Product catalogue

# VICODA®
# SPRING ELEMENTS

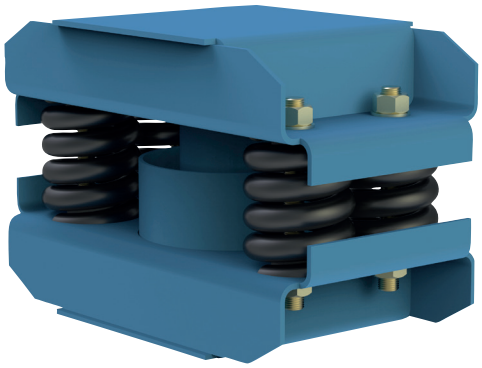
VICODA® is a product brand of LISEGA Group

## About our product

VICODA® spring elements are effectively used for vibration isolation of machinery within power stations, e.g. turbine tables, feedwater pumps etc. They provide support of static loads and reduce the transmission of dynamic loads to the foundation. VICODA® spring elements are usually composed of three major parts: an upper and lower housing, helical coil springs and a viscoelastic damper. The system frequency usually has values between 2 and 7 Hz.

## Design

The basic design of a spring element consists of a set of helical coil steel compression springs connected to a top and bottom plate. In general spring elements only have very low damping properties due to natural material damping of steel components. Whenever higher damping characteristics are needed, viscoelatic damping elements can be integrated into the spring element. An important feature of spring elements is the ability to lock them at a predetermined level of compression (Preloading). Preloaded spring elements are installed in a locked position thus acting as solid supports. At the end of the installation - which may be the installation of heavy machinery - the spring elements are activated: they are unlocked. From that moment on the devices act as vibration control elements.



## Turbo groups

## Product range

The VICODA® product portfolio covers most of the typical applications of base-isolation within power stations as well as for mounting of condensers. By combining a set of VICODA® spring elements in one application an optimum set-up can be realized. VICODA® spring elements are offered with and without additonal damping elements. Without damping the elements cover loads from 126 kN to 2096 kN and with damping loads up to 1300 kN.

## Fields of application

Main fields of application are:

- elastic foundation of turbines/ turbo groups
- elastic foundation of coal mills
- elastic foundation of fans/ blowers
- mounting of condensers

## Coal mills

## Fans/ blowers

# Parameters and construction

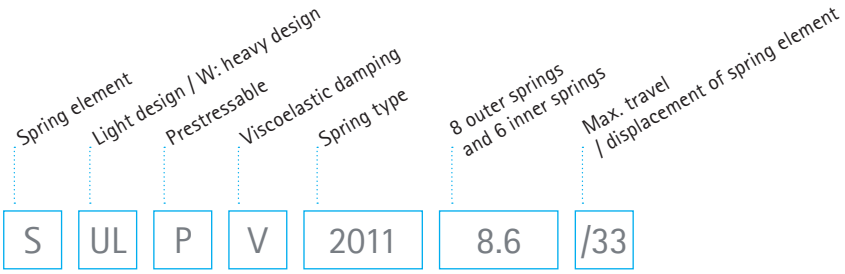
The basic parameters needed for the definition of a base isolation solution with spring elements are:

- the load [kN], determined by the weight of the supported machine and the load distribution
- the main excitation frequencies [Hz] of the vibrating source
- operation temperatures [°C] - in case of damping elements
- installation dimensions [mm] and geometrical limitations

LISEGA is pleased to provide you support when selecting spring elements.

# Description of type designation on example

S-ULPV-2011-8.6/33




S-ULPV-2011-8.6/33
Spring element-light design-presstressable-viscous damping-spring set 2011-8 outer springs and 6 inner springs/maximum displacement 33 mm

S-WP-4020-10.8/24
Spring element-heavy design-presstressable-spring set 4020-10 outer springs and 8 inner springs/maximum displacement 24 mm

# Product data sheets

A selection of product data sheets is presented on the following pages:

| SPRING ELEMENTS FOR POWER PLANT APPLICATIONS | | | |
|---|---|---|---|
| Type | Maximum load [kN] | Natural frequency at nominal load [Hz] | Page |
| S-ULP-2011.../33 | 416 | 2.75 | 6 |
| S-ULPV-2011.../33 | 416 | 2.75 | 7 |
| S-ULP-2010.../47 | 414 | 2.3 | 8 |
| S-ULPV-2011.../47 | 414 | 2.3 | 9 |
| S-WP(R)-2071.../32 | 1585 | 2.75 | 10 |
| S-WPV(R)-2071.../32 | 957 | 2.75 | 10 |
| S-WP-3010.../32 | 1307 | 2.75 | 11 |
| S-WPV-3010.../32 | 1307 | 2.75 | 12 |
| S-WPVR-3010.../32 | 1307 | 2.75 | 12 |
| S-WP-4020.../24 | 2092 | 3.5 | 13 |
| S-WPV-4020.../24 | 1112 | 3.5 | 15 |
| S-WP-4020.../32 | 1555 | 3.5 | 16 |

| SPRING ELEMENTS FOR CONDENSERS | | |
|---|---|---|
| Type | Maximum load [kN] | Page |
| S-WLP-3021.../150 | 630 | 17 |
| S-WLP-3030.../150 | 473 | 17 |
| S-WLP-4030.../150 | 788 | 18 |
| S-WLP-5010.../150 | 1279 | 18 |
| S-WLP-50.../160 | 292 | 19 |
| S-WLPV-50.../160 | 292 | 19 |

