

VARIABLE EFFORT SUPPORTS

The latest range of Variable Effort Supports has been designed to cater for the ever increasing space limitations on Offshore Rigs and other process plants and also to enable the units to be finished in either a galvanised or protective paint finish at minimum cost, allowing full assembly without damaging such finishes.

APPLICATION

Variable Effort Supports are used to support the weight of pipework or equipment whilst allowing a degree of movement relative to the supporting structure. Where pipes transport hot (or cold) liquids or gases they expand (or contract) due to the difference between operating and ambient temperatures. It is necessary to support the pipe in operating and ambient conditions, whilst permitting movement between the two. Variable Effort Supports may also be needed to cater for ambient temperature variation local to items of plant or long vertical pipe runs, or where pipes pass between buildings that may be subject to relative movement due to subsidence or earthquake.

RANGE

We offer a wide range of Variable Effort Supports catering for loads from 3.43 kgf to 23265 kgf.

Available in the following variations:

WORKING RANGES

V1	35mm
V2	70mm
V3	140mm

With twenty-nine spring sizes (1 to 29) within each travel range.

SUPPORT TYPES

TS1, TS2, TS3	Top Suspended
TA	Top Adjustable
ES	Extended Support
DS	Double Support
BMI, BM2, BM3, BM4	Base Mounted

RELATED SPECIFICATIONS

Our Variable Effort Supports are designed and manufactured to meet the requirements of the following specifications:

BS3974	ANSI/ASME B31.1
ANSI/ASME B31.3	ANSI/MSS SP-58
ANSI/MSS SP-69	

INSTALLATION AND ERECTION

Types TS1, TS2, TS3, TA and ES

Lift the support carefully into position and secure to the hanger rod for type TS1, to the beam attachment with a suspension bolt or clevis pin for types TS2 and TS3 or to the support beams for types TA and ES. Make the connection to the pipework via the hanger rod and pipe clip. Apply tension to the spring unit by rotating the turnbuckle (or adjusting nut for type TA). When the preset load is attained, the locking nuts above the spring plate will become free to rotate. The locking nuts beneath the spring plate are then ready to carry any hydrostatic test load. On completion of hydrostatic testing, lagging, etc. the locking nuts must be fully withdrawn from the spring plate to the unlocked position (see diagram).

Type DS

The procedure is similar to the above except that the spring canister is inverted and application of the load will release the locking nuts below the spring plate, with nuts above the spring plate carrying the hydrostatic test load, etc.

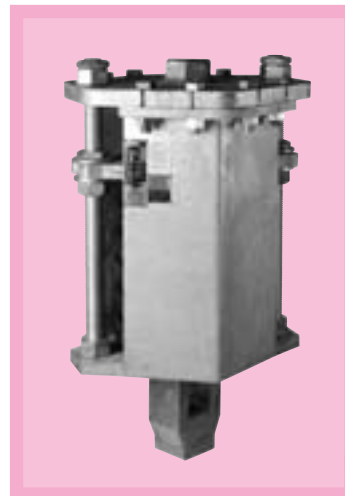
Types BM1, BM2, BM3, BM4

For these supports the load is transferred to the support by rotation of the height adjustment nut, which is situated below the load pad, rather than via a turnbuckle. Then proceed as for TS1, etc.

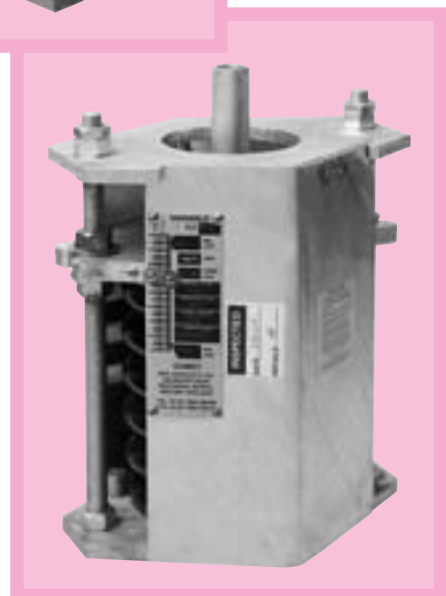
MAINTENANCE

Variable Effort Supports are designed to be maintenance free. On no account should any attempt be made to remove the spring coil from the canister, since it has been pre-compressed. Periodic inspection should be carried out at a frequency which suits the environment in which they are used. Check for visual damage, for any corrosion (especially of the spring coil and threaded rods) and to ensure that no debris has fallen into the support which could impede the movement of the spring.

A more detailed erection and maintenance procedure is available upon request.



Type TS1
(Construction for sizes 25–29)



Type ES

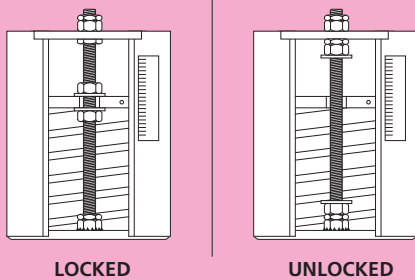
VARIABLE EFFORT SUPPORTS

Type TS2



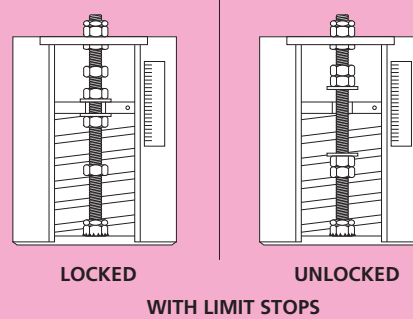
Type BM1

STANDARD FEATURES



1. Compactness of units. Installed heights designed to minimum.
2. Preset and multi-locking device, allowing unit to be supplied locked at its installed load and ready to accept a test load of at least twice the rated load. The infinitely adjustable multi-lock is permanently fixed to the unit, allowing re-locking at any travel position. This is of particular benefit at times of plant outages or during pipework maintenance/inspection.
3. Overtravel is provided on either side of the working range.
4. Supports are fitted with stainless steel nameplates marked with the installed and operating load, support reference mark, type and unique serial number.
5. Supports are painted with a durable high-build thixotropic paint.

OPTIONAL FEATURES



1. Limit Stops. The preset/multilock facility may be enhanced to precisely limit spring travel. Additional nuts welded in position are used to limit movement to a specified amount.
2. The construction of our variable effort supports makes the application of special paint finishes a simple matter.
3. Supports are available with neoprene-coated or plastic-coated springs for corrosion resistance.
4. For extreme corrosive conditions extra-thick body section can be supplied.
5. Fully galvanised supports are available where required. Spring coils in galvanised units are supplied neoprene or plastic coated.
6. For extended life in offshore or other situations subject to highly corrosive conditions, supports are available in various grades of stainless steel with the spring coil from 17/4 PH (precipitation hardened) stainless steel. Please check with our design department for dimensional information.
7. In Cryogenic applications supports are available manufactured entirely in austenitic stainless steel. Please check with our design department for dimensional information.
8. For type BM1 Supports, where lateral loading greater than 25% of the maximum operating load is envisaged, PTFE covered load pads should be specified.

VARIABLE EFFORT SUPPORTS

SELECTION

Selection of Variable Effort Supports can either be done manually from the catalogue as described below, or by using computer software that is available from our sales department.

SELECTION FROM THE CATALOGUE

Load charts are positioned inside the front and back cover so that they may be opened out and used at the same time as dimensional charts for the units being selected.

Range: The choice of range V1, V2 or V3 will depend upon the movement at the support position and the allowable change in effort.

Change in effort = movement x Spring Rate

This often expressed as a percentage of operating load.

$$\text{Variation in effort} = \frac{\text{Movement} \times \text{Spring Rate}}{\text{Operating Load}} \times 100\%$$

This variation is usually limited to 25% although greater variation is sometimes specified where a higher spring rate is justified in the pipework analysis, or lesser when supporting critical items.

For guidance only on selecting the travel range, movements of 15 mm, 30 mm and 60 mm will produce variations in effort of approximately 25% of 'mild table load' on ranges V1, V2 and V3 respectively.

SUPPORT SIZE

Selection of support size is determined using the selection charts in N of kgf which are located inside the front and rear covers.

SELECTION PROCEDURE

1. Determine the required supporting effort and pipe movement (up or down) installed to operating. Weights of spreader beams, heavy pipe clamps, etc. should be added to the pipe load.
2. Estimate which travel range will be required. (See above).
3. Select the smallest spring size which has the operating load within the working travel.
4. Ensure the spring selected can accommodate the preset to operating travel within the working range. This is done by moving up and down the chart from the operating load by the amount of the travel. Down if the movement 'installed to operating' is up, and up if the movement 'installed to operating' is down.
5. If the spring selected can not accommodate the movement try a larger spring size or the next travel range. If the movement can not be accommodated by V3 range then a constant effort support is required.
6. Check the variation in supporting effort for the selected spring

$$\text{Variation} = \frac{\text{Movement} \times \text{Spring Rate}}{\text{Operating Load}} \times 100\%$$

If this exceeds the allowable variation then choose the next travel range and go back to 3 above. If the variation is less than half of the allowable then a smaller travel range may be acceptable. Choose a smaller travel range and go back to Step 4. If the variation exceeds the allowable for a V3 selection then a constant effort support is required.

TYPE

Determine the type of unit required, i.e. TS1, TS2, TS3, TA, ES, DS, BM1, BM2, BM3 or BM4. Selection will depend upon the location of steelwork/concrete and available space.

Once the travel range, spring size and type have been selected the descriptions can be written, i.e. V1-18BMI.

CALCULATION OF INSTALLED DIMENSIONS

The "RTO" or rod take out dimension for TS1, TS2, TS3 and DS units and "J" dimension for TA, ES and BM supports tabulated are dimensions at minimum load, i.e. at the start of the working range. In order to determine installed dimensions carry out the calculations below:

a) Installed Load =
Operating Load + (Movement x Spring Rate)
for 'installed to operating' movement up.

b) Installed Load =
Operating Load - (Movement x Spring Rate)
for 'installed to operating' movement down.

$$\text{Spring Displacement at Installed Load} = \frac{\text{Installed Load} - \text{Minimum Load (mm)}}{\text{Spring Rate}}$$

$$\text{Installed Dimension} = \text{R.T.O.} + \text{Spring Displacement at Installed Load (TS1, TS2, TS3 and DS units).}$$

$$\text{Installed Dimension} = \text{J} - \text{Spring Displacement at Installed Load (TA, ES and BM units).}$$

ORDERING

Either:

- a) Advise
- i) Number off.
 - ii) Support Description, i.e.
V2 — 12 — TS3
Travel Range Spring Size Type
 - iii) Operating Load.
 - iv) Installed to operating movement and direction.
 - v) Finish required.
 - vi) Support Mark No.
 - vii) Thread Form.

N.B. If exact load and movement are not known supports will be supplied set at mid-travel.

- or b)
- i) Number off.
 - ii) Support Type.
 - iii) Operating Load.
 - iv) Installed to operating movement.
 - v) Allowable variation. This will be taken as 25% of operating load unless otherwise stated.
 - vi) Finish.
 - vii) Support Mark No.
 - viii) Thread Form.

In this case we will determine support size to be supplied.

