X92-B

External forces and moments

Rating R1 : 6450 kW/Cyl. / 80 rpm Standard Tuning

Engine Type		6X92-B	7X92-B	8X92-B	8X92-B	8X92-B
Speed		80 rpm	80 rpm	80 rpm	80 rpm	80 rpm
Power		38700 kW	45150 kW	51600 kW	51600 kW	51600 kW
Firing order		regular	regular	irregular	irregular	regular
Crank type		FCV3-S	FCV3-S	FCV2-S / FCV3-S	FCV6-S	FCV1-L / FCV3-S
Crankshaft type		1-part	1-part	1-part	1-part	2-part
Massmoments / Forces						
Free Forces						
F1v	[±kN]	0	0	2	16	25
F1h	[±kN]	0	0	1	16	53
F2v	[±kN]	0	0	6	6	0
F4v	[±kN]	0	0	47	47	0
External Moments						
M1v	[±kNm]	0	486	1265	1308	975
M1h	[±kNm]	0	510	1191	1154	381
M2v *)	[±kNm]	6906	2005	315	315	327
M4v	[±kNm]	479	1362	547	547	569
Lateral H-Moments M_{LH}						
Ord.1	[±kNm]	0	0	2	2	6
Ord.2	[±kNm]	0	0	1	1	0
Ord.3	[±kNm]	0	0	40	40	26
Ord.4	[±kNm]	0	0	613	613	0
Ord.5	[±kNm]	0	0	261	261	3
Ord.6	[±kNm]	4307	0	13	13	0
Ord.7	[±kNm]	0	3461	23	23	0
Ord.8	[±kNm]	0	0	2544	2544	2574
Ord.9	[±kNm]	0	0	13	13	0
Ord.10	[±kNm]	0	0	3	3	0
Ord.11	[±kNm]	0	0	44	44	0
Ord.12	[±kNm]	341	0	92	92	0
Lateral X-Moments M_{LX}						
Ord.1	[±kNm]	0	362	892	892	213
Ord.2	[±kNm]	832	242	38	38	64
Ord.3	[±kNm]	882	964	1228	1228	1472
Ord.4	[±kNm]	1612	4580	1840	1840	1905
Ord.5	[±kNm]	0	358	4498	4498	5265
Ord.6	[±kNm]	0	54	90	90	27
Ord.7	[±kNm]	0	0	387	387	23
Ord.8	[±kNm]	318	25	136	136	0
Ord.9	[±kNm]	577	65	80	80	10
Ord.10	[±kNm]	158	450	38	38	6
Ord.11	[±kNm]	0	226	278	278	340
Ord.12	[±kNm]	0	18	63	63	72
Torque variation	[±kNm]	4414	3516	3155	3155	2641

* No engine fitted 2nd order balancer available. If reduction of M2v is needed, an external compensator has to be applied.

The values for other engine ratings are available on request
The resulting lateral guide force at the crosshead can be calculated as follows: FL=MLH x 0.192 [kN]

X92-B

External forces and moments

Rating R1 : 6450 kW/Cyl. / 80 rpm Standard Tuning

Engine Type		9X92-B	10X92-B	11X92-B	12X92-B
Speed		80 rpm	80 rpm	80 rpm	80 rpm
Power		58050 kW	64500 kW	70950 kW	77400 kW
Firing order		irregular	irregular	irregular	irregular
Crank type		FCV1-L / FCV3-S	FCV1-L / FCV3-S	FCV4-L / FCV2-S	FCV4-L / FCV2-S
Crankshaft type		2-part	2-part	2-part	2-part
Massmoments / Forces					
Free Forces					
F1v	[±kN]	43	85	43	56
F1h	[±kN]	45	74	42	62
F2v	[±kN]	72	29	10	38
F4v	[±kN]	48	14	24	26
External Moments					
M1v	[±kNm]	869	154	236	1195
M1h	[±kNm]	815	185	216	1576
M2v *)	[±kNm]	2439	1607	2382	775
M4v	[±kNm]	732	768	317	1293
Lateral H-Moments M_{LH}					
Ord.1	[±kNm]	80	174	106	132
Ord.2	[±kNm]	10	18	32	10
Ord.3	[±kNm]	43	47	143	40
Ord.4	[±kNm]	611	164	305	335
Ord.5	[±kNm]	746	276	1761	1662
Ord.6	[±kNm]	167	148	1357	248
Ord.7	[±kNm]	94	71	222	1028
Ord.8	[±kNm]	98	19	360	186
Ord.9	[±kNm]	1918	124	92	74
Ord.10	[±kNm]	29	1466	82	67
Ord.11	[±kNm]	20	63	818	50
Ord.12	[±kNm]	20	4	21	611
Lateral X-Moments M_{LX}					
Ord.1	[±kNm]	609	132	151	972
Ord.2	[±kNm]	305	193	293	92
Ord.3	[±kNm]	1743	2186	2734	3040
Ord.4	[±kNm]	2459	2571	1061	4318
Ord.5	[±kNm]	2214	358	1139	1521
Ord.6	[±kNm]	3622	897	542	622
Ord.7	[±kNm]	583	3440	402	675
Ord.8	[±kNm]	209	254	2250	1058
Ord.9	[±kNm]	23	63	639	1858
Ord.10	[±kNm]	119	18	69	445
Ord.11	[±kNm]	37	22	196	162
Ord.12	[±kNm]	286	18	81	54
Torque variation	[±kNm]	2899	1966	3298	2938