| INSTRUCTION SHEET | |
|---|---|
| Pages | 20 - 27 |

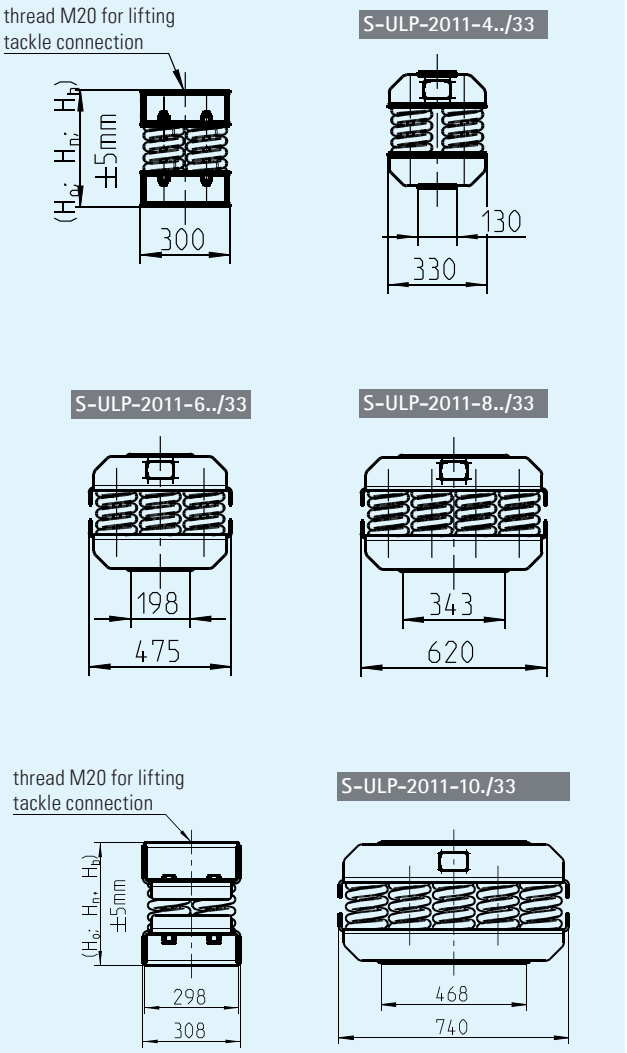
**NOTE:** This legend is valid for all following data sheets. The drawings are not true to scale. Other load ranges and natural frequencies are available on request. All data and dimensions are subject to change. General tolerances DIN ISO 2768-vL.

# Spring element type: S-ULP-2011.../33

LEGEND

$H_o$: unloaded height  $H_n$: height at nominal load  $H_b$: height at blockload

## DIMENSIONS




## S-ULP-2011

| Type | Nom. load [kN] | Vertical stiffness[1)] [kN/mm] | Horizontal stiffness[1)] [kN/mm] | Height [mm] | | |
|---|---|---|---|---|---|---|
| | | | | $H_o^*$ | $H_n^*$ | $H_b^*$ |
| S-ULP-2011-4.0/33 | 126 | 3.84 | 4.52 | 390 | 357 | 346 |
| S-ULP-2011-4.1/33 | 136 | 4.14 | 4.68 | | | |
| S-ULP-2011-4.2/33 | 146 | 4.44 | 4.84 | | | |
| S-ULP-2011-4.3/33 | 156 | 4.75 | 5.00 | | | |
| S-ULP-2011-4.4/33 | 166 | 5.05 | 5.16 | | | |
| S-ULP-2011-6.0/33 | 190 | 5.76 | 6.78 | | | |
| S-ULP-2011-6.1/33 | 200 | 6.06 | 6.94 | | | |
| S-ULP-2011-6.2/33 | 210 | 6.36 | 7.10 | | | |
| S-ULP-2011-6.3/33 | 220 | 6.67 | 7.26 | | | |
| S-ULP-2011-6.4/33 | 230 | 6.97 | 7.42 | | | |
| S-ULP-2011-6.5/33 | 240 | 7.27 | 7.58 | | | |
| S-ULP-2011-6.6/33 | 250 | 7.57 | 7.74 | | | |
| S-ULP-2011-8.0/33 | 253 | 7.68 | 9.04 | | | |
| S-ULP-2011-8.1/33 | 263 | 7.98 | 9.20 | | | |
| S-ULP-2011-8.2/33 | 273 | 8.28 | 9.36 | | | |
| S-ULP-2011-8.3/33 | 283 | 8.59 | 9.52 | | | |
| S-ULP-2011-8.4/33 | 293 | 8.89 | 9.68 | | | |
| S-ULP-2011-8.5/33 | 303 | 9.19 | 9.84 | | | |
| S-ULP-2011-8.6/33 | 313 | 9.49 | 10.00 | | | |
| S-ULP-2011-8.7/33 | 323 | 9.79 | 10.16 | | | |
| S-ULP-2011-8.8/33 | 333 | 10.09 | 10.32 | | | |
| max. weight approx.: 129kg | | | | | | |
| S-ULP-2011-10.0/33 | 316 | 9.60 | 11.30 | 390 | 357 | 346 |
| S-ULP-2011-10.1/33 | 326 | 9.90 | 11.46 | | | |
| S-ULP-2011-10.2/33 | 336 | 10.20 | 11.62 | | | |
| S-ULP-2011-10.3/33 | 346 | 10.50 | 11.78 | | | |
| S-ULP-2011-10.4/33 | 356 | 10.81 | 11.94 | | | |
| S-ULP-2011-10.5/33 | 366 | 11.11 | 12.10 | | | |
| S-ULP-2011-10.6/33 | 376 | 11.41 | 12.26 | | | |
| S-ULP-2011-10.7/33 | 386 | 11.71 | 12.42 | | | |
| S-ULP-2011-10.8/33 | 396 | 12.02 | 12.58 | | | |
| S-ULP-2011-10.9/33 | 406 | 12.32 | 12.74 | | | |
| S-ULP-2011-10.10/33 | 416 | 12.62 | 12.90 | | | |
| max. weight approx.: 157kg | | | | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) natural frequency at nominal load 2.75 Hz
3) spring elements are fully prestressable
4) 2 x 4 mm adhesive pads are included, shims on request