VARIABLE EFFORT SUPPORT SELECTION CHART

Newtons

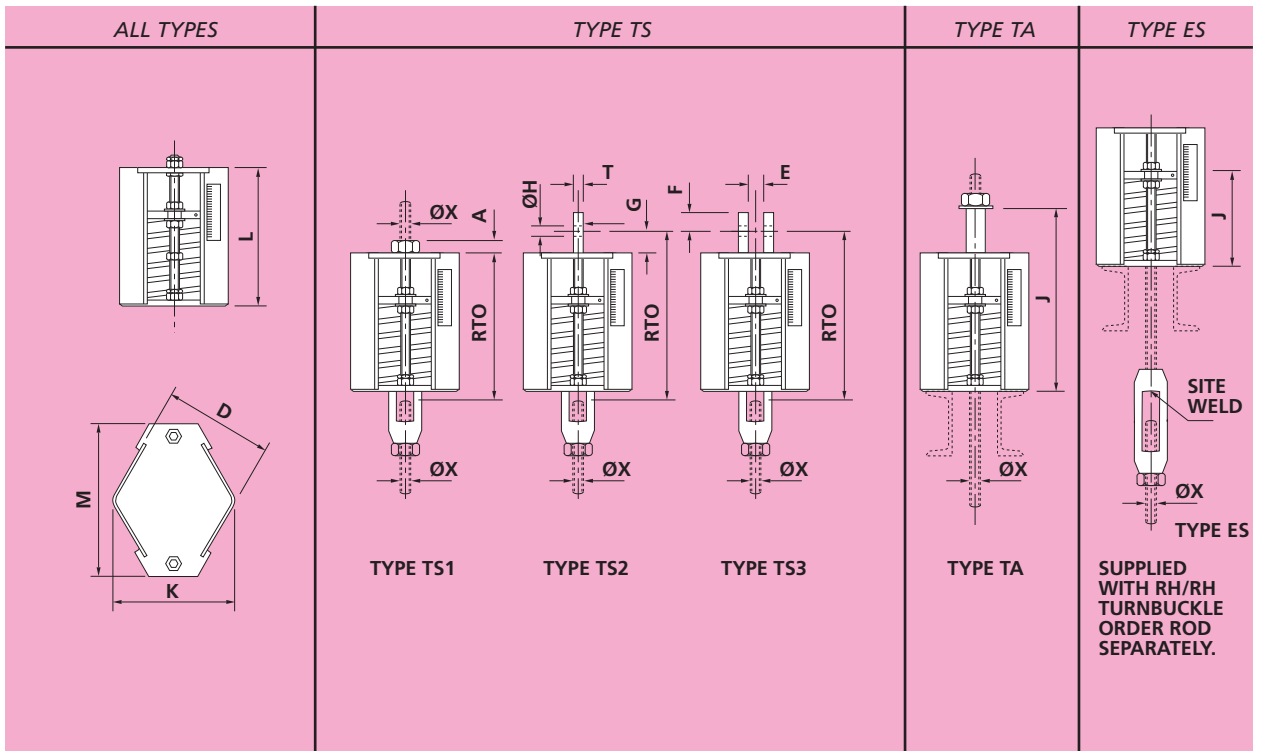
MOVEMENT mm					SPRING SIZE																													
	V1	V2	V3	V4	V5	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
O >MIN<-<MAX<						26.7	46.7	75.5	107	125	160	178	289	353	461	608	775	1079	1412	1981	2471	3501	4511	5972	7963	10611	14328	20006	26782	35333	47023	62272	83102	111139
						28.1	48.4	77.6	110	129	165	183	296	363	473	625	798	1108	1453	2034	2544	3591	4631	6132	8176	10894	14711	20532	27483	36281	48270	63934	85360	114064
						29.5	50.2	79.7	112	133	170	189	303	373	486	642	821	1138	1493	2088	2617	3682	4752	6291	8389	11177	15095	21059	28183	37228	49517	65595	87619	116989
						30.9	51.9	81.8	115	137	175	194	310	382	499	659	844	1167	1534	2141	2690	3772	4872	6451	8602	11460	15479	21586	28884	38175	50764	67257	89878	119915
						32.3	53.7	83.9	118	141	179	200	317	392	511	676	867	1196	1575	2194	2763	3863	4992	6610	8815	11743	15863	22112	29584	39122	52010	68919	92137	122840
MIN	0	0	0	0	0	33.7	55.5	86.0	121	146	184	206	324	402	524	693	890	1226	1615	2248	2836	3953	5113	6770	9029	12026	16247	22639	30285	40069	53257	70580	94396	125765
						35.1	57.2	88.1	124	150	189	211	331	412	536	710	912	1255	1656	2301	2908	4043	5233	6929	9242	12309	16631	23166	30985	41016	54504	72242	96655	128690
						36.5	59.0	90.2	126	154	194	217	338	422	549	727	935	1285	1697	2354	2982	4134	5353	7089	9455	12591	17015	23692	31686	41964	55751	73904	98914	131616
						37.9	60.7	92.3	129	158	199	222	345	431	562	744	958	1314	1737	2406	3055	4224	5474	7249	9668	12874	17399	24219	32387	42911	56998	75565	101173	134541
						39.3	62.5	94.5	132	162	204	228	352	441	574	761	981	1344	1778	2461	3128	4315	5594	7408	9881	13157	17783	24746	33087	43858	58245	77227	103431	137466
W						40.7	64.2	96.6	135	167	209	234	359	451	587	778	1004	1373	1819	2514	3201	4405	5714	7568	10094	13440	18166	25272	33788	44805	59492	78889	105690	140391
						42.1	66.0	98.7	138	171	214	239	366	461	599	795	1027	1402	1859	2568	3274	4496	5834	7727	10307	13723	18550	25799	34488	45752	60739	80550	107949	143317
						43.5	67.7	101	140	175	219	245	373	471	612	812	1050	1432	1900	2621	3347	4586	5955	7887	10520	14006	18934	26326	35189	46700	61985	82212	110208	146242
						44.9	69.5	103	143	179	224	251	380	481	624	829	1073	1461	1941	2674	3420	4676	6075	8046	10733	14289	19318	26853	35889	47647	63232	83873	112467	149167
						46.3	71.3	105	146	183	228	256	387	490	637	846	1096	1491	1981	2728	3493	4767	6195	8206	10947	14572	19702	27379	36590	48594	64479	85535	114726	152092
O	5	10	20	30	40	47.7	73.0	107	149	188	233	262	394	500	650	863	1119	1520	2022	2781	3566	4857	6316	8365	11160	14855	20086	27906	37291	49541	65726	87197	116985	155018
						49.1	74.8	109	152	192	238	267	401	510	662	880	1142	1549	2063	2834	3639	4948	6436	8525	11373	15138	20470	28433	37991	50488	66973	88558	119244	157943
						50.5	76.5	111	154	196	243	273	406	520	675	897	1165	1579	2103	2888	3711	5038	6556	8684	11586	15421	20854	28959	38692	51435	68220	90520	121502	160868
						51.9	78.3	113	157	200	248	279	415	530	687	914	1188	1608	2144	2941	3784	5128	6677	8844	11799	15704	21238	29486	39392	52383	69467	92182	123761	163793
						53.3	80.0	116	160	205	253	284	422	539	700	931	1211	1638	2185	2994	3857	5219	6797	9003	12012	15967	21622	30013	40093	53330	70714	93843	126202	166719
K	10	20	40	60	80	54.7	81.8	118	163	209	258	290	429	549	713	948	1234	1667	2225	3048	3930	5309	6917	9163	12225	16270	22005	30539	40794	54277	71960	95505	128279	169644
						56.1	83.5	120	166	213	263	296	436	559	725	965	1257	1697	2266	3101	4003	5400	7038	9323	12438	16553	22389	31066	41494	55224	73207	97166	130538	172569
						57.5	85.3	122	168	217	268	301	443	569	738	982	1280	1726	2307	3154	4076	5490	7158	9482	12652	16836	22773	31593	42195	56171	74454	98228	132797	175494
						58.9	87.1	124	171	221	273	307	450	579	750	999	1303	1755	2347	3208	4149	5580	7278	9642	12865	17119	23157	32119	42895	57118	75701	100490	135056	178420
						60.3	88.8	126	174	226	278	312	457	588	763	1016	1326	1785	2388	3261	4222	5671	7399	9801	13078	17402	23541	32646	43596	58066	76948	102151	137315	181345
R	20	40	80	120	160	61.7	90.6	128	177	230	282	318	465	598	775	1033	1349	1814	2429	3314	4295	5761	7519	9961	13291	17685	23925	33173	44296	59013	78195	103813	139574	184270
						63.1	92.3	130	180	234	287	324	472	608	788	1050	1372	1844	2469	3368	4368	5852	7639	10120	13504	17968	24309	33699	44997	59960	79442	105475	141832	187195
						64.5	94.1	132	182	238	292	329	479	618	801	1067	1395	1873	2510	3421	4441	5942	7759	10280	13717	18251	24693	34226	45698	60907	80689	107136	144091	190121
						65.9	95.8	134	185	242	297	335	486	628	813	1084	1418	1902	2551	3474	4514	6033	7880	10439	13930	18534	25077	34753	46398	61854	81936	108798	146350	193046
						67.3	97.6	137	188	247	302	341	493	637	826	1100	1441	1932	2591	3528	4587	6123	8000	10599	14143	18817	25460	35280	47099	62802	83182	110459	148609	195971
A	25	50	100	150	200	68.7	99.3	139	191	251	307	346	500	647	838	1117	1464	1961	2632	3581	4660	6213	8120	10758	14356	19100	25844	35806	47799	63749	84429	112121	150868	198896
						70.1	101	141	194	255	312	352	507	657	851	1134	1487	1991	2673	3634	4733	6304	8241	10918	14570	19382	26228	36333	48500	64696	85676	113783	153127	201822
						71.5	103	143	196	259	317	357	514	667	864	1151	1510	2020	2713	3688	4806	6394	8361	11077	14783	19665	26612	36860	49200	65643	86923	115444	155386	204747
						72.9	105	145	199	263	322	363	521	677	876	1168	1532	2050	2754	3741	4879	6485	8481	11237	14996	19948	26996	37386	49901	66590	88170	117106	157645	207672
						74.3	106	147	202	268	327	369	528	686	889	1185	1555	2079	2795	3794	4952	6575	8602	11397	15209	20231	27380	37913	50602	67537	89417	118768	159903	210597
G	30	60	120	180	240	75.7	108	149	205	272	331	374	535	696	901	1202	1578	2108	2835	3848	5025	6665	8722	11556	15422	20514	27764	38440	51302	68485	90664	120429	162162	213523
						77.1	110	15																										