* No engine fitted 2nd order balancer available. If reduction of M2v is needed, an external compensator has to be applied.

The values for other engine ratings are available on request
The resulting lateral guide force at the crosshead can be calculated as follows: FL=MLH x 0.192 [kN]

X92-B

External forces and moments

Rating R1 : 6450 kW/Cyl. / 80 rpm Delta Tuning

Engine Type		6X92-B	7X92-B	8X92-B	8X92-B	8X92-B
Speed		80 rpm	80 rpm	80 rpm	80 rpm	80 rpm
Power		38700 kW	45150 kW	51600 kW	51600 kW	51600 kW
Firing order		regular	regular	irregular	irregular	regular
Crank type		FCV3-S	FCV3-S	FCV2-S / FCV3-S	FCV6-S	FCV1-L / FCV3-S
Crankshaft type		1-part	1-part	1-part	1-part	2-part
Massmoments / Forces						
Free Forces						
F1v	[±kN]	0	0	2	16	25
F1h	[±kN]	0	0	1	16	53
F2v	[±kN]	0	0	6	6	0
F4v	[±kN]	0	0	47	47	0
External Moments						
M1v	[±kNm]	0	486	1265	1308	975
M1h	[±kNm]	0	510	1191	1154	381
M2v *)	[±kNm]	6906	2005	315	315	327
M4v	[±kNm]	479	1362	547	547	569
Lateral H-Moments M_{LH}						
Ord.1	[±kNm]	0	0	1	1	6
Ord.2	[±kNm]	0	0	1	1	0
Ord.3	[±kNm]	0	0	39	39	19
Ord.4	[±kNm]	0	0	596	596	0
Ord.5	[±kNm]	0	0	254	254	3
Ord.6	[±kNm]	4177	0	13	13	0
Ord.7	[±kNm]	0	3349	23	23	0
Ord.8	[±kNm]	0	0	2448	2448	2477
Ord.9	[±kNm]	0	0	12	12	0
Ord.10	[±kNm]	0	0	3	3	0
Ord.11	[±kNm]	0	0	42	42	0
Ord.12	[±kNm]	322	0	87	87	0
Lateral X-Moments M_{LX}						
Ord.1	[±kNm]	0	359	885	885	211
Ord.2	[±kNm]	885	257	40	40	66
Ord.3	[±kNm]	967	1057	1346	1346	1614
Ord.4	[±kNm]	1577	4481	1800	1800	1864
Ord.5	[±kNm]	0	348	4380	4380	5126
Ord.6	[±kNm]	0	52	87	87	26
Ord.7	[±kNm]	0	0	375	375	23
Ord.8	[±kNm]	305	24	130	130	0
Ord.9	[±kNm]	558	62	78	78	10
Ord.10	[±kNm]	152	433	37	37	6
Ord.11	[±kNm]	0	210	258	258	316
Ord.12	[±kNm]	0	17	60	60	68
Torque variation	[±kNm]	4277	3400	3040	3040	2535

* No engine fitted 2nd order balancer available. If reduction of M2v is needed, an external compensator has to be applied.