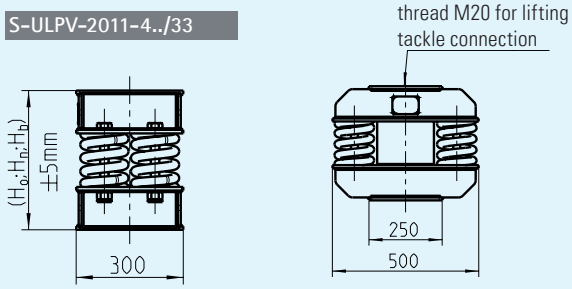
# Spring element type: S-ULPV-2011.../33

LEGEND

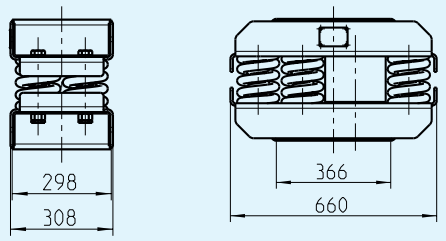
$H_0$: unloaded height  $H_n$: height at nominal load  $H_0$: height at blockload

## DIMENSIONS

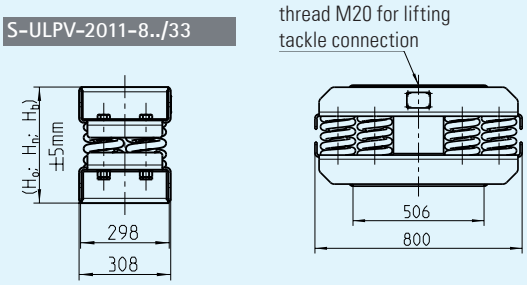
S-ULPV-2011-4../33



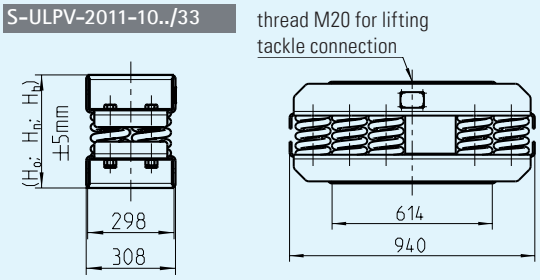

S-ULPV-2011-6../33




S-ULPV-2011-8../33




S-ULPV-2011-10../33




## S-ULPV-2011

| Type | Nom. load [kN] | Vert. stiffness[1] [kN/mm] | Hor. stiffness[1] [kN/mm] | Height [mm] | | | Damping parameter [kNs/m] | |
|---|---|---|---|---|---|---|---|---|
| | | | | $H_0$* | $H_n$* | $H_b$* | $d_v$ [5] | $d_h$ [5] |
| S-ULPV-2011-4.0/33 | 126 | 3.84 | 4.52 | 390 | 357 | 346 | 85 | 170 |
| S-ULPV-2011-4.1/33 | 136 | 4.14 | 4.68 | | | | | |
| S-ULPV-2011-4.2/33 | 146 | 4.44 | 4.84 | | | | | |
| S-ULPV-2011-4.3/33 | 156 | 4.75 | 5.00 | | | | | |
| S-ULPV-2011-4.4/33 | 166 | 5.05 | 5.16 | | | | | |
| S-ULPV-2011-6.0/33 | 190 | 5.76 | 6.78 | | | | | |
| S-ULPV-2011-6.1/33 | 200 | 6.06 | 6.94 | | | | | |
| S-ULPV-2011-6.2/33 | 210 | 6.36 | 7.10 | | | | | |
| S-ULPV-2011-6.3/33 | 220 | 6.67 | 7.26 | | | | | |
| S-ULPV-2011-6.4/33 | 230 | 6.97 | 7.42 | | | | | |
| S-ULPV-2011-6.5/33 | 240 | 7.27 | 7.58 | | | | | |
| S-ULPV-2011-6.6/33 | 250 | 7.57 | 7.74 | | | | | |
| max. weight approx.: 130kg | | | | | | | | |
| S-ULPV-2011-8.0/33 | 253 | 7.68 | 9.04 | 390 | 357 | 346 | 110 | 230 |
| S-ULPV-2011-8.1/33 | 263 | 7.98 | 9.20 | | | | | |
| S-ULPV-2011-8.2/33 | 273 | 8.28 | 9.36 | | | | | |
| S-ULPV-2011-8.3/33 | 283 | 8.59 | 9.52 | | | | | |
| S-ULPV-2011-8.4/33 | 293 | 8.89 | 9.68 | | | | | |
| S-ULPV-2011-8.5/33 | 303 | 9.19 | 9.84 | | | | | |
| S-ULPV-2011-8.6/33 | 313 | 9.49 | 10.00 | | | | | |
| S-ULPV-2011-8.7/33 | 323 | 9.79 | 10.16 | | | | | |
| S-ULPV-2011-8.8/33 | 333 | 10.09 | 10.32 | | | | | |
| max. weight approx.: 162kg | | | | | | | | |
| S-ULPV-2011-10.0/33 | 316 | 9.60 | 11.30 | 390 | 357 | 346 | 140 | 300 |
| S-ULPV-2011-10.1/33 | 326 | 9.90 | 11.46 | | | | | |
| S-ULPV-2011-10.2/33 | 336 | 10.20 | 11.62 | | | | | |
| S-ULPV-2011-10.3/33 | 346 | 10.50 | 11.78 | | | | | |
| S-ULPV-2011-10.4/33 | 356 | 10.81 | 11.94 | | | | | |
| S-ULPV-2011-10.5/33 | 366 | 11.11 | 12.10 | | | | | |
| S-ULPV-2011-10.6/33 | 376 | 11.41 | 12.26 | | | | | |
| S-ULPV-2011-10.7/33 | 386 | 11.71 | 12.42 | | | | | |
| S-ULPV-2011-10.8/33 | 396 | 12.02 | 12.58 | | | | | |
| S-ULPV-2011-10.9/33 | 406 | 12.32 | 12.74 | | | | | |
| S-ULPV-2011-10.10/33 | 416 | 12.62 | 12.90 | | | | | |
| max. weight approx.: 189kg | | | | | | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) natural frequency at nominal load 2.75 Hz
3) spring elements are fully prestressable
4) 2x4 mm adhesive pads are included, shims on request
5) $d_v$; $d_h$: min. values are given for height $H_n$ at natural frequencies $f_v$; $f_h$ at 20°C