VARIABLE EFFORT SUPPORT LOAD SELECTION CHART

kgf

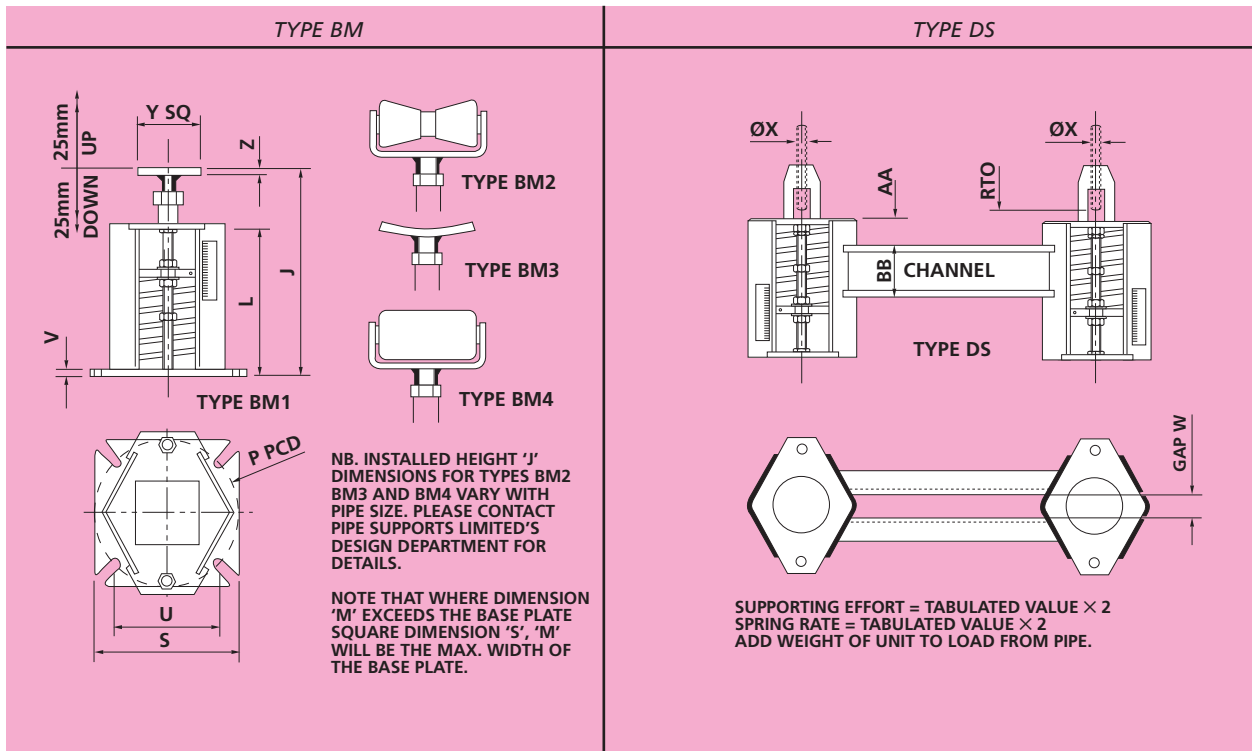
MOVEMENT mm					SPRING SIZE																													
	V1	V2	V3	V4	V5	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
O VER TRAVEL	MIN	0	0	0	0	2.72	4.76	7.7	10.9	12.7	16.3	18.1	29.5	36.0	47.0	62.0	79.0	110	144	202	252	357	460	609	812	1082	1461	2040	2731	3603	4795	6350	8474	11333
						2.86	4.94	7.91	11.2	13.1	16.8	18.7	30.2	37.0	48.3	63.7	81.3	113	148	207	259	366	472	625	834	1111	1500	2094	2802	3700	4922	6519	8704	11631
						3.01	5.12	8.13	11.5	13.6	17.3	19.2	30.9	38.0	49.6	65.5	83.7	116	152	213	267	375	485	642	855	1140	1539	2147	2874	3796	5049	6689	8935	11930
						3.15	5.30	8.34	11.8	14.0	17.8	19.8	31.6	39.0	50.8	67.2	86.0	119	156	218	274	385	497	658	877	1169	1578	2201	2945	3883	5176	6858	9165	12228
						3.29	5.48	8.56	12.0	14.4	18.3	20.4	32.4	40.0	52.1	68.9	88.4	122	161	224	282	394	509	674	899	1197	1618	2255	3017	3989	5304	7028	9395	12526
W	0	0	0	0	0	3.43	5.66	8.77	12.3	14.8	18.8	21.0	33.1	41.0	53.4	70.7	90.7	125	165	229	289	403	521	690	921	1226	1657	2309	3088	4086	5431	7197	9626	12824
						3.58	5.83	8.99	12.6	15.3	19.3	21.5	33.8	42.0	54.7	72.4	93.0	128	169	235	297	412	534	707	942	1255	1696	2362	3160	4183	5558	7367	9856	13123
						3.72	6.01	9.20	12.9	15.7	19.8	22.1	34.5	43.0	56.0	74.1	95.4	131	173	240	304	422	546	723	964	1284	1735	2416	3231	4279	5685	7536	10086	13421
						3.86	6.19	9.42	13.2	16.1	20.3	22.7	35.2	44.0	57.3	75.9	97.7	134	177	246	312	431	558	739	986	1313	1774	2470	3303	4376	5812	7706	10317	13719
						4.01	6.37	9.63	13.5	16.6	20.8	23.3	35.9	45.0	58.5	77.6	100	137	181	251	319	440	570	755	1008	1342	1813	2523	3374	4472	5939	7875	10547	14018
O	5	30	20	30	40	4.15	6.55	9.85	13.8	17.0	21.3	23.8	36.6	46.0	59.8	79.3	102	140	185	256	326	449	583	772	1029	1371	1852	2577	3445	4569	6066	8044	10777	14316
						4.29	6.73	10.1	14.0	17.4	21.8	24.4	37.4	47.0	61.1	81.0	105	143	190	262	334	458	595	788	1051	1399	1892	2631	3517	4665	6194	8214	11008	14614
						4.44	6.91	10.3	14.3	17.9	22.3	25.0	38.1	48.0	62.4	82.8	107	146	194	267	341	468	607	804	1073	1428	1931	2684	3588	4762	6321	8383	11238	14913
						4.58	7.09	10.5	14.6	18.3	22.8	25.6	38.8	49.0	63.7	84.5	109	149	198	273	349	477	619	820	1095	1457	1970	2738	3660	4859	6448	8553	11468	15211
						4.72	7.27	10.7	14.9	18.7	23.3	26.1	39.5	50.0	65.0	86.2	112	152	202	278	356	486	632	837	1116	1486	2009	2792	3731	4955	6575	8722	11699	15509
K	10	20	40	60	80	4.86	7.45	10.9	15.2	19.1	23.8	26.7	40.2	51.0	66.2	88.0	114	155	206	284	364	495	644	853	1138	1515	2048	2846	3803	5052	6702	8892	11929	15807
						5.01	7.62	11.1	15.5	19.6	24.3	27.3	40.9	52.0	67.5	89.7	116	158	210	289	371	505	656	869	1160	1544	2087	2899	3874	5148	6829	9061	12159	16106
						5.15	7.80	11.3	15.8	20.0	24.8	27.8	41.6	53.0	68.8	91.4	119	161	214	294	378	514	669	886	1181	1573	2126	2953	3945	5245	6956	9230	12390	16404
						5.29	7.98	11.6	16.0	20.4	25.3	28.4	42.4	54.0	70.1	93.2	121	164	219	300	386	523	681	902	1203	1601	2166	3007	4017	5342	7084	9400	12620	16702
						5.44	8.16	11.8	16.3	20.9	25.8	29.0	43.1	55.0	71.4	94.9	123	167	223	305	393	532	693	918	1225	1630	2205	3060	4088	5438	7211	9569	12850	17001
N	15	30	60	90	120	5.58	8.34	12.0	16.6	21.3	26.3	29.6	43.8	56.0	72.7	96.6	126	170	227	311	401	541	705	934	1247	1659	2244	3114	4160	5535	7338	9739	13081	17299
						5.72	8.52	12.2	16.9	21.7	26.8	30.1	44.5	57.0	73.9	98.4	128	173	231	316	408	551	718	951	1268	1688	2283	3168	4231	5631	7465	9908	13311	17597
						5.86	8.70	12.4	17.2	22.1	27.3	30.7	45.2	58.0	75.2	100	131	176	235	322	416	560	730	967	1290	1717	2322	3222	4303	5728	7592	10078	13542	17895
						6.01	8.88	12.6	17.5	22.6	27.8	31.3	45.9	59.0	76.5	102	133	179	239	327	423	569	742	983	1312	1746	2361	3275	4374	5824	7719	10247	13772	18194
						6.15	9.06	12.9	17.7	23.0	28.3	31.9	46.7	60.0	77.8	104	135	182	244	333	431	578	754	999	1334	1774	2401	3329	4446	5921	7847	10417	14002	18492
R	20	40	80	120	160	6.29	9.24	13.1	18.0	23.4	28.8	32.4	47.4	61.0	79.1	105	138	185	248	338	438	587	767	1016	1355	1803	2440	3383	4517	6018	7974	10586	14233	18790
						6.44	9.41	13.3	18.3	23.9	29.3	33.0	48.1	62.0	80.4	107	140	188	252	343	445	597	779	1032	1377	1832	2479	3436	4588	6114	8101	10755	14463	19089
						6.58	9.59	13.5	18.6	24.3	29.8	33.6	48.8	63.0	81.6	109	142	191	256	349	453	606	791	1048	1399	1861	2518	3490	4660	6211	8228	10925	14693	19387
						6.72	9.77	13.7	18.9	24.7	30.3	34.1	49.5	64.0	82.9	110	145	194	260	354	460	615	804	1065	1420	1890	2557	3544	4731	6307	8355	11094	14924	19685
						6.86	9.95	13.9	19.2	25.1	30.8	34.7	50.2	65.0	84.2	112	147	197	264	360	468	624	816	1081	1442	1919	2596	3598	4803	6404	8482	11264	15154	19983
A	25	50	100	150	200	7.01	10.1	14.1	19.5	25.6	31.3	35.3	50.9	66.0	85.5	114	149	200	268	365	475	634	828	1097	1464	1948	2635	3651	4874	6501	8609	11433	15384	20282
						7.15	10.3	14.4	19.7	26.0	31.8	35.9	51.7	67.0	86.8	116	152	203	273	371	483	643	840	1113	1486	1976	2675	3705	4946	6597	8737	11603	15615	20580
						7.29	10.5	14.6	20.0	26.4	32.3	36.4	52.4	68.0	88.1	117	154	206	277	376	490	652	853	1130	1507	2005	2714	3759	5017	6694	8864	11772	15845	20878
						7.44	10.7	14.8	20.3	26.9	32.8	37.0	53.1	69.0	89.3	119	156	209	281	381	497	661	865	1146	1529	2034	2753	3812	5088	6790	8991	11941	16075	21177
						7.58	10.8	15.0	20.6	27.3	33.3	37.6	53.8	70.0	90.6	121	159	212	285	387	505	670	877	1162	1551	2063	2792	3866	5160	6887	9118	12111	16306	21475
G	30	60	120	180	240	7.72	11.0	15.2	20.9	27.7	33.8	38.2	54.5	71.0	91.9	123	161	215	289	392	512	680	889	1178	1573	2092	2831	3920	5231	6983	9245	12280	16536	21773
						7.87	11.2	15.4	21.2	28.2	34.3	38.7	55.2	72.0	93.2	124	163	218	293	398	520	689	902	1195	1594	2121	2870	3973	5303	7080	9372	12450	16766	22072
						8.01	11.4	15.6	21.5	28.6	34.8	39.3	55.9	73.0	94.5	126	166	221	297	403	527	698	914	1211	1616	2150	2909	4027	5374	7177	9499	12619	16997	22370
						8.15	11.6	15.9	21.7	29.0	35.3	39.9	56.7	74.0	95.8	128	168	224	302	409	535	707	926	1227	1638	2178	2949	4081	5446	7273	9627	12789	17227	22668
						8.29	11.7	16.1	22.0	29.4	35.8	40.5	57.4	75.0	97.0	130	170	227	306	414	542	717	938	1243	1660	2207	2988	4135	5517	7370	9754	12958	17457	22966
E	35	70	140	210	280	8.44	11.9	16.3	22.3	29.9	36.3	41.0	58.1	76.0	98.3	131	173	230	310	420	550	726	951	1260	1681	2236	3027	4188	5589	7486	9881	13128	17688	23265
						8.58	12.1	16.5	22.6	30.3	36.8	41.6	58.8	77.0	99.6	133	175	233	314	425	557	735	963	1276	1703	2265	3066	4242	5660	7563	10008	13297	17918	23563
						8.72	12.3	16.7	22.9	30.7	37.3	42.2	59.5	78.0	101	135	177	236	318	430	564	744	975	1292	1725	2294	3105	4296	5731	7660	10135	13466	18148	23861
						8.87	12.5	16.9	23																									

RANGE V1



SUPPORT SIZE	ROD DIA X mm	BODY DIMENSIONS					RTO AT MIN LOAD (mm)			DEPTH OF THRD A mm	LUG DIMENSIONS TYPES TS2 & TS3					WEIGHTS kgf			J AT MIN LOAD mm	WEIGHT kgf	J AT MIN LOAD mm	WEIGHT kgf
		D mm	K mm	M mm	L mm (not BM)	TS1	TS2	TS3	E mm		F mm	G mm	H mm	T mm	TS1	TS2	TS3					
V1-1	M12	108	122	155	133	150	182	182	12	20	20	30	14	6	4.0	4.1	4.2	153	3.2	84	3.4	
V1-2	M12	108	122	155	117	150	182	182	12	20	20	30	14	6	4.1	4.2	4.3	157	3.2	88	3.5	
V1-3	M12	108	122	155	123	150	182	182	12	20	20	30	14	6	4.1	4.2	4.3	163	3.3	93	3.5	
V1-4	M12	108	122	155	124	150	182	182	12	20	20	30	14	6	4.2	4.3	4.4	164	3.3	94	3.6	
V1-5	M12	108	122	155	123	150	182	182	12	20	20	30	14	6	4.2	4.3	4.4	163	3.3	93	3.6	
V1-6	M12	108	122	155	126	150	182	182	12	20	20	30	14	6	4.2	4.3	4.4	166	3.3	96	3.6	
V1-7	M12	108	122	155	127	150	182	182	12	20	20	30	14	6	4.3	4.4	4.5	167	3.4	97	3.7	
V1-8	M12	108	122	155	133	150	182	182	12	20	20	30	14	6	4.4	4.5	4.6	173	3.5	103	3.8	
V1-9	M12	108	122	155	136	150	182	182	12	20	20	30	14	6	4.4	4.5	4.6	176	3.6	106	3.8	
V1-10	M12	108	122	155	134	150	182	182	12	20	20	30	14	6	4.5	4.6	4.7	174	3.6	105	3.9	
V1-11	M12	108	122	155	139	150	182	182	12	20	20	30	14	6	4.6	4.7	4.8	179	3.7	109	4.0	
V1-12	M12	108	122	155	139	150	182	182	12	20	20	30	14	6	4.7	4.8	4.9	179	3.8	110	4.1	
V1-13	M12	108	122	155	160	158	196	196	12	25	30	36	18	6	5.0	5.1	5.3	200	4.1	130	4.4	
V1-14	M12	108	122	155	173	171	209	209	12	25	30	36	18	6	5.4	5.6	5.7	213	4.6	143	4.8	
V1-15	M12	108	122	155	194	192	230	230	12	25	30	36	18	6	6.0	6.2	6.3	234	5.1	165	5.4	
V1-16	M16	145	164	200	210	207	260	260	16	30	35	50	22	10	12.3	12.6	13.0	250	10.4	172	10.8	
V1-17	M16	145	164	200	184	181	234	234	16	30	35	50	22	10	11.5	11.9	12.2	224	9.6	146	10.1	
V1-18	M16	145	164	200	197	194	247	247	16	30	35	50	22	10	12.2	12.5	12.9	237	10.3	159	10.7	
V1-19	M20	175	198	250	209	205	269	269	20	35	45	60	26	10	20.8	21.4	22.0	249	16.7	163	17.3	
V1-20	M24	175	198	250	231	226	301	301	24	40	55	70	33	12	23.0	24.0	25.1	271	18.3	181	19.3	
V1-21	M30	175	198	250	259	253	339	339	30	45	55	80	40	15	26.4	27.8	29.4	299	20.5	204	22.2	
V1-22	M30	220	250	330	268	262	348	348	30	45	55	80	40	15	45.3	46.6	48.2	308	35.8	208	37.5	
V1-23	M36	220	250	330	313	306	403	403	36	60	75	90	46	15	57.2	59.2	61.5	353	44.6	242	46.6	
V1-24	M42	220	250	330	360	352	465	465	42	70	85	105	52	20	72.1	75.6	79.8	400	55.4	277	58.3	
V1-25	M48	330	376	500	366	356	486	486	48	75	100	120	60	20	137	142	148	406	112	283	116	
V1-26	M56	330	376	500	398	387	538	538	56	80	115	140	68	20	161	167	175	438	132	307	139	
V1-27	M64	330	376	520	425	412	580	580	64	90	130	155	76	25	184	194	205	465	148	328	158	
V1-28	M72	330	376	530	488	474	643	643	72	90	130	155	76	25	233	241	253	528	185	378	198	
V1-29	M80	330	376	540	571	555	746	746	80	100	150	175	85	25	293	304	318	611	228	448	247	