The values for other engine ratings are available on request
The resulting lateral guide force at the crosshead can be calculated as follows: FL=MLH x 0.192 [kN]

X92-B

External forces and moments

Rating R1 : 6450 kW/Cyl. / 80 rpm Delta Tuning

Engine Type		**9X92-B**	**10X92-B**	**11X92-B**	**12X92-B**
Speed		80 rpm	80 rpm	80 rpm	80 rpm
Power		58050 kW	64500 kW	70950 kW	77400 kW
Firing order		irregular	irregular	irregular	irregular
Crank type		FCV1-L / FCV3-S	FCV1-L / FCV3-S	FCV4-L / FCV2-S	FCV4-L / FCV2-S
Crankshaft type		2-part	2-part	2-part	2-part
Massmoments / Forces					
Free Forces					
F1v	[±kN]	43	85	43	56
F1h	[±kN]	45	74	42	62
F2v	[±kN]	72	29	10	38
F4v	[±kN]	48	14	24	26
External Moments					
M1v	[±kNm]	869	154	236	1195
M1h	[±kNm]	815	185	216	1576
M2v *)	[±kNm]	2439	1607	2382	775
M4v	[±kNm]	732	768	317	1293
Lateral H-Moments M_{LH}					
Ord.1	[±kNm]	79	172	105	131
Ord.2	[±kNm]	11	18	31	9
Ord.3	[±kNm]	38	39	138	39
Ord.4	[±kNm]	594	159	296	326
Ord.5	[±kNm]	726	268	1714	1617
Ord.6	[±kNm]	162	144	1316	241
Ord.7	[±kNm]	91	69	215	995
Ord.8	[±kNm]	94	18	346	179
Ord.9	[±kNm]	1849	120	89	71
Ord.10	[±kNm]	28	1410	79	65
Ord.11	[±kNm]	19	60	773	47
Ord.12	[±kNm]	19	3	20	577
Lateral X-Moments M_{LX}					
Ord.1	[±kNm]	603	131	149	964
Ord.2	[±kNm]	324	205	311	98
Ord.3	[±kNm]	1912	2398	2999	3335
Ord.4	[±kNm]	2405	2515	1038	4224
Ord.5	[±kNm]	2156	348	1109	1481
Ord.6	[±kNm]	3509	868	525	602
Ord.7	[±kNm]	565	3333	390	654
Ord.8	[±kNm]	201	244	2156	1014
Ord.9	[±kNm]	22	61	618	1796
Ord.10	[±kNm]	115	17	67	428
Ord.11	[±kNm]	34	20	182	150
Ord.12	[±kNm]	271	17	77	51
Torque variation	[±kNm]	2802	1897	3187	2841

* No engine fitted 2nd order balancer available. If reduction of M2v is needed, an external compensator has to be applied.

The values for other engine ratings are available on request
The resulting lateral guide force at the crosshead can be calculated as follows: FL=MLH x 0.192 [kN]

X92-B

External forces and moments

Rating R1 : 6450 kW/Cyl. / 80 rpm LowLoad Tuning

Engine Type		6X92-B	7X92-B	8X92-B	8X92-B	8X92-B
Speed		80 rpm	80 rpm	80 rpm	80 rpm	80 rpm
Power		38700 kW	45150 kW	51600 kW	51600 kW	51600 kW
Firing order		regular	regular	irregular	irregular	regular
Crank type		FCV3-S	FCV3-S	FCV2-S / FCV3-S	FCV6-S	FCV1-L / FCV3-S
Crankshaft type		1-part	1-part	1-part	1-part	2-part
Massmoments / Forces						
Free Forces						
F1v	[±kN]	0	0	2	16	25
F1h	[±kN]	0	0	1	16	53
F2v	[±kN]	0	0	6	6	0
F4v	[±kN]	0	0	47	47	0
External Moments						
M1v	[±kNm]	0	486	1265	1308	975
M1h	[±kNm]	0	510	1191	1154	381
M2v *)	[±kNm]	6906	2005	315	315	327
M4v	[±kNm]	479	1362	547	547	569
Lateral H-Moments M_{LH}						
Ord.1	[±kNm]	0	0	1	1	6
Ord.2	[±kNm]	0	0	1	1	0
Ord.3	[±kNm]	0	0	39	39	19
Ord.4	[±kNm]	0	0	597	597	0
Ord.5	[±kNm]	0	0	254	254	3
Ord.6	[±kNm]	4181	0	13	13	0
Ord.7	[±kNm]	0	3345	23	23	0
Ord.8	[±kNm]	0	0	2449	2449	2477
Ord.9	[±kNm]	0	0	12	12	0
Ord.10	[±kNm]	0	0	3	3	0
Ord.11	[±kNm]	0	0	42	42	0
Ord.12	[±kNm]	322	0	87	87	0
Lateral X-Moments M_{LX}						
Ord.1	[±kNm]	0	359	886	886	211
Ord.2	[±kNm]	882	256	40	40	65
Ord.3	[±kNm]	967	1058	1347	1347	1615
Ord.4	[±kNm]	1576	4480	1800	1800	1863
Ord.5	[±kNm]	0	348	4381	4381	5128
Ord.6	[±kNm]	0	52	87	87	26
Ord.7	[±kNm]	0	0	373	373	23
Ord.8	[±kNm]	305	24	131	131	0
Ord.9	[±kNm]	560	63	78	78	10
Ord.10	[±kNm]	151	429	36	36	6
Ord.11	[±kNm]	0	212	260	260	319
Ord.12	[±kNm]	0	17	60	60	68
Torque variation	[±kNm]	4281	3396	3040	3040	2536

* No engine fitted 2nd order balancer available. If reduction of M2v is needed, an external compensator has to be applied.