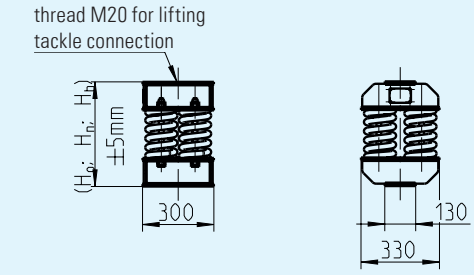
# Spring element type: S-ULP-2011.../47

LEGEND

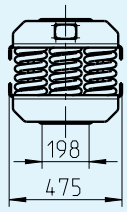
$H_o$: unloaded height  $H_n$: height at nominal load  $H_b$: height at blockload

## DIMENSIONS

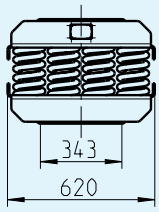
S-ULP-2011-4../47



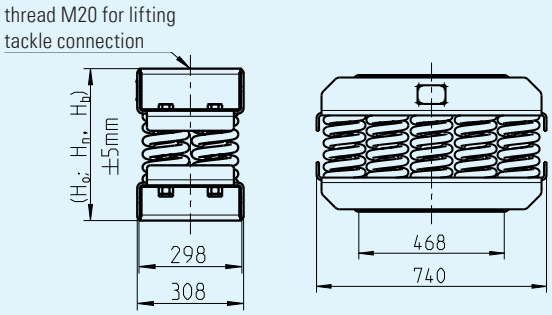

S-ULP-2011-6../47




S-ULP-2011-8../47




S-ULP-2011-10../47




## S-ULP-2011

| Type | Nom. load [kN] | Vertical stiffness[1)] [kN/mm] | Horizontal stiffness[1)] [kN/mm] | Height [mm] | | |
|---|---|---|---|---|---|---|
| | | | | $H_o^*$ | $H_n^*$ | $H_b^*$ |
| S-ULP-2011-4.0/47 | 127 | 2.71 | 2.08 | 440 | 393 | 397 |
| S-ULP-2011-4.1/47 | 137 | 2.92 | 2.10 | | | |
| S-ULP-2011-4.2/47 | 146 | 3.12 | 2.12 | | | |
| S-ULP-2011-4.3/47 | 156 | 3.33 | 2.14 | | | |
| S-ULP-2011-4.4/47 | 165 | 3.53 | 2.16 | | | |
| S-ULP-2011-6.0/47 | 191 | 4.07 | 3.12 | | | |
| S-ULP-2011-6.1/47 | 200 | 4.27 | 3.14 | | | |
| S-ULP-2011-6.2/47 | 210 | 4.48 | 3.16 | | | |
| S-ULP-2011-6.3/47 | 219 | 4.68 | 3.18 | | | |
| S-ULP-2011-6.4/47 | 229 | 4.89 | 3.20 | | | |
| S-ULP-2011-6.5/47 | 239 | 5.09 | 3.22 | | | |
| S-ULP-2011-6.6/47 | 248 | 5.29 | 3.24 | | | |
| S-ULP-2011-8.0/47 | 254 | 5.42 | 4.16 | | | |
| S-ULP-2011-8.1/47 | 264 | 5.63 | 4.18 | | | |
| S-ULP-2011-8.2/47 | 274 | 5.83 | 4.20 | | | |
| S-ULP-2011-8.3/47 | 283 | 6.04 | 4.22 | | | |
| S-ULP-2011-8.4/47 | 293 | 6.24 | 4.24 | | | |
| S-ULP-2011-8.5/47 | 302 | 6.45 | 4.26 | | | |
| S-ULP-2011-8.6/47 | 312 | 6.65 | 4.28 | | | |
| S-ULP-2011-8.7/47 | 322 | 6.85 | 4.30 | | | |
| S-ULP-2011-8.8/47 | 331 | 7.06 | 4.31 | | | |
| max. weight approx.: 145kg | | | | | | |
| S-ULP-2011-10.0/47 | 318 | 6.78 | 5.20 | 440 | 393 | 377 |
| S-ULP-2011-10.1/47 | 328 | 6.98 | 5.22 | | | |
| S-ULP-2011-10.2/47 | 337 | 7.19 | 5.24 | | | |
| S-ULP-2011-10.3/47 | 347 | 7.39 | 5.26 | | | |
| S-ULP-2011-10.4/47 | 356 | 7.60 | 5.28 | | | |
| S-ULP-2011-10.5/47 | 366 | 7.80 | 5.30 | | | |
| S-ULP-2011-10.6/47 | 376 | 8.01 | 5.32 | | | |
| S-ULP-2011-10.7/47 | 385 | 8.21 | 5.34 | | | |
| S-ULP-2011-10.8/47 | 395 | 8.42 | 5.36 | | | |
| S-ULP-2011-10.9/47 | 405 | 8.62 | 5.37 | | | |
| S-ULP-2011-10.10/47 | 414 | 8.82 | 5.39 | | | |
| max. weight approx.: 177kg | | | | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) natural frequency at nominal load 2.3 Hz
3) spring elements are fully prestressable
4) 2x4 mm adhesive pads are included, shims on request