RANGE V1



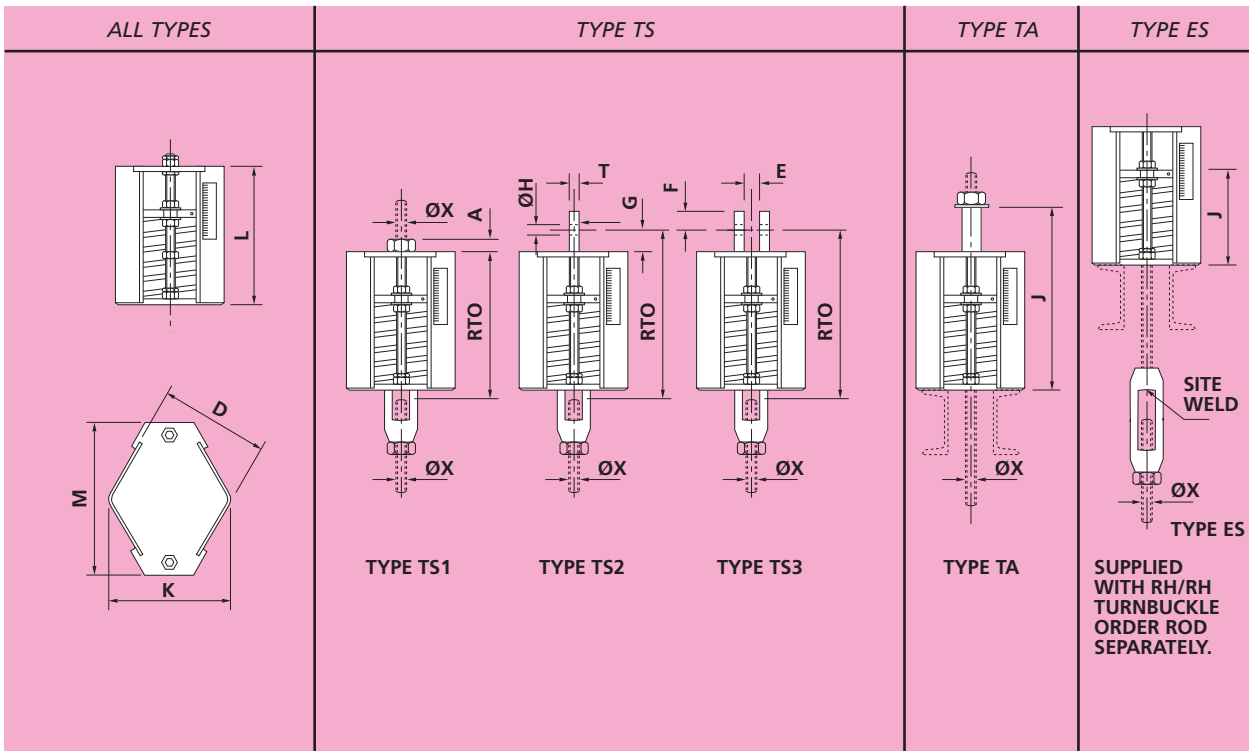
SUPPORT SIZE	J AT MIN. LOAD TYPE BM1 mm	BODY L'TH L mm	BASE PLATE SQ.		BASE BOLT CRS. SQ. U mm	BASE BOLT SIZE V mm	BASE PLATE THK Y mm	LOAD PAD SQ. Z mm	LOAD PAD THK BM1	WEIGHT kgf	RTO AT MIN LOAD mm	DIM. AA mm	GAP W mm	BEAM DEPTH BB (mm)			WEIGHT kgf		
			L	S										P	800 MAX CENTRES	1200 MAX CENTRES	1600 MAX CENTRES	@ 800 CRS	@ 1200 CRS
V1-1	184	104	150	160	113	M16	6	75	6	3.5	63	25	18	50	50	50	14	18	21
V1-2	188	108	150	160	113	M16	6	75	6	3.5	59	25	18	50	50	50	14	18	21
V1-3	193	113	150	160	113	M16	6	75	6	3.5	54	25	18	50	50	50	14	18	21
V1-4	194	114	150	160	113	M16	6	75	6	3.6	53	25	18	50	50	50	15	18	22
V1-5	193	113	150	160	113	M16	6	75	6	3.6	54	25	18	50	50	50	15	18	22
V1-6	196	116	150	160	113	M16	6	75	6	3.6	51	25	18	50	50	50	15	18	22
V1-7	197	117	150	160	113	M16	6	75	6	3.6	50	25	18	50	50	50	15	18	22
V1-8	203	123	150	160	113	M16	6	75	6	3.7	44	25	18	50	50	50	15	18	22
V1-9	206	126	150	160	113	M16	6	75	6	3.8	41	25	18	50	50	50	15	18	22
V1-10	210	127	185	177	125	M20	8	75	6	5.4	42	25	22	75	75	75	19	24	30
V1-11	214	131	185	177	125	M20	8	75	6	5.5	38	25	22	75	75	75	19	25	30
V1-12	215	132	185	177	125	M20	8	75	6	5.6	37	25	22	75	75	75	19	25	31
V1-13	241	152	200	197	139	M20	8	75	10	6.8	25	25	26	75	75	75	20	25	31
V1-14	254	165	200	197	139	M20	8	75	10	7.2	25	25	26	75	75	75	21	26	32
V1-15	276	187	200	197	139	M20	8	75	10	7.6	25	25	26	75	75	75	22	27	33
V1-16	292	204	270	240	170	M20	10	100	12	15.1	25	25	33	100	100	125	38	46	64
V1-17	266	178	270	240	170	M20	10	100	12	14.7	25	25	33	100	100	125	36	44	63
V1-18	279	191	270	240	170	M20	10	100	12	15.2	25	25	33	100	100	125	37	45	64
V1-19	289	199	270	240	170	M20	12	120	12	22.5	25	25	40	125	150	150	59	82	97
V1-20	307	217	270	240	170	M20	12	120	12	23.6	25	25	40	125	150	150	63	86	102
V1-21	330	240	270	240	170	M20	12	120	12	25.4	25	25	40	125	150	150	70	93	109
V1-22	337	246	270	268	190	M20	12	150	15	38.6	25	25	52	200	200	250	119	138	158
V1-23	361	270	270	268	190	M20	12	150	15	44	25	25	52	200	200	250	143	162	182
V1-24	401	308	270	268	190	M20	20	150	15	57	25	25	52	200	200	250	172	192	212
V1-25	422	320	400	400	283	M24	20	200	20	117	25	25	60	250	300	390	296	342	411
V1-26	446	339	400	400	283	M24	20	200	20	132	25	25	70	250	300	390	345	391	459
V1-27	473	363	400	400	283	M24	20	200	20	150	25	25	80	250	300	390	391	437	506
V1-28	536	416	400	400	283	M24	25	200	25	189	25	25	80	390	390	430	517	560	629
V1-29	626	495	400	400	283	M24	30	200	30	237	25	25	90	390	390	430	637	681	750

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10

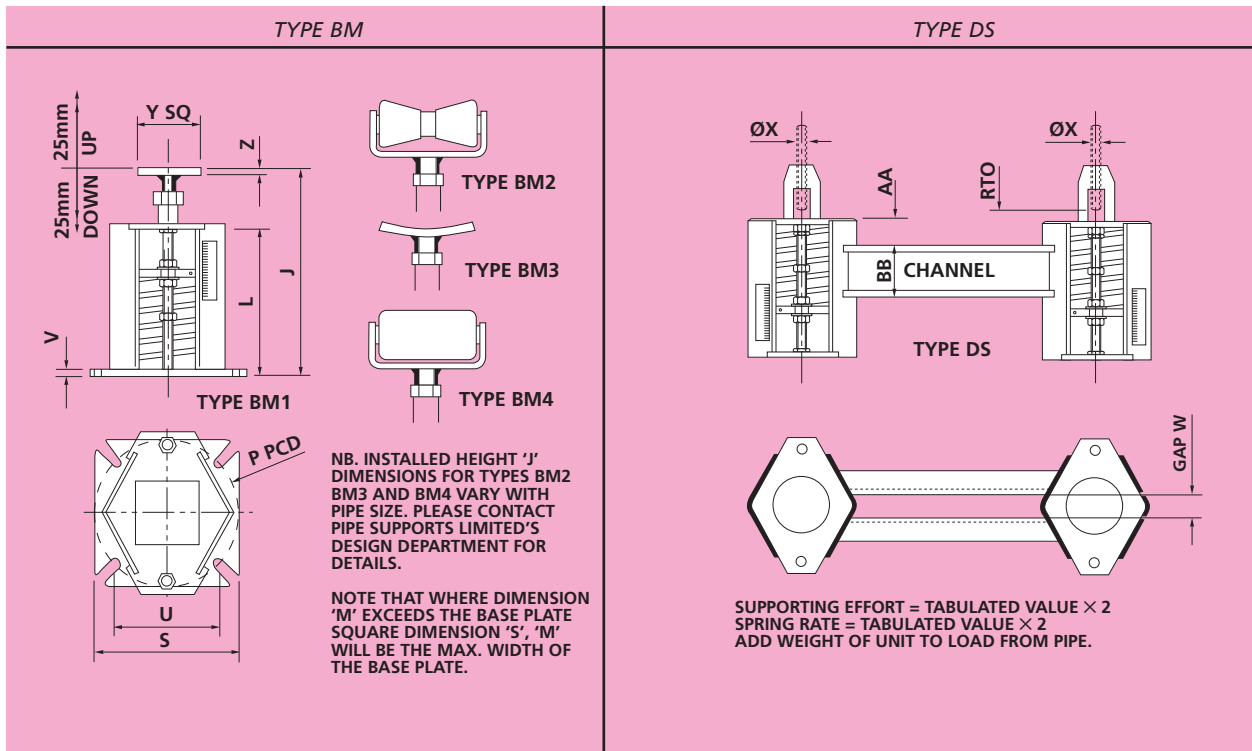
11

RANGE V2



SUPPORT SIZE	ROD DIA	BODY DIMENSIONS					RTO AT MIN LOAD (mm)			DEPTH OF THRD	LUG DIMENSIONS TYPES TS2 & TS3					WEIGHTS kgf			J AT MIN LOAD mm	WEIGHT kgf	J AT MIN LOAD mm	WEIGHT kgf
		X mm	D mm	K mm	M mm	L mm (not BM)	TS1	TS2	TS3		A mm	E mm	F mm	G mm	H mm	T mm	TS1	TS2				
V2-1	M12	108	122	155	169	167	199	199	12	20	20	30	14	6	4.4	4.5	4.6	249	3.6	133	3.8	
V2-2	M12	108	122	155	176	174	206	206	12	20	20	30	14	6	4.5	4.6	4.7	256	3.7	140	3.9	
V2-3	M12	108	122	155	185	183	215	215	12	20	20	30	14	6	4.7	4.8	4.9	265	3.8	148	4.1	
V2-4	M12	108	122	155	191	189	221	221	12	20	20	30	14	6	4.8	4.9	5.0	271	3.9	155	4.2	
V2-5	M12	108	122	155	187	185	217	217	12	20	20	30	14	6	4.7	4.8	4.9	267	3.9	151	4.1	
V2-6	M12	108	122	155	197	195	227	227	12	20	20	30	14	6	4.8	4.9	5.0	277	4.0	161	4.2	
V2-7	M12	108	122	155	190	188	220	220	12	20	20	30	14	6	4.8	4.9	5.0	270	4.0	154	4.2	
V2-8	M12	108	122	155	206	204	236	236	12	20	20	30	14	6	5.1	5.1	5.3	286	4.2	170	4.4	
V2-9	M12	108	122	155	208	206	238	238	12	20	20	30	14	6	5.0	5.1	5.2	288	4.2	171	4.4	
V2-10	M12	145	164	200	206	204	236	236	12	20	20	30	14	6	9.5	9.6	9.7	286	8.4	167	8.6	
V2-11	M12	145	164	200	209	207	239	239	12	20	20	30	14	6	9.7	9.8	9.9	289	8.6	171	8.8	
V2-12	M12	145	164	200	213	211	243	243	12	20	20	30	14	6	9.9	10.0	10.1	293	8.8	175	9.0	
V2-13	M12	145	164	200	222	220	258	258	12	25	30	36	18	6	10.2	10.3	10.5	302	9.1	183	9.3	
V2-14	M12	145	164	200	235	233	271	271	12	25	30	36	18	6	10.9	11.0	11.1	315	9.7	197	9.9	
V2-15	M12	145	164	200	261	259	297	297	12	25	30	36	18	6	12.2	12.4	12.5	341	11.1	223	11.3	
V2-16	M16	175	198	250	244	241	294	294	16	30	35	50	22	10	17.7	18.0	18.4	324	15.2	199	15.5	
V2-17	M16	175	198	250	264	261	314	314	16	30	35	50	22	10	18.8	19.2	19.6	344	16.3	219	16.7	
V2-18	M16	175	198	250	284	281	334	334	16	30	35	50	22	10	20.4	20.8	21.1	364	17.9	239	18.2	
V2-19	M20	220	250	320	285	281	345	345	20	35	45	60	26	10	34.0	34.6	35.2	365	28.5	232	29.0	
V2-20	M24	220	250	320	311	306	381	381	24	40	55	70	33	12	37.7	38.7	39.8	391	31.7	254	32.4	
V2-21	M30	220	250	320	348	342	428	428	30	45	55	80	40	15	45.5	46.9	48.5	428	36.1	281	37.5	
V2-22	M30	220	250	330	389	383	469	469	30	45	55	80	40	15	55.2	56.5	58.2	469	45.4	322	46.9	
V2-23	M36	220	250	330	454	447	544	544	36	60	75	90	46	15	71.2	73.1	75.5	534	58.3	376	59.6	
V2-24	M42	220	250	330	526	518	631	631	42	70	85	105	52	20	89.9	93.4	97.6	606	72.4	436	74.6	
V2-25	M48	330	376	500	467	457	587	587	48	75	100	120	60	20	165	170	176	547	139	377	143	
V2-26	M56	330	376	500	541	530	681	681	56	80	115	140	68	20	193	199	206	621	162	443	168	
V2-27	M64	330	376	520	611	598	766	766	64	90	130	155	76	25	234	243	255	691	195	507	204	
V2-28	M72	330	376	530	728	714	883	883	72	90	130	155	76	25	303	312	323	808	250	611	262	
V2-29	M80	330	376	540	845	829	1020	1020	80	100	150	175	85	25	382	393	407	925	309	715	328	