The values for other engine ratings are available on request
The resulting lateral guide force at the crosshead can be calculated as follows: FL=MLH x 0.192 [kN]

X92-B

External forces and moments

Rating R1 : 6450 kW/Cyl. / 80 rpm LowLoad Tuning

Engine Type		9X92-B	10X92-B	11X92-B	12X92-B
Speed		80 rpm	80 rpm	80 rpm	80 rpm
Power		58050 kW	64500 kW	70950 kW	77400 kW
Firing order		irregular	irregular	irregular	irregular
Crank type		FCV1-L / FCV3-S	FCV1-L / FCV3-S	FCV4-L / FCV2-S	FCV4-L / FCV2-S
Crankshaft type		2-part	2-part	2-part	2-part
Massmoments / Forces					
Free Forces					
F1v	[±kN]	43	85	43	56
F1h	[±kN]	45	74	42	62
F2v	[±kN]	72	29	10	38
F4v	[±kN]	48	14	24	26
External Moments					
M1v	[±kNm]	869	154	236	1195
M1h	[±kNm]	815	185	216	1576
M2v *)	[±kNm]	2439	1607	2382	775
M4v	[±kNm]	732	768	317	1293
Lateral H-Moments M_{LH}					
Ord.1	[±kNm]	79	172	105	131
Ord.2	[±kNm]	11	18	31	9
Ord.3	[±kNm]	38	40	139	39
Ord.4	[±kNm]	594	159	296	326
Ord.5	[±kNm]	727	268	1715	1618
Ord.6	[±kNm]	163	144	1317	241
Ord.7	[±kNm]	91	69	215	994
Ord.8	[±kNm]	94	18	347	179
Ord.9	[±kNm]	1851	120	89	71
Ord.10	[±kNm]	28	1404	78	65
Ord.11	[±kNm]	19	60	774	47
Ord.12	[±kNm]	19	3	20	577
Lateral X-Moments M_{LX}					
Ord.1	[±kNm]	604	131	150	965
Ord.2	[±kNm]	322	204	310	98
Ord.3	[±kNm]	1913	2398	3000	3336
Ord.4	[±kNm]	2405	2514	1038	4223
Ord.5	[±kNm]	2157	348	1110	1482
Ord.6	[±kNm]	3514	870	526	603
Ord.7	[±kNm]	563	3322	389	652
Ord.8	[±kNm]	201	244	2159	1016
Ord.9	[±kNm]	22	61	620	1802
Ord.10	[±kNm]	114	17	66	425
Ord.11	[±kNm]	34	21	184	152
Ord.12	[±kNm]	271	17	77	51
Torque variation	[±kNm]	2805	1892	3188	2840

* No engine fitted 2nd order balancer available. If reduction of M2v is needed, an external compensator has to be applied.

The values for other engine ratings are available on request
The resulting lateral guide force at the crosshead can be calculated as follows: FL=MLH x 0.192 [kN]