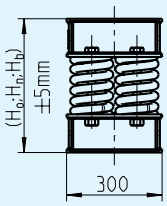
# Spring element type: S-ULPV-2011.../47

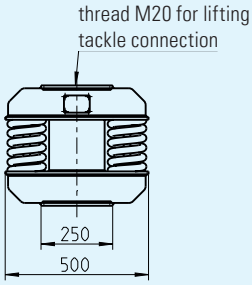
LEGEND

$H_0$: unloaded height  $H_n$: height at nominal load  $H_0$: height at blockload

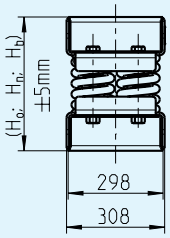
## DIMENSIONS

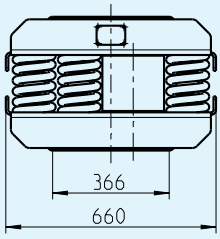
S-ULPV-2011-4../33



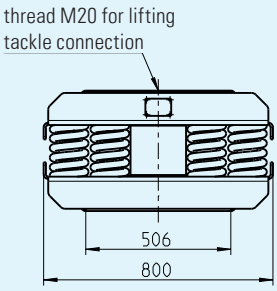




S-ULPV-2011-6../33

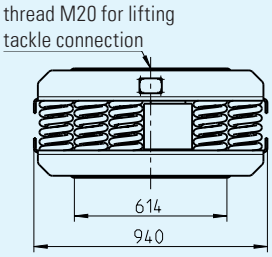



S-ULPV-2011-8../33




S-ULPV-2011-10../33




## S-ULPV-2011

| Type | Nom. load [kN] | Vert. stiffness[1] [kN/mm] | Hor. stiffness[1] [kN/mm] | Height [mm] | | | Damping parameter [kNs/m] | |
|---|---|---|---|---|---|---|---|---|
| | | | | $H_0$* | $H_n$* | $H_b$* | $d_v$ [5] | $d_h$ [5] |
| S-ULPV-2011-4.0/47 | 127 | 2.71 | 2.08 | 440 | 393 | 377 | 85 | 170 |
| S-ULPV-2011-4.1/47 | 137 | 2.92 | 2.10 | | | | | |
| S-ULPV-2011-4.2/47 | 146 | 3.12 | 2.12 | | | | | |
| S-ULPV-2011-4.3/47 | 156 | 3.33 | 2.14 | | | | | |
| S-ULPV-2011-4.4/47 | 165 | 3.53 | 2.16 | | | | | |
| S-ULPV-2011-6.0/47 | 191 | 4.07 | 3.12 | | | | | |
| S-ULPV-2011-6.1/47 | 200 | 4.27 | 3.14 | | | | | |
| S-ULPV-2011-6.2/47 | 210 | 4.48 | 3.16 | | | | | |
| S-ULPV-2011-6.3/47 | 219 | 4.68 | 3.18 | | | | | |
| S-ULPV-2011-6.4/47 | 229 | 4.89 | 3.20 | | | | | |
| S-ULPV-2011-6.5/47 | 239 | 5.09 | 3.22 | | | | | |
| S-ULPV-2011-6.6/47 | 248 | 5.29 | 3.24 | | | | | |
| max. weight approx.: 141 kg | | | | | | | | |
| S-ULPV-2011-8.0/47 | 254 | 5.42 | 4.16 | 440 | 393 | 377 | 110 | 230 |
| S-ULPV-2011-8.1/47 | 264 | 5.63 | 4.18 | | | | | |
| S-ULPV-2011-8.2/47 | 274 | 5.83 | 4.20 | | | | | |
| S-ULPV-2011-8.3/47 | 283 | 6.04 | 4.22 | | | | | |
| S-ULPV-2011-8.4/47 | 293 | 6.24 | 4.24 | | | | | |
| S-ULPV-2011-8.5/47 | 302 | 6.45 | 4.26 | | | | | |
| S-ULPV-2011-8.6/47 | 312 | 6.65 | 4.28 | | | | | |
| S-ULPV-2011-8.7/47 | 322 | 6.85 | 4.30 | | | | | |
| S-ULPV-2011-8.8/47 | 331 | 7.06 | 4.31 | | | | | |
| max. weight approx.: 162kg | | | | | | | | |
| S-ULPV-2011-10.0/47 | 318 | 6.78 | 5.20 | 440 | 393 | 377 | 140 | 300 |
| S-ULPV-2011-10.1/47 | 328 | 6.98 | 5.22 | | | | | |
| S-ULPV-2011-10.2/47 | 337 | 7.19 | 5.24 | | | | | |
| S-ULPV-2011-10.3/47 | 347 | 7.39 | 5.26 | | | | | |
| S-ULPV-2011-10.4/47 | 356 | 7.60 | 5.28 | | | | | |
| S-ULPV-2011-10.5/47 | 366 | 7.80 | 5.30 | | | | | |
| S-ULPV-2011-10.6/47 | 376 | 8.01 | 5.32 | | | | | |
| S-ULPV-2011-10.7/47 | 385 | 8.21 | 5.34 | | | | | |
| S-ULPV-2011-10.8/47 | 395 | 8.42 | 5.36 | | | | | |
| S-ULPV-2011-10.9/47 | 405 | 8.62 | 5.37 | | | | | |
| S-ULPV-2011-10.10/47 | 414 | 8.82 | 5.39 | | | | | |
| max. weight approx.: 210kg | | | | | | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) natural frequency at nominal load 2.3 Hz
3) spring elements are fully prestressable
4) 2x4mm adhesive pads are included, shims on request
5) $d_v$; $d_h$: min. values are given for height $H_n$ at natural frequencies $f_v$; $f_h$ at 20°C