RANGE V2



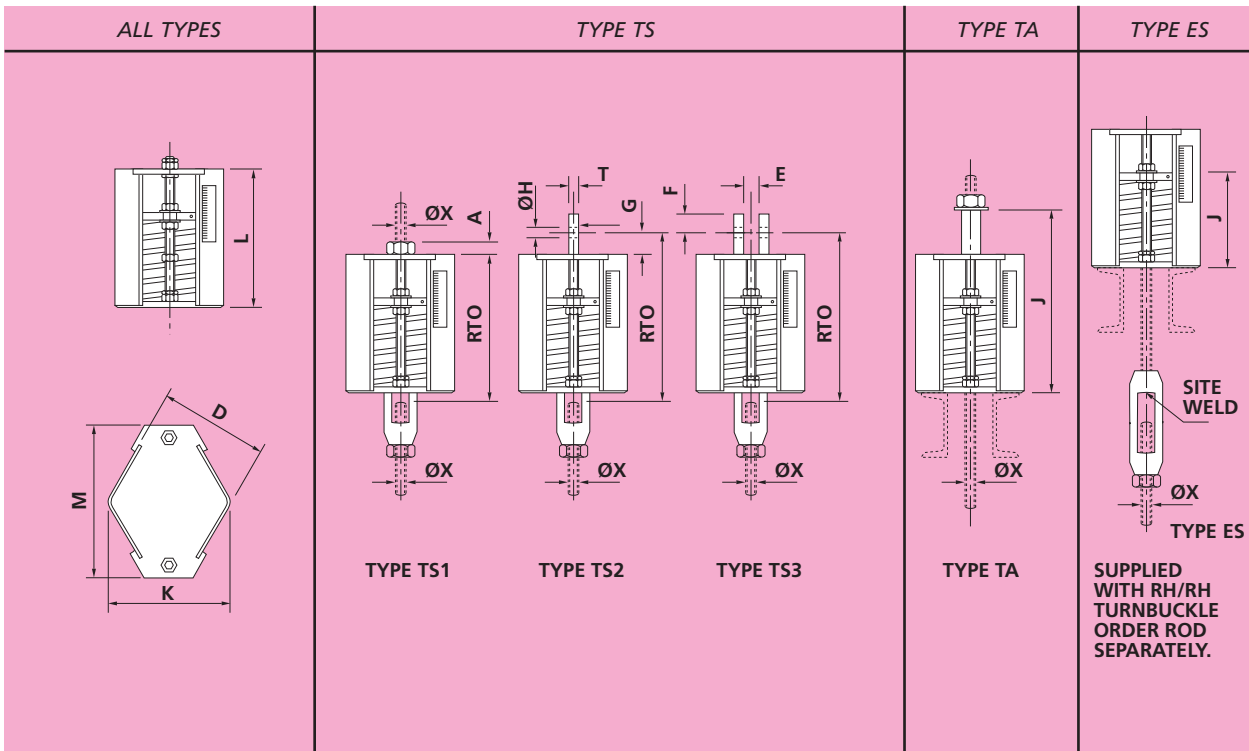
SUPPORT SIZE	J AT MIN. LOAD TYPE BM1 mm	BODY L'TH L mm	BASE PLATE SQ.		BASE BOLT CRS. SQ. U mm	BASE BOLT SIZE	BASE PLATE THK V mm	LOAD PAD SQ. Y mm	LOAD PAD THK Z mm	WEIGHT kgf BM1	RTO AT MIN LOAD mm	DIM. AA mm	GAP W mm	BEAM DEPTH BB (mm)			WEIGHT kgf		
			S mm	P mm										800 MAX CENTRES	1200 MAX CENTRES	1600 MAX CENTRES	@ 800 CRS	@ 1200 CRS	@ 1600 CRS
V2-1	280	159	150	160	113	M16	6	75	6	3.7	25	25	18	50	50	50	15	18	22
V2-2	287	166	150	160	113	M16	6	75	6	3.7	25	25	18	50	50	50	15	19	22
V2-3	295	174	150	160	113	M16	6	75	6	3.8	25	25	18	50	50	50	16	19	23
V2-4	302	181	150	160	113	M16	6	75	6	3.9	25	25	18	50	50	50	16	19	23
V2-5	298	177	150	160	113	M16	6	75	6	3.8	25	25	18	50	50	50	16	19	23
V2-6	308	187	150	160	113	M16	6	75	6	3.9	25	25	18	50	50	50	16	19	23
V2-7	301	180	150	160	113	M16	6	75	6	3.9	25	25	18	50	50	50	16	19	23
V2-8	317	196	150	160	113	M16	6	75	6	4.1	25	25	18	50	50	50	16	20	23
V2-9	318	197	150	160	113	M16	6	75	6	4.0	25	25	18	50	50	50	16	20	23
V2-10	325	205	200	197	139	M20	10	75	6	9.6	25	25	22	75	75	75	28	34	40
V2-11	329	209	200	197	139	M20	10	75	6	9.7	25	25	22	75	75	75	29	34	40
V2-12	333	213	200	197	139	M20	10	75	6	9.9	25	25	22	75	75	75	29	35	40
V2-13	347	221	200	197	139	M20	10	75	10	10.8	25	25	26	75	75	75	30	35	41
V2-14	361	235	200	197	139	M20	10	75	10	11.3	25	25	26	75	75	75	31	37	42
V2-15	387	261	200	197	139	M20	10	75	10	12.4	25	25	26	75	75	75	34	39	45
V2-16	368	239	270	240	170	M20	12	100	12	20.0	25	25	33	100	100	125	48	56	74
V2-17	388	259	270	240	170	M20	12	100	12	20.9	25	25	33	100	100	125	50	58	76
V2-18	408	279	270	240	170	M20	12	100	12	22.2	25	25	33	100	100	125	53	61	80
V2-19	405	276	270	268	190	M20	12	120	12	31.7	25	25	40	125	150	150	84	106	122
V2-20	427	298	270	268	190	M20	12	120	12	34.2	25	25	40	125	150	150	91	113	129
V2-21	454	325	270	268	190	M20	12	120	12	37.8	25	25	40	125	150	150	107	129	145
V2-22	498	366	270	268	190	M20	12	150	15	46.8	25	25	52	200	200	250	139	158	178
V2-23	542	410	270	268	190	M20	12	150	15	55.5	25	25	52	200	200	250	171	190	210
V2-24	607	473	270	268	190	M20	20	150	15	71.4	25	25	52	200	200	250	208	228	247
V2-25	563	420	400	400	283	M24	20	200	20	141	25	25	60	250	300	390	352	398	467
V2-26	629	481	400	400	283	M24	20	200	20	158	25	25	70	250	300	390	409	455	523
V2-27	699	548	400	400	283	M24	20	200	20	192	25	25	80	250	300	390	491	537	606
V2-28	816	655	400	400	283	M24	25	200	25	248	25	25	80	390	390	430	657	700	769
V2-29	940	768	400	400	283	M24	30	200	30	312	25	25	90	390	390	430	815	859	928

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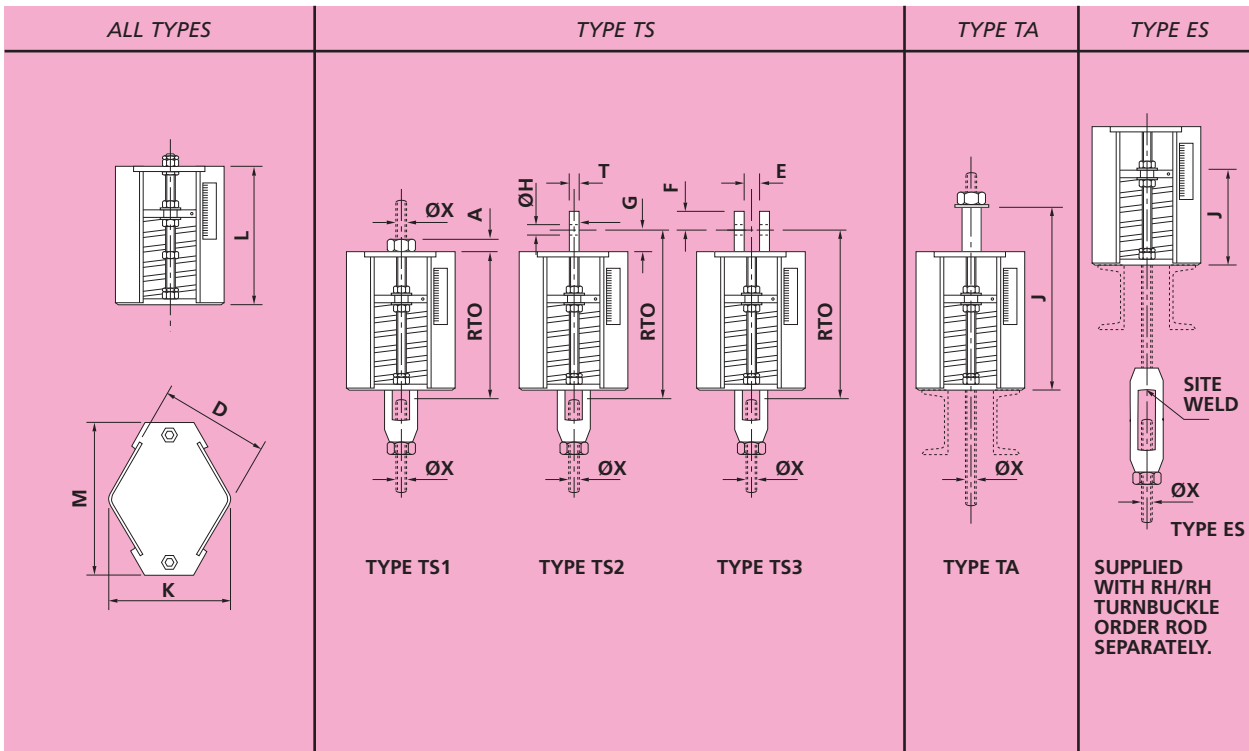
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RANGE V3



