	780	1560	240	1020		0.95		
2300	N45	2050	4100	520	1380		0.75		
	N50	2300	4600	600	2300	400	0.75	4100	0.5
	N60	2560	5120	680	3360		0.95		

Structure of a D Coupling



1 CFK-housing
2 Spherical bearing
3 Natural rubber element
4 Adapter plate

Couplings in conjunction with universal joint shafts or rigid shafts with one joint – series BR 181 & BR 182

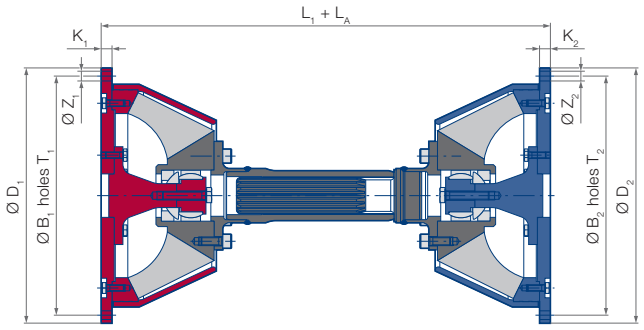
If only one coupling element is required, our highly flexible coupling of type BR 181 or 182 is used. In doing so, the power transmission to the dynamometer can either take place via a universal joint shaft, a rigid shaft with just one joint or a titanium bar with a CV joint. The BR 181 with an integrated roller bearing is the perfect solution when using a universal joint shaft.

Our BR 182 is used, if a rigid shaft with one joint or a titanium bar with a CV joint is used. Its integrated spherical bearing then becomes the second point of articulation.

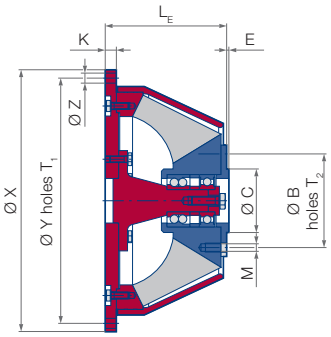
BR 181 / BR 182 technical data

Size	Shore hardness	Nominal torque	Maximum torque	Permissible continuous alternating torque	Dynamic torsional stiffness	Permissible power loss	Relative damping	Maximum speed	Continuously permissible angular offset
	A	T_{KN} [Nm]	T_{Kmax} [Nm]	T_{KW} [Nm]	C_{Tdyn} [Nm/rad]	P_{KV} [W]	ψ	N_{max} [rpm]	β_{max} [°]
160	N45	140	280	35	190		0.75		
	N50	160	320	50	320	30	0.75	10 000	1.4
	N60	180	360	50	470		0.95		
350	N45	300	600	75	420		0.75		
	N50	350	700	100	700	60	0.75	7 500	1.2
	N60	390	780	120	1020		0.95		
700	N45	600	1 200	150	840		0.75		
	N50	700	1 400	210	1 400	115	0.75	6 100	0.9
	N60	780	1 560	240	2040		0.95		
2 300	N45	2 050	4 100	520	2760		0.75		
	N50	2 300	4 600	600	4 600	200	0.75	4 100	0.5
	N60	2 560	5 120	680	6720		0.95		

Cutaway model BR 191



Cutaway model BR 181/182



Dimensions BR 191

Size	Flange size [mm]	Flange connection, primary / secondary side [mm]						Mass [kg]		Mass moment of inertia [kgm²]		
	$D_{1/2}$	$B_{1/2,\ \pm0.2}$	$Z_{1/2}$	$T_{1/2}$	$K_{1/2}$	L_Z	L_A	m_1	m_2	Primary side J_1	Center section J_2	Secondary side J_3
160	185	170	9	6	8	357.5	60	5.9	6.0	0.012	0.004	0.012
350	235	220	9	6	10	413.3	60	11.5	11.6	0.044	0.013	0.044
700	285	265	9	6	12	467.5	60	19.9	20.0	0.119	0.034	0.119
2300	430	400	13	6	17	700.4	110	40.0	37.0	0.366	0.184	0.366

Dimensions BR 181 / 182

Size	Primary side [mm]					Secondary side [mm]						Mass [kg]	Mass moment of inertia [kgm²]	
	X_{g7}	$Y_{\pm0,2}$	Z	T_1	K	C_{g7}	$B_{\pm0,1}$	M	T_2	E	L_E	m_1	Primary side J_A	Secondary side J_I
160	185	170	9	6	8	42	62.0	M6	6	2	83.0	4.6	0.012	0.001
350	235	220	9	6	10	57	84.0	M8	6	2	108.9	10.1	0.044	0.006
700	285	265	9	6	12	75	101.5	M8	8	2	136.0	18.3	0.119	0.016
2300	430	400	13	6	17	110	155.5	M14	8	2	184.7	31.0	0.366	0.072

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