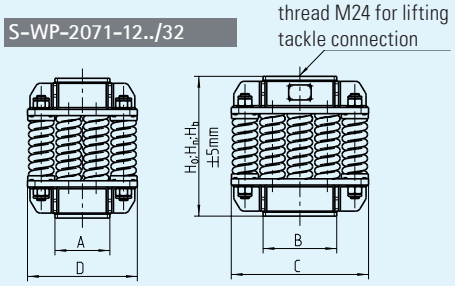
# Spring element type: S-WP(R)-2071.../32
# S-WPV(R)-2071.../32

LEGEND

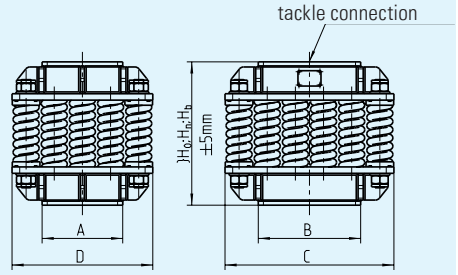
$H_0$: unloaded height  $H_n$: height at nominal load  $H_b$: height at blockload

## DIMENSIONS

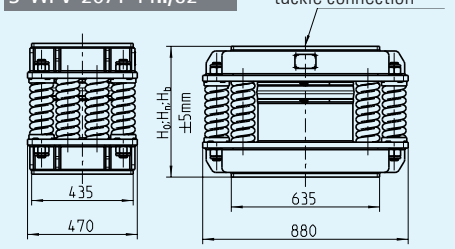
S-WP-2071-12../32



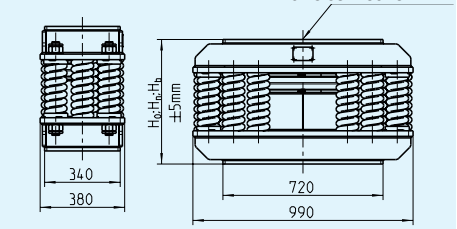

S-WPR-2071-20../32




S-WPV-2071-14../32




S-WPVR-2071-16../32




### S-WP-2071

| Type | Nom. load [kN] | Ver. stiffness 1) [kN/mm] | Hor. stiffness 1) [kN/mm] | A [mm] | B [mm] | C [mm] | D [mm] | Height [mm] $H_0$* | $H_n$* | $H_b$* |
|---|---|---|---|---|---|---|---|---|---|---|
| S-WP-2071-12.00/32 | 638 | 19.95 | 3.17 | 315 | 315 | 550 | 360 | 560 | 528 | 514 |
| S-WP-2071-13.00/32 | 692 | 21.61 | 3.43 | | | | | | | |
| S-WP-2071-14.00/32 | 745 | 23.27 | 3.70 | | | | | | | |
| S-WP-2071-15.00/32 | 798 | 24,94 | 3.96 | | | | | | | |
| S-WP-2071-16.00/32 | 851 | 26.60 | 4.22 | 220 | 295 | 550 | 440 | | | |
| S-WP-2071-17.00/32 | 904 | 28.26 | 4.49 | | | | | | | |
| S-WP-2071-18.00/32 | 957 | 29.92 | 4.75 | | | | | | | |
| S-WP-2071-19.00/32 | 1011 | 31.59 | 5.02 | | | | | | | |
| S-WP-2071-20.00/32 | 1064 | 33.25 | 5.28 | | | | | | | |

max. weight approx.: 349kg

### S-WPR-2071

| Type | Nom. load [kN] | Ver. stiffness 1) [kN/mm] | Hor. stiffness 1) [kN/mm] | A [mm] | B [mm] | C [mm] | D [mm] | Height [mm] $H_0$* | $H_n$* | $H_b$* |
|---|---|---|---|---|---|---|---|---|---|---|
| S-WPR-2071-20.00/32 | 1018 | 31.8 | 4.9 | 325 | 365 | 550 | 440 | 560 | 528 | 514 |
| S-WPR-2071-25.00/32 | 1282 | 40.1 | 6.1 | 315 | 480 | 575 | 575 | | | |
| S-WPR-2071-30.00/32 | 1585 | 49.5 | 7.3 | 360 | 480 | 660 | 550 | | | |

max. weight approx.: 547kg

### S-WPV-2071

| Type | Nom. load [kN] | Vert. stiffness1) [kN/mm] | Hor. stiffness1) [kN/mm] | Height [mm] $H_0$* | $H_n$* | $H_b$* | Damping parameter [kNs/m] $d_v$ 5) | $d_h$ 5) |
|---|---|---|---|---|---|---|---|---|
| S-WPV-2071-14.00/32 | 745 | 23.27 | 3.70 | 560 | 528 | 514 | 300 | 800 |
| S-WPV-2071-15.00/32 | 798 | 24.94 | 3.96 | | | | | |
| S-WPV-2071-16.00/32 | 851 | 26.60 | 4.22 | | | | | |