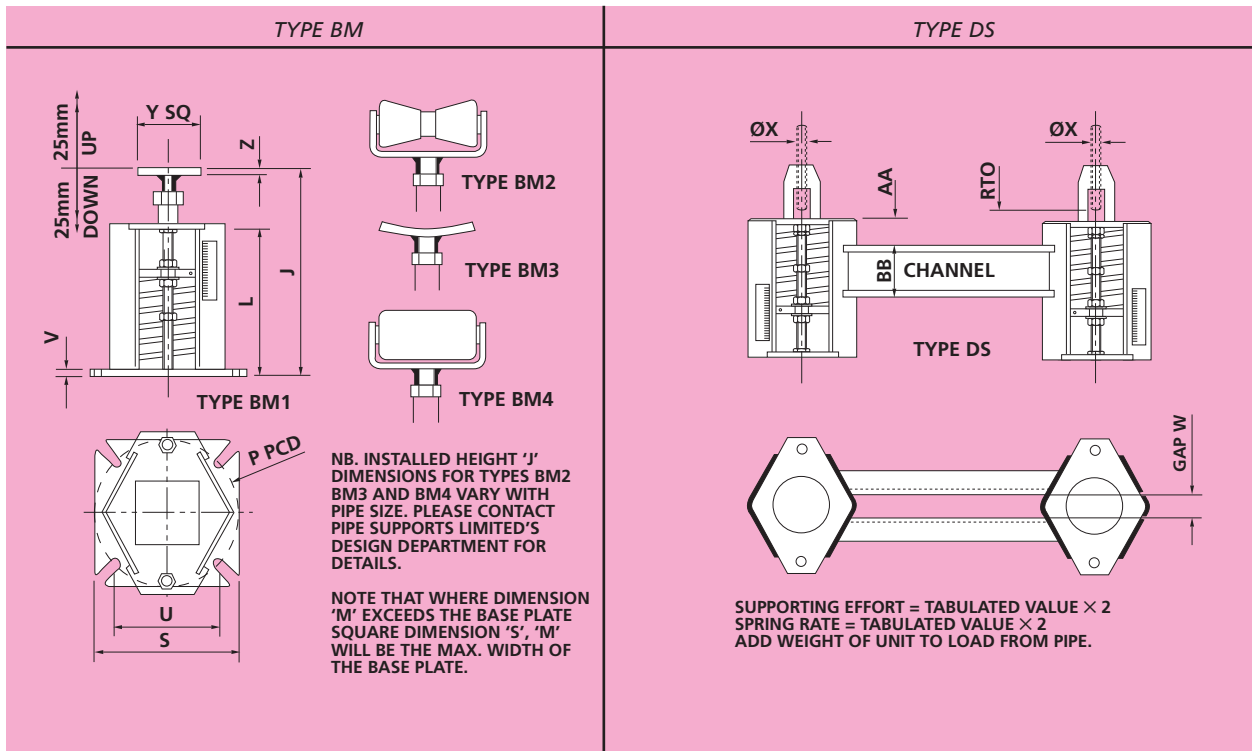
SUPPORT SIZE	ROD DIA	BODY DIMENSIONS					RTO AT MIN LOAD (mm)			DEPTH OF THR'D	LUG DIMENSIONS TYPES TS2 & TS3					WEIGHTS kgf			J AT MIN LOAD mm	WEIGHT kgf	J AT MIN LOAD mm	WEIGHT kgf
		X mm	D mm	K mm	M mm	L mm (not BM)	TS1	TS2	TS3		A mm	E mm	F mm	G mm	H mm	T mm	TS1	TS2				
V3-1	M12	108	122	155	294	292	324	324	12	20	20	30	14	6	5.4	5.5	5.6	454	4.7	243	4.8	
V3-2	M12	108	122	155	315	313	345	345	12	20	20	30	14	6	5.8	5.8	6.0	475	5.0	264	5.1	
V3-3	M12	108	122	155	329	327	359	359	12	20	20	30	14	6	5.9	6.0	6.1	489	5.1	278	5.2	
V3-4	M12	108	122	155	330	328	360	360	12	20	20	30	14	6	6.0	6.1	6.2	490	5.2	279	5.3	
V3-5	M12	108	122	155	323	321	353	353	12	20	20	30	14	6	6.0	6.1	6.2	483	5.2	272	5.3	
V3-6	M12	108	122	155	328	326	358	358	12	20	20	30	14	6	6.0	6.1	6.2	488	5.2	277	5.3	
V3-7	M12	108	122	155	336	334	366	366	12	20	20	30	14	6	6.2	6.3	6.4	496	5.4	286	5.5	
V3-8	M12	108	122	155	356	354	386	386	12	20	20	30	14	6	6.6	6.7	6.8	516	5.7	306	5.9	
V3-9	M12	108	122	155	370	368	400	400	12	20	20	30	14	6	7.0	7.1	7.2	530	6.1	319	6.2	
V3-10	M12	145	164	200	351	349	381	381	12	20	20	30	14	6	12.0	12.0	12.2	511	10.9	299	11.0	
V3-11	M12	145	164	200	357	355	387	387	12	20	20	30	14	6	12.3	12.4	12.5	517	11.2	305	11.4	
V3-12	M12	145	164	200	364	362	394	394	12	20	20	30	14	6	12.7	12.8	12.9	524	11.6	312	11.7	
V3-13	M12	145	164	200	380	378	416	416	12	25	30	36	18	6	13.2	13.3	13.5	540	12.1	328	12.2	
V3-14	M12	145	164	200	406	404	442	442	12	25	30	36	18	6	14.4	14.5	14.7	566	13.3	353	13.4	
V3-15	M12	145	164	200	455	453	491	491	12	25	30	36	18	6	16.9	17.1	17.2	615	15.8	403	15.9	
V3-16	M16	220	250	320	374	371	424	424	16	30	35	50	22	10	30.0	30.3	30.7	534	27.0	315	27.2	
V3-17	M16	220	250	320	409	406	459	459	16	30	35	50	22	10	33.6	33.9	34.3	569	30.5	350	30.7	
V3-18	M16	220	250	320	430	427	480	480	16	30	35	50	22	10	36.0	36.4	36.7	590	32.9	371	33.1	
V3-19	M20	220	250	320	473	469	533	533	20	35	45	60	26	10	43.8	44.4	45.0	633	38.2	406	38.4	
V3-20	M24	220	250	320	519	514	589	589	24	40	55	70	33	12	50.0	51.0	52.1	679	43.8	448	44.2	
V3-21	M30	220	250	320	578	572	658	658	30	45	55	80	40	15	61.6	63.0	64.6	738	51.6	497	52.6	
V3-22	M30	220	250	330	649	643	729	729	30	45	55	80	40	15	76.1	77.5	79.1	809	65.7	568	66.7	
V3-23	M36	220	250	330	759	752	849	849	36	60	75	90	46	15	101	103	105	919	87.0	667	87.2	
V3-24	M42	220	250	330	929	921	1034	1034	42	70	85	105	52	20	136	140	144	1089	117	825	117	
V3-25	M48	330	376	500	806	796	926	926	48	75	100	120	60	20	235	240	246	966	207	702	209	
V3-26	M56	330	376	500	942	931	1082	1082	56	80	115	140	68	20	283	289	297	1102	248	830	251	
V3-27	M64	330	376	520	1074	1061	1229	1229	64	90	130	155	76	25	358	367	379	1234	311	956	318	
V3-28	M72	330	376	530	1285	1271	1440	1440	72	90	130	155	76	25	474	483	494	1445	408	1154	417	
V3-29	M80	330	376	540	1503	1487	1678	1678	80	100	150	175	85	25	609	620	635	1663	517	1359	532	

RANGE V4



SUPPORT SIZE	ROD DIA	BODY DIMENSIONS					RTO AT MIN LOAD (mm)			DEPTH OF THRD	LUG DIMENSIONS TYPES TS2 & TS3					WEIGHTS kgf			J AT MIN LOAD mm	WEIGHT kgf	J AT MIN LOAD mm	WEIGHT kgf
		X mm	D mm	K mm	M mm	L mm (not BM)	TS1	TS2	TS3		A mm	E mm	F mm	G mm	H mm	T mm	TS1	TS2				
V4-1	M12	149.2	156.2	155	429	427	459	459	12	20	20	30	14	6	7.6	7.7	7.8	669	6.6	378	6.7	
V4-2	M12	149.2	156.2	155	457	455	487	487	12	20	20	30	14	6	8.1	8.1	8.4	697	7.0	406	7.1	
V4-3	M12	149.2	156.2	155	480	478	510	510	12	20	20	30	14	6	8.3	8.4	8.5	720	7.1	429	7.3	
V4-4	M12	149.2	156.2	155	487	485	517	517	12	20	20	30	14	6	8.4	8.5	8.7	727	7.3	436	7.4	
V4-5	M12	149.2	156.2	155	476	474	506	506	12	20	20	30	14	6	8.4	8.5	8.7	716	7.3	425	7.4	
V4-6	M12	149.2	156.2	155	486	484	516	516	12	20	20	30	14	6	8.4	8.5	8.7	726	7.3	435	7.4	
V4-7	M12	149.2	156.2	155	492	490	522	522	12	20	20	30	14	6	8.7	8.8	9.0	732	7.6	442	7.7	
V4-8	M12	149.2	156.2	155	528	526	558	558	12	20	20	30	14	6	9.2	9.4	9.5	768	8.0	478	8.3	
V4-9	M12	149.2	156.2	155	544	542	574	574	12	20	20	30	14	6	9.8	9.9	10.1	784	8.5	493	8.7	
V4-10	M12	177.6	188.9	200	523	521	553	553	12	20	20	30	14	6	16.8	16.8	17.1	763	15.3	471	15.4	
V4-11	M12	177.6	188.9	200	532	530	562	562	12	20	20	30	14	6	17.2	17.4	17.5	772	15.7	480	16.0	
V4-12	M12	177.6	188.9	200	543	541	573	573	12	20	20	30	14	6	17.8	17.9	18.1	783	16.2	491	16.4	
V4-13	M12	177.6	188.9	200	568	566	604	604	12	25	30	36	18	6	18.5	18.6	18.9	808	16.9	516	17.1	
V4-14	M12	177.6	188.9	200	607	605	643	643	12	25	30	36	18	6	20.2	20.3	20.6	847	18.6	554	18.8	
V4-15	M12	177.6	188.9	200	682	680	718	718	12	25	30	36	18	6	23.7	23.9	24.1	922	22.1	630	22.3	
V4-16	M16	246.2	263.5	320	578	575	628	628	16	30	35	50	22	10	42.0	42.4	43.0	818	37.8	517	38.1	
V4-17	M16	246.2	263.5	320	633	630	683	683	16	30	35	50	22	10	47.0	47.5	48.0	873	42.7	572	43.0	
V4-18	M16	246.2	263.5	320	675	672	725	725	16	30	35	50	22	10	50.4	51.0	51.4	915	46.1	614	46.3	
V4-19	M20	246.2	263.5	320	709	705	769	769	20	35	45	60	26	10	61.3	62.2	63.0	949	53.5	639	53.8	
V4-20	M24	246.2	263.5	320	778	773	848	848	24	40	55	70	33	12	70.0	71.4	72.9	1018	61.3	704	61.9	
V4-21	M30	246.2	263.5	320	863	857	943	943	30	45	55	80	40	15	86.2	88.2	90.4	1103	72.2	779	73.6	
V4-22	M30	248.2	263.5	330	970	964	1050	1050	30	45	55	80	40	15	107	109	111	1210	92.0	884	93.4	
V4-23	M36	248.2	263.5	330	1129	1122	1219	1219	36	60	75	90	46	15	141	144	147	1369	122	1032	122	
V4-24	M42	248.2	263.5	330	1343	1335	1448	1448	42	70	85	105	52	20	190	196	202	1583	164	1239	164	
V4-25	M48	375.8	408.5	500	1165	1155	1285	1285	48	75	100	120	60	20	329	336	344	1405	290	1056	293	
V4-26	M56	375.8	408.5	500	1367	1356	1507	1507	56	80	115	140	68	20	396	405	416	1607	347	1245	351	
V4-27	M64	379.2	412.5	520	1572	1559	1727	1727	64	90	130	155	76	25	501	514	531	1812	435	1434	445	
V4-28	M72	379.2	412.5	530	1882	1868	2037	2037	72	90	130	155	76	25	664	676	692	2122	571	1726	584	
V4-29	M80	379.2	412.5	540	2200	2184	2375	2375	80	100	150	175	85	25	853	868	889	2440	724	2031	745	