X92-B

External forces and moments

Rating R1 : 6450 kW/Cyl. / 80 rpm DeltaBypass Tuning

Engine Type		6X92-B	7X92-B	8X92-B	8X92-B	8X92-B
Speed		80 rpm	80 rpm	80 rpm	80 rpm	80 rpm
Power		38700 kW	45150 kW	51600 kW	51600 kW	51600 kW
Firing order		regular	regular	irregular	irregular	regular
Crank type		FCV3-S	FCV3-S	FCV2-S / FCV3-S	FCV6-S	FCV1-L / FCV3-S
Crankshaft type		1-part	1-part	1-part	1-part	2-part
Massmoments / Forces						
Free Forces						
F1v	[±kN]	0	0	2	16	25
F1h	[±kN]	0	0	1	16	53
F2v	[±kN]	0	0	6	6	0
F4v	[±kN]	0	0	47	47	0
External Moments						
M1v	[±kNm]	0	486	1265	1308	975
M1h	[±kNm]	0	510	1191	1154	381
M2v *)	[±kNm]	6906	2005	315	315	327
M4v	[±kNm]	479	1362	547	547	569
Lateral H-Moments M_{LH}						
Ord.1	[±kNm]	0	0	1	1	6
Ord.2	[±kNm]	0	0	1	1	0
Ord.3	[±kNm]	0	0	39	39	20
Ord.4	[±kNm]	0	0	597	597	0
Ord.5	[±kNm]	0	0	254	254	3
Ord.6	[±kNm]	4183	0	13	13	0
Ord.7	[±kNm]	0	3346	23	23	0
Ord.8	[±kNm]	0	0	2450	2450	2478
Ord.9	[±kNm]	0	0	12	12	0
Ord.10	[±kNm]	0	0	3	3	0
Ord.11	[±kNm]	0	0	42	42	0
Ord.12	[±kNm]	322	0	87	87	0
Lateral X-Moments M_{LX}						
Ord.1	[±kNm]	0	359	886	886	211
Ord.2	[±kNm]	880	256	40	40	65
Ord.3	[±kNm]	966	1057	1346	1346	1613
Ord.4	[±kNm]	1577	4482	1801	1801	1864
Ord.5	[±kNm]	0	349	4384	4384	5131
Ord.6	[±kNm]	0	52	87	87	26
Ord.7	[±kNm]	0	0	374	374	23
Ord.8	[±kNm]	305	24	131	131	0
Ord.9	[±kNm]	560	63	78	78	10
Ord.10	[±kNm]	151	429	36	36	6
Ord.11	[±kNm]	0	212	260	260	318
Ord.12	[±kNm]	0	17	60	60	68
Torque variation	[±kNm]	4284	3397	3042	3042	2537

* No engine fitted 2nd order balancer available. If reduction of M2v is needed, an external compensator has to be applied.

The values for other engine ratings are available on request
The resulting lateral guide force at the crosshead can be calculated as follows: FL=MLH x 0.192 [kN]

X92-B

External forces and moments

Rating R1 : 6450 kW/Cyl. / 80 rpm DeltaBypass Tuning

Engine Type		9X92-B	10X92-B	11X92-B	12X92-B
Speed		80 rpm	80 rpm	80 rpm	80 rpm
Power		58050 kW	64500 kW	70950 kW	77400 kW
Firing order		irregular	irregular	irregular	irregular
Crank type		FCV1-L / FCV3-S	FCV1-L / FCV3-S	FCV4-L / FCV2-S	FCV4-L / FCV2-S
Crankshaft type		2-part	2-part	2-part	2-part
Massmoments / Forces					
Free Forces					
F1v	[±kN]	43	85	43	56
F1h	[±kN]	45	74	42	62
F2v	[±kN]	72	29	10	38
F4v	[±kN]	48	14	24	26
External Moments					
M1v	[±kNm]	869	154	236	1195
M1h	[±kNm]	815	185	216	1576
M2v *)	[±kNm]	2439	1607	2382	775
M4v	[±kNm]	732	768	317	1293
Lateral H-Moments M_{LH}					
Ord.1	[±kNm]	79	172	105	131
Ord.2	[±kNm]	11	18	31	9
Ord.3	[±kNm]	38	40	140	39
Ord.4	[±kNm]	594	159	296	326
Ord.5	[±kNm]	727	268	1716	1619
Ord.6	[±kNm]	163	144	1318	241
Ord.7	[±kNm]	91	69	215	994
Ord.8	[±kNm]	94	18	347	179
Ord.9	[±kNm]	1852	120	89	71
Ord.10	[±kNm]	28	1404	78	65
Ord.11	[±kNm]	19	60	773	47
Ord.12	[±kNm]	19	3	20	577
Lateral X-Moments M_{LX}					
Ord.1	[±kNm]	604	131	150	966
Ord.2	[±kNm]	322	204	310	97
Ord.3	[±kNm]	1911	2396	2997	3332
Ord.4	[±kNm]	2406	2516	1038	4226
Ord.5	[±kNm]	2158	348	1110	1483
Ord.6	[±kNm]	3516	870	526	604
Ord.7	[±kNm]	563	3324	389	653
Ord.8	[±kNm]	201	244	2160	1016
Ord.9	[±kNm]	22	61	620	1803
Ord.10	[±kNm]	114	17	66	425
Ord.11	[±kNm]	34	21	183	151
Ord.12	[±kNm]	271	17	77	51
Torque variation	[±kNm]	2806	1893	3189	2840

* No engine fitted 2nd order balancer available. If reduction of M2v is needed, an external compensator has to be applied.

The values for other engine ratings are available on request
The resulting lateral guide force at the crosshead can be calculated as follows: FL=MLH x 0.192 [kN]

6-12 X92-B / Free external mass moments
Power related unbalance (PRU)
Rating R1 6450 kW/Cyl. @ 80 rpm