max. weight approx.: 555kg

### S-WPVR-2071

| Type | Nom. load [kN] | Ver. stiffness1) [kN/mm] | Hor. stiffness 1) [kN/mm] | Height [mm] $H_0$* | $H_n$* | $H_b$* |
|---|---|---|---|---|---|---|
| S-WPVR-2071-16.00/32 | 851 | 26.6 | 4.2 | 560 | 528 | 514 |
| S-WPVR-2071-17.00/32 | 912 | 28.5 | 4.4 | | | |
| S-WPVR-2071-18.00/32 | 957 | 29.9 | 4.8 | | | |

max. weight approx.: 490kg

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) natural frequency at nominal load 2.75Hz
3) spring elements are fully prestressable
4) 2x4 mm adhesive pads are included
6) $d_v$; $d_h$: min. values are given for height $H_n$ at natural frequencies $f_v$; $f_h$ at 20°C

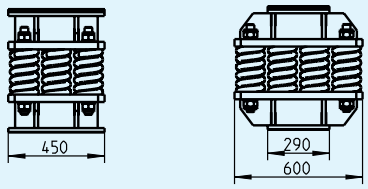
# Spring element type: S-WP-3010.../32

LEGEND

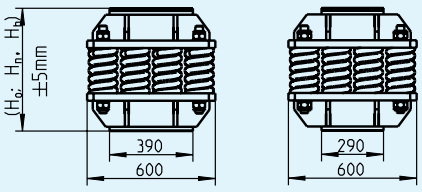
$H_o$: unloaded height  $H_n$: height at nominal load  $H_o$: height at blockload

## DIMENSIONS

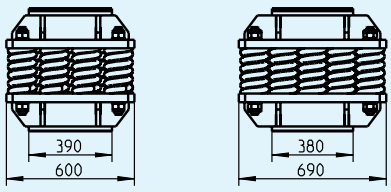
S-WP-3010-10../32
S-WP-3010-12../32



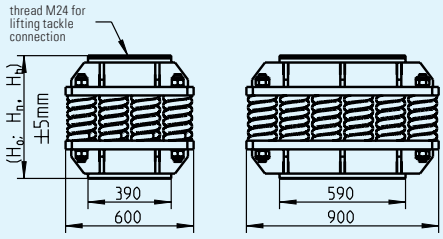

S-WP-3010-14../32
S-WP-3010-16../32




S-WP-3010-18../32




S-WP-3010-22../32




## S-WPR-3010

| Type | Nom. load [kN] | Ver. stiffness [1)] [kN/mm] | Hor. stiffness [1)] [kN/mm] | Height [mm] | | |
|---|---|---|---|---|---|---|
| | | | | $H_o$* | $H_n$* | $H_b$* |
| S-WP-3010-10.00/32 | 510 | 15.97 | 9.94 | 560 | 528 | 514 |
| S-WP-3010-12.00/32 | 613 | 19.16 | 11.93 | | | |
| S-WP-3010-12.04/32 | 659 | 20.59 | 11.95 | | | |
| S-WP-3010-14.04/32 | 761 | 23.79 | 13.94 | | | |
| S-WP-3010-16.00/32 | 817 | 25.55 | 15.90 | | | |
| S-WP-3010-16.12/32 | 955 | 29.85 | 15.97 | | | |
| S-WP-3010-18.10/32 | 1034 | 32.33 | 17.94 | | | |
| S-WP-3010-22.07/32 | 1204 | 37.64 | 21.90 | | | |
| S-WP-3010-22.16/32 | 1307 | 40.86 | 21.95 | | | |
| max. weight approx.: 820 kg | | | | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) natural frequency at nominal load 2.75Hz
3) spring elements are fully prestressable
4) 2x4 mm adhesive pads are included
5) $d_v$; $d_h$: min. values are given for height at natural frequencies $f_v$; $f_h$ at 20°C

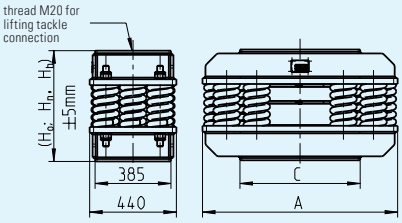
# Spring element type: S-WPV(R)-3010.../32

LEGEND

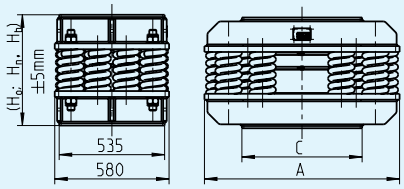
$H_0$: unloaded height  $H_n$: height at nominal load  $H_0$: height at blockload