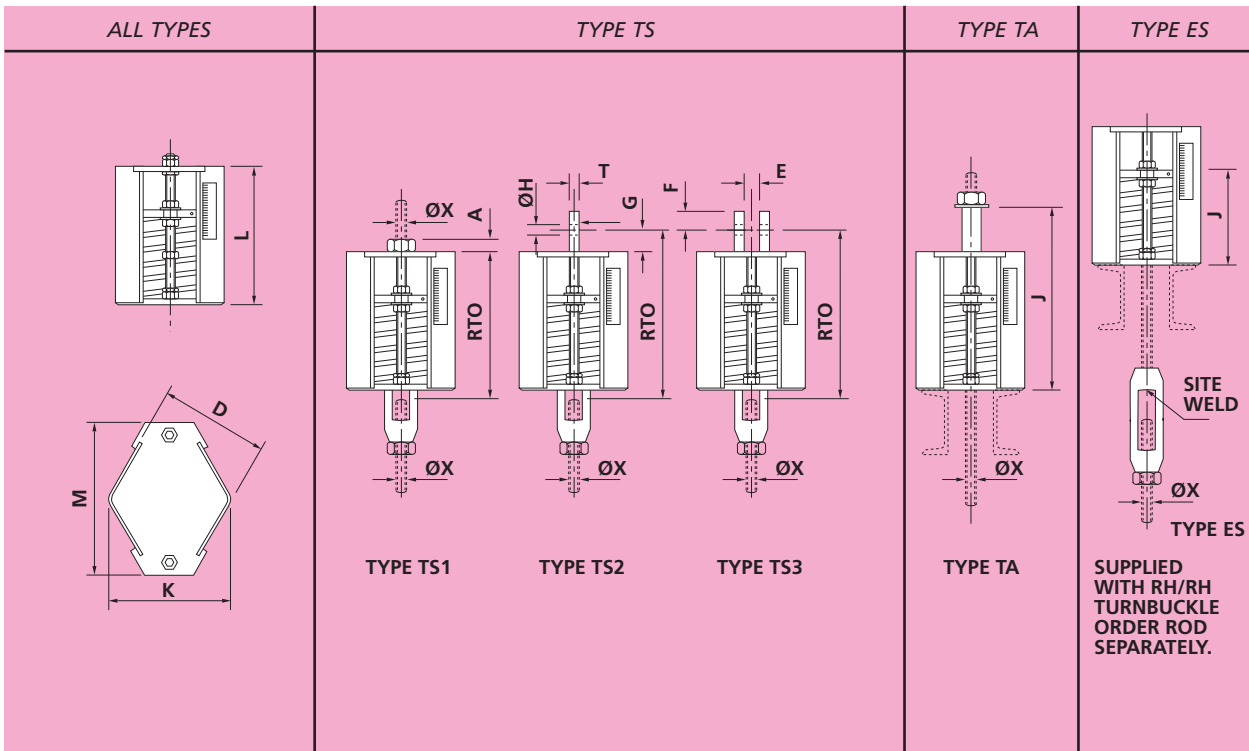
RANGE V4



SUPPORT SIZE	J AT MIN. LOAD TYPE BM1 mm	BODY L'TH L mm	BASE PLATE E SQ. S mm	BASE PLATE E PCD P mm	BASE BOLT CRS. SQ. U mm	BASE BOLT SIZE V mm	BASE PLATE E Y mm	LOAD PAD SQ. Z mm	LOAD PAD THK TYPE BM1 kgf	WEIGHT RTO AT MIN LOAD mm	DIM. M mm	GAP W mm	RSC SIZE			WEIGHT kgf			
													900 MAX CENTRES	1300 MAX CENTRES	1800 MAX CENTRES	@ 900 CRS	@ 1300 CRS	@ 1800 CRS	
V4-1	701	416	156	170	120	M16	6	75	6	5.7	25	25	18	51 x 25	51 x 25	51 x 25	20.6	23.3	26.7
V4-2	729	444	156	170	120	M16	6	75	6	6.0	25	25	18	51 x 25	51 x 25	51 x 25	21.5	24.2	27.7
V4-3	752	467	156	170	120	M16	6	75	6	6.2	25	25	18	51 x 25	51 x 25	51 x 25	21.9	24.7	28.1
V4-4	759	474	156	170	120	M16	6	75	6	6.2	25	25	18	51 x 25	51 x 25	51 x 25	22.1	24.9	28.3
V4-5	748	463	156	170	120	M16	6	75	6	6.3	25	25	18	51 x 25	51 x 25	51 x 25	22.1	24.8	28.3
V4-6	758	473	156	170	120	M16	6	75	6	6.3	25	25	18	51 x 25	51 x 25	51 x 25	22.3	25.0	28.4
V4-7	765	480	156	170	120	M16	6	75	6	6.6	25	25	18	51 x 25	51 x 25	51 x 25	22.8	25.6	29.0
V4-8	801	516	156	170	120	M16	6	75	6	6.9	25	25	18	51 x 25	51 x 25	51 x 25	23.8	26.6	30.0
V4-9	816	531	156	170	120	M16	6	75	6	7.3	25	25	18	51 x 25	51 x 25	51 x 25	24.9	27.7	31.1
V4-10	805	521	200	205	145	M20	10	75	6	15.3	25	25	22	76 x 38	76 x 38	76 x 38	43.4	48.8	55.5
V4-11	814	530	200	205	145	M20	10	75	6	15.7	25	25	22	76 x 38	76 x 38	76 x 38	44.4	49.8	56.5
V4-12	825	541	200	205	145	M20	10	75	6	16.1	25	25	22	76 x 38	76 x 38	76 x 38	45.5	50.9	57.6
V4-13	856	566	200	205	145	M20	10	75	10	17.6	25	25	26	76 x 38	76 x 38	76 x 38	47.0	52.3	59.0
V4-14	894	604	200	205	145	M20	10	75	10	19.0	25	25	26	76 x 38	76 x 38	76 x 38	50.3	55.6	62.3
V4-15	970	680	200	205	145	M20	10	75	10	21.8	25	25	26	76 x 38	76 x 38	76 x 38	57.4	62.7	69.4
V4-16	864	573	270	280	198	M20	12	100	12	39.8	25	25	33	76 x 38	102 x 51	102 x 51	92.8	106	117
V4-17	919	628	270	280	198	M20	12	100	12	44.0	25	25	33	76 x 38	102 x 51	102 x 51	103	116	127
V4-18	961	670	270	280	198	M20	12	100	12	46.9	25	25	33	76 x 38	102 x 51	102 x 51	110	123	134
V4-19	988	695	270	287	203	M20	12	120	12	55.3	25	25	40	102 x 51	127 x 64	127 x 64	136	154	169
V4-20	1053	760	270	287	203	M20	12	120	12	61.5	25	25	40	102 x 51	127 x 64	127 x 64	154	172	187
V4-21	1128	835	270	287	203	M20	12	120	12	70.8	25	25	40	102 x 51	127 x 64	127 x 64	186	204	218
V4-22	1236	940	276	294	208	M20	12	150	15	89.2	25	25	52	152 x 76	203 x 76	203 x 76	237	264	288
V4-23	1377	1081	300	308	218	M20	12	150	15	111.3	25	25	52	152 x 76	203 x 76	203 x 76	306	333	357
V4-24	1586	1288	300	308	218	M20	20	150	15	152.6	25	25	52	152 x 76	203 x 76	203 x 76	405	431	455
V4-25	1418	1111	430	453	320	M24	20	200	20	280.0	25	25	60	203 x 89	254 x 89	305 x 89	689	724	777
V4-26	1606	1295	430	453	320	M24	20	200	20	324.8	25	25	70	203 x 89	254 x 89	305 x 89	823	858	911
V4-27	1802	1487	440	467	330	M24	20	200	20	413.0	25	25	80	203 x 89	254 x 89	305 x 89	1031	1067	1120
V4-28	2107	1782	460	481	340	M24	25	200	25	546.0	25	25	80	305 x 89	305 x 102	381 x 102	1369	1411	1483
V4-29	2432	2096	480	495	350	M24	30	200	30	701.4	25	25	90	305 x 89	305 x 102	381 x 102	1746	1788	1861

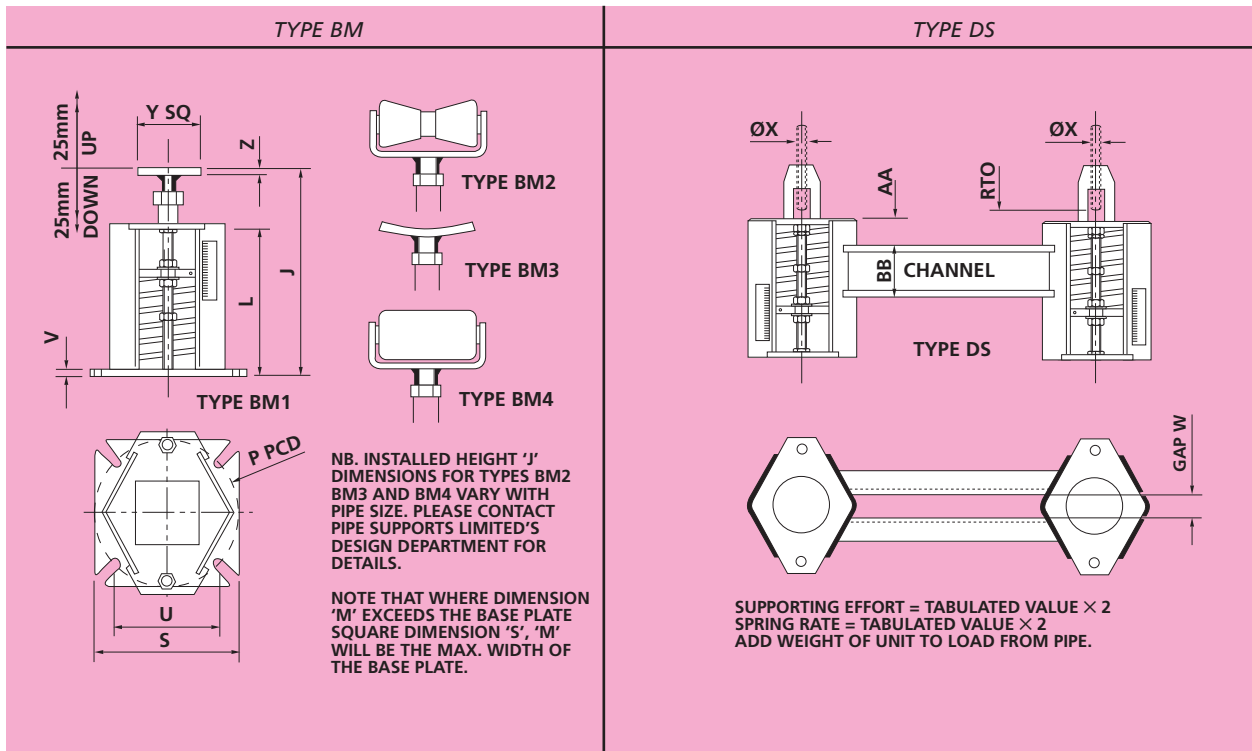


RANGE V5



SUPPORT SIZE	ROD DIA	BODY DIMENSIONS					RTO AT MIN LOAD (mm)			DEPTH OF THR'D	LUG DIMENSIONS TYPES TS2 & TS3					WEIGHTS kgf			J AT MIN LOAD mm	WEIGHT kgf	J AT MIN LOAD mm	WEIGHT kgf
		X mm	D mm	K mm	M mm	L mm (not BM)	TS1	TS2	TS3		A mm	E mm	F mm	G mm	H mm	T mm	TS1	TS2				
V5-1	M12	149.2	156.2	155	556	554	586	586	12	20	20	30	14	6	9.2	9.4	9.5	876	8.0	505	8.2	
V5-2	M12	149.2	156.2	155	598	596	628	628	12	20	20	30	14	6	9.9	9.9	10.2	918	8.5	547	8.7	
V5-3	M12	149.2	156.2	155	626	624	656	656	12	20	20	30	14	6	10.0	10.2	10.4	946	8.7	575	8.8	
V5-4	M12	149.2	156.2	155	628	626	658	658	12	20	20	30	14	6	10.2	10.4	10.5	948	8.8	577	9.0	
V5-5	M12	149.2	156.2	155	614	612	644	644	12	20	20	30	14	6	10.2	10.4	10.5	934	8.8	563	9.0	
V5-6	M12	149.2	156.2	155	624	622	654	654	12	20	20	30	14	6	10.2	10.4	10.5	944	8.8	573	9.0	
V5-7	M12	149.2	156.2	155	640	638	670	670	12	20	20	30	14	6	10.5	10.7	10.9	960	9.2	590	9.4	
V5-8	M12	149.2	156.2	155	680	678	710	710	12	20	20	30	14	6	11.2	11.4	11.6	1000	9.7	630	10.0	
V5-9	M12	149.2	156.2	155	708	706	738	738	12	20	20	30	14	6	11.9	12.1	12.2	1028	10.4	657	10.5	
V5-10	M12	177.6	188.9	200	670	668	700	700	12	20	20	30	14	6	20.4	20.4	20.7	990	18.5	618	18.7	
V5-11	M12	177.6	188.9	200	682	680	712	712	12	20	20	30	14	6	20.9	21.1	21.3	1002	19.0	630	19.4	
V5-12	M12	177.6	188.9	200	696	694	726	726	12	20	20	30	14	6	21.6	21.8	21.9	1016	19.7	644	19.9	
V5-13	M12	177.6	188.9	200	728	726	764	764	12	25	30	36	18	6	22.4	22.6	23.0	1048	20.6	676	20.7	
V5-14	M12	177.6	188.9	200	780	778	816	816	12	25	30	36	18	6	24.5	24.7	25.0	1100	22.6	727	22.8	
V5-15	M12	177.6	188.9	200	878	876	914	914	12	25	30	36	18	6	28.7	29.1	29.2	1198	26.9	826	27.0	
V5-16	M16	246.2	263.5	320	714	711	764	764	16	30	35	50	22	10	51.0	51.5	52.2	1034	45.9	653	46.2	
V5-17	M16	246.2	263.5	320	781	778	831	831	16	30	35	50	22	10	57.1	57.6	58.3	1101	51.9	720	52.2	
V5-18	M16	246.2	263.5	320	822	819	872	872	16	30	35	50	22	10	61.2	61.9	62.4	1142	55.9	761	56.3	
V5-19	M20	246.2	263.5	320	899	895	959	959	20	35	45	60	26	10	74.5	75.5	76.5	1219	64.9	829	65.3	
V5-20	M24	246.2	263.5	320	987	982	1057	1057	24	40	55	70	33	12	85.0	86.7	88.6	1307	74.5	913	75.1	
V5-21	M30	246.2	263.5	320	1095	1089	1175	1175	30	45	55	80	40	15	105	107	110	1415	87.7	1011	89.4	
V5-22	M30	248.2	263.5	330	1231	1225	1311	1311	30	45	55	80	40	15	129	132	134	1551	111.7	1145	113.4	
V5-23	M36	248.2	263.5	330	1436	1429	1526	1526	36	60	75	90	46	15	172	175	179	1756	147.9	1339	148.2	
V5-24	M42	248.2	263.5	330	1704	1696	1809	1809	42	70	85	105	52	20	231	238	245	2024	198.9	1600	198.9	
V5-25	M48	375.8	408.5	500	1449	1439	1569	1569	48	75	100	120	60	20	400	408	418	1769	351.9	1340	355.3	
V5-26	M56	375.8	408.5	500	1708	1697	1848	1848	56	80	115	140	68	20	481	491	505	2028	421.6	1586	426.7	
V5-27	M64	379.2	412.5	520	1970	1957	2125	2125	64	90	130	155	76	25	609	624	644	2290	528.7	1832	540.6	
V5-28	M72	379.2	412.5	530	2367	2353	2522	2522	72	90	130	155	76	25	806	821	840	2687	693.6	2211	708.9	
V5-29	M80	379.2	412.5	540	2778	2762	2953	2953	80	100	150	175	85	25	1035	1054	1080	3098	879	2609	904	