## DIMENSIONS

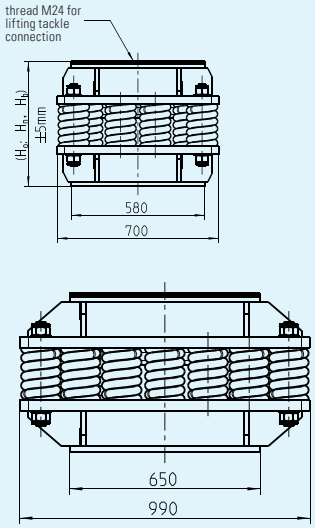
S-WPV-3010-10../32
S-WPV-3010-12../32




S-WPV-3010-14../32
S-WPV-3010-16../32
S-WPV-3010-18../32
S-WPV-3010-22../32




S-WPVR-3010-22../32




## S-WP-3010

| Type | Nom. load [kN] | Ver. stiffness[1)] [kN/mm] | Hor. stiffness[1)] [kN/mm] | Height [mm] $H_0^*$ | Height [mm] $H_n^*$ | Height [mm] $H_b^*$ | A [mm] | C [mm] | Damping parameter [kNs/m] $d_v$ [5)] | Damping parameter [kNs/m] $d_h$ [5)] |
|---|---|---|---|---|---|---|---|---|---|---|
| S-WPV-3010-10.00/32 | 510 | 15.97 | 9.94 | 560 | 528 | 514 | 990 | 610 | 230 | 600 |
| S-WPV-3010-12.00/32 | 613 | 19.16 | 11.93 | | | | | | | |
| S-WPV-3010-12.04/32 | 659 | 20.59 | 11.95 | | | | | | | |
| S-WPV-3010-14.04/32 | 761 | 23.79 | 13.94 | | | | | | 300 | 800 |
| S-WPV-3010-16.00/32 | 817 | 25.55 | 15.90 | | | | | | | |
| S-WPV-3010-16.12/32 | 955 | 29.85 | 15.97 | | | | | | | |
| S-WPV-3010-18.10/32 | 1034 | 32.33 | 17.94 | | | | 1040 | 740 | | |
| S-WPV-3010-22.07/32 | 1204 | 37.64 | 21.90 | | | | 1090 | 790 | | |
| S-WPV-3010-22.16/32 | 1307 | 40.86 | 21.95 | | | | | | | |
| max. weight approx.: 760kg | | | | | | | | | | |

## S-WPVR-3010

| Type | Nom. load [kN] | Vert. stiffness[1)] [kN/mm] | Hor. stiffness[1)] [kN/mm] | Height [mm] $H_0^*$ | Height [mm] $H_n^*$ | Height [mm] $H_b^*$ | Damping parameter [kNs/m] $d_v$ [5)] | Damping parameter [kNs/m] $d_h$ [5)] |
|---|---|---|---|---|---|---|---|---|
| S-WPVR-3010-22.07/32 | 1204 | 37.64 | 21.90 | 574 | 542 | 528 | 550 | 1100 |
| S-WPVR-3010-22.16/32 | 1307 | 40.86 | 21.95 | | | | | |
| max. weight approx.: 925kg | | | | | | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) natural frequency at nominal load 2.75Hz
3) spring elements are fully prestressable
4) 2x4 mm adhesive pads are included
6) $d_v$; $d_h$: min. values are given for height $H_n$ at natural frequencies $f_v$; $f_h$ at 20°C

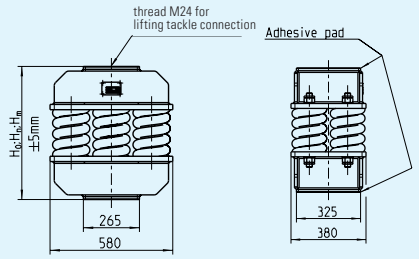
# Spring element type: S-WP-4020.../24

LEGEND

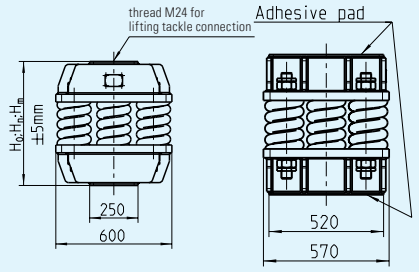
$H_0$: unloaded height  $H_n$: height at nominal load  $H_m$: height at maximum load

## DIMENSIONS

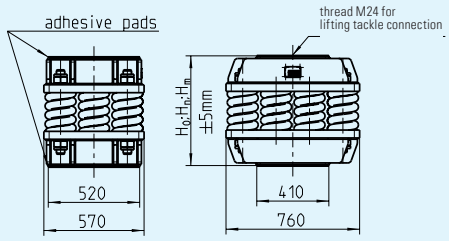
S-WP-4020-05../24
S-WP-4020-06../24




S-WP-4020-07../24
S-WP-4020-08../24
S-WP-4020-09../24




S-WP-4020-10../24
S-WP-4020-11../24
S-WP-4020-12../24




## S-WP-4020

| Type | Nom. load [kN] | Max. load [kN] | Ver. stiffness[1)] [kN/mm] | Hor. stiffness[1)] [kN/mm] | Height [mm] | | |
|---|---|---|---|---|---|---|---|
| | | | | | $H_0$* | $H_n$* | $H_m$* |
| S-WP-4020-05.00/24 | 533 | 639 | 26.65 | 22.70 | 636 | 616 | 612 |
| S-WP-4020-05.01/24 | 558 | 671 | 27.95 | 23.10 | | | |
| S-WP-4020-05.02/24 | 584 | 703 | 29.25 | 23.50 | | | |
| S-WP-4020-05.03/24 | 610 | 734 | 30.55 | 23.90 | | | |
| S-WP-4020-06.00/24 | 639 | 767 | 31.98 | 27.20 | | | |
| S-WP-4020-06.01/24 | 665 | 799 | 33.28 | 27.60 | | | |
| S-WP-4020-06.02/24 | 691 | 831 | 34.58 | 28.00 | | | |
| S-WP-4020-07.00/24 | 746 | 895 | 27.31 | 31.77 | 636 | 616 | 612 |
| S-WP-4020-07.01/24 | 772 | 927 | 38.61 | 32.16 | | | |
| S-WP-4020-07.02/24 | 798 | 959 | 39.91 | 32.55 | | | |