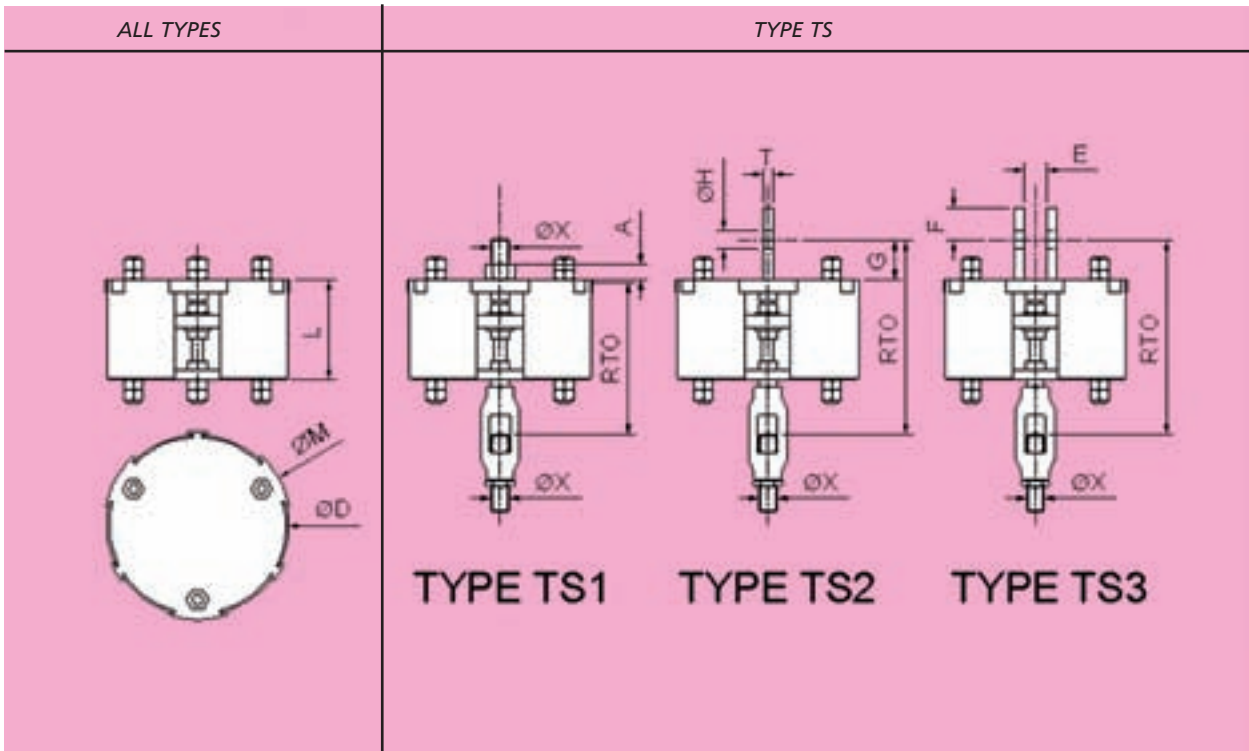
RANGE V5



SUPPORT SIZE	J AT MIN. LOAD TYPE BM1 mm	BODY L'TH L mm	BASE PLATE SQ. S mm	BASE PLATE PCD P mm	BASE BOLT CRS. SQ. U mm	BASE BOLT SIZE V mm	BASE PLATE THK Y mm	LOAD PAD SQ. Z mm	LOAD PAD THK BM1 kgf	WEIGHT TYPE RTO AT MIN LOAD mm	DIM. M mm	GAP W mm	RSC SIZE			WEIGHT kgf			
													900 MAX CENTRES	1300 MAX CENTRES	1800 MAX CENTRES	@ 900 CRS	@ 1300 CRS	@ 1800 CRS	
V5-1	910	543	156	169.7	120	M16	6	75	6	7.0	25	25	18	51 x 25	51 x 25	51 x 25	23.9	26.7	30.2
V5-2	952	585	156	169.7	120	M16	6	75	6	7.3	25	25	18	51 x 25	51 x 25	51 x 25	25.0	27.7	31.5
V5-3	980	613	156	169.7	120	M16	6	75	6	7.5	25	25	18	51 x 25	51 x 25	51 x 25	25.5	28.4	31.9
V5-4	982	615	156	169.7	120	M16	6	75	6	7.5	25	25	18	51 x 25	51 x 25	51 x 25	25.7	28.6	32.2
V5-5	968	601	156	169.7	120	M16	6	75	6	7.7	25	25	18	51 x 25	51 x 25	51 x 25	25.7	28.5	32.2
V5-6	978	611	156	169.7	120	M16	6	75	6	7.7	25	25	18	51 x 25	51 x 25	51 x 25	25.9	28.7	32.3
V5-7	995	628	156	169.7	120	M16	6	75	6	8.0	25	25	18	51 x 25	51 x 25	51 x 25	26.5	29.4	33.0
V5-8	1035	668	156	169.7	120	M16	6	75	6	8.3	25	25	18	51 x 25	51 x 25	51 x 25	27.7	30.7	34.2
V5-9	1062	695	156	169.7	120	M16	6	75	6	8.8	25	25	18	51 x 25	51 x 25	51 x 25	29.1	32.0	35.6
V5-10	1034	668	200	205.1	145	M20	10	75	6	18.5	25	25	22	76 x 38	76 x 38	76 x 38	50.6	56.0	63.0
V5-11	1046	680	200	205.1	145	M20	10	75	6	19.0	25	25	22	76 x 38	76 x 38	76 x 38	51.8	57.4	64.2
V5-12	1060	694	200	205.1	145	M20	10	75	6	19.6	25	25	22	76 x 38	76 x 38	76 x 38	53.1	58.6	65.5
V5-13	1098	726	200	205.1	145	M20	10	75	10	21.4	25	25	26	76 x 38	76 x 38	76 x 38	54.9	60.3	67.3
V5-14	1149	777	200	205.1	145	M20	10	75	10	23.1	25	25	26	76 x 38	76 x 38	76 x 38	59.0	64.4	71.4
V5-15	1248	876	200	205.1	145	M20	10	75	10	26.5	25	25	26	76 x 38	76 x 38	76 x 38	67.6	73.1	80.0
V5-16	1082	709	270	280	198	M20	12	100	12	48.3	25	25	33	76 x 38	102 x 51	102 x 51	110.8	124.5	135.5
V5-17	1149	776	270	280	198	M20	12	100	12	53.4	25	25	33	76 x 38	102 x 51	102 x 51	122.9	136.7	147.7
V5-18	1190	817	270	280	198	M20	12	100	12	57.0	25	25	33	76 x 38	102 x 51	102 x 51	131.3	145.2	156.4
V5-19	1260	885	270	287.1	203	M20	12	120	12	67.2	25	25	40	102 x 51	127 x 64	127 x 64	162.3	181.2	197.0
V5-20	1344	969	270	287.1	203	M20	12	120	12	74.6	25	25	40	102 x 51	127 x 64	127 x 64	184.0	203.4	219.9
V5-21	1442	1067	270	287.1	203	M20	12	120	12	86.0	25	25	40	102 x 51	127 x 64	127 x 64	223.2	243.2	259.4
V5-22	1579	1201	276	294.2	208	M20	12	150	15	108.3	25	25	52	152 x 76	203 x 76	203 x 76	282.5	311.5	337.7
V5-23	1766	1388	300	308.3	218	M20	12	150	15	135.2	25	25	52	152 x 76	203 x 76	203 x 76	366.4	396.2	423.0
V5-24	2029	1649	300	308.3	218	M20	20	150	15	185.3	25	25	52	152 x 76	203 x 76	203 x 76	486.4	518.0	547.6
V5-25	1784	1395	430	452.5	320	M24	20	200	20	340.0	25	25	60	203 x 89	254 x 89	305 x 89	830	872	933
V5-26	2029	1636	430	452.5	320	M24	20	200	20	394.4	25	25	70	203 x 89	254 x 89	305 x 89	993	1037	1101
V5-27	2282	1885	440	466.7	330	M24	20	200	20	501.5	25	25	80	203 x 89	254 x 89	305 x 89	1246	1295	1365
V5-28	2674	2267	460	480.8	340	M24	25	200	25	663.0	25	25	80	305 x 89	305 x 102	381 x 102	1654	1708	1796
V5-29	3092	2674	480	495	350	M24	30	200	30	851.7	25	25	90	305 x 89	305 x 102	381 x 102	2112	2169	2263



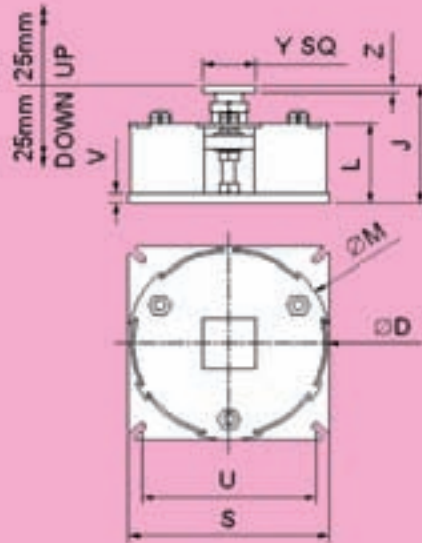
HIGH LOAD VARIABLES



SUPPORT SIZE	ROD DIA X mm	BODY DIMENSIONS			RTO AT MIN LOAD (mm)			DEPTH OF THR'D A mm	LUG DIMENSIONS TYPES TS2 & TS3					WEIGHTS kgf		
		øD mm	øM mm	L mm (not BM)	TS1	TS2	TS3		E mm	F mm	G mm	H mm	T mm	TS1	TS2	TS3
V1-H1	M56	630	657	353	539	690	690	56	80	115	140	68	20	386	393	400
V1-H2	M64	630	657	400	584	752	752	64	90	130	155	76	25	472	482	493
V1-H3	M72	730	757	406	577	766	766	72	100	150	175	85	25	633	645	659
V1-H4	M80	730	757	469	638	854	854	80	100	160	200	95	40	732	755	781
V1-H5	M90	730	757	479	666	884	884	90	100	160	200	95	40	814	834	860
V1-H6	M90	730	757	514	701	919	919	90	100	160	200	95	40	872	892	918
V1-H7	M100	780	807	537	722	957	957	100	110	170	215	105	40	1044	1066	1096
V2-H1	M56	730	757	431	622	773	773	56	80	115	140	68	20	532	538	546
V2-H2	M64	730	757	485	674	842	842	64	90	130	155	76	25	654	664	675
V2-H3	M72	730	757	528	704	893	893	72	100	150	175	85	25	702	714	728
V2-H4	M80	730	757	611	785	1001	1001	80	100	160	200	95	40	816	839	865
V2-H5	M90	730	757	621	813	1031	1031	90	100	160	200	95	40	909	929	955
V2-H6	M90	730	757	681	873	1091	1091	90	100	160	200	95	40	978	998	1024
V2-H7	M100	780	807	704	894	1129	1129	100	110	170	215	105	40	1167	1189	1219
V3-H1	M56	730	757	634	835	986	986	56	80	115	140	68	20	619	625	633
V3-H2	M64	730	757	717	916	1084	1084	64	90	130	155	76	25	767	777	788
V3-H3	M72	730	757	790	976	1165	1165	72	100	150	175	85	25	848	860	875
V3-H4	M80	730	757	918	1102	1318	1318	80	100	160	200	95	40	994	1018	1044
V3-H5	M90	730	757	928	1130	1348	1348	90	100	160	200	95	40	1111	1131	1157
V3-H6	M90	730	757	1041	1243	1461	1461	90	100	160	200	95	40	1215	1235	1261
V3-H7	M100	780	807	1064	1264	1499	1499	100	110	170	215	105	40	1441	1463	1493

HIGH LOAD VARIABLES

TYPE BM1



ALL TYPES			TYPE BM1								
SUPPORT SIZE	BODY DIMENSIONS		J AT MIN. LOAD TYPE	BODY L'TH	BASE PLATE SQ.	BASE BOLT CRS. SQ.	BASE BOLT SIZE	BASE PLATE THK	LOAD PAD SQ.	LOAD PAD THK	WEIGHT
	∅ D mm	∅ M mm	BM1 mm	L mm	S mm	U mm	V mm	Y mm	Z mm	TYPE BM1 kgf	
V1-H1	630	657	408	276	650	550	M24	35	200	25	326.0
V1-H2	630	657	449	313	650	550	M24	40	200	25	383.3
V1-H3	730	757	460	313	750	650	M24	40	200	30	519.0
V1-H4	730	757	508	361	750	650	M30	50	200	30	600.8
V1-H5	730	757	558	371	750	650	M30	50	200	30	646.8
V1-H6	730	757	595	396	750	650	M30	50	200	40	672.0
V1-H7	780	807	608	409	800	700	M30	60	200	40	818.1
V2-H1	730	757	526	354	750	650	M24	35	200	25	458.9
V2-H2	730	757	574	398	750	650	M24	40	200	25	545.8
V2-H3	730	757	622	435	750	650	M24	40	200	30	586.9
V2-H4	730	757	690	503	750	650	M30	50	200	30	681.9
V2-H5	730	757	740	513	750	650	M30	50	200	30	737.5
V2-H6	730	757	802	563	750	650	M30	50	200	40	772.9
V2-H7	780	807	815	576	800	700	M30	60	200	40	933.6
V3-H1	730	757	809	557	750	650	M24	35	200	25	543.6
V3-H2	730	757	886	630	750	650	M24	40	200	25	658.1
V3-H3	730	757	964	697	750	650	M24	40	200	30	729.9
V3-H4	730	757	1077	810	750	650	M30	50	200	30	853.4
V3-H5	730	757	1127	820	750	650	M30	50	200	30	929.0
V3-H6	730	757	1242	923	750	650	M30	50	200	40	996.7
V3-H7	780	807	1255	936	800	700	M30	60	200	40	1190.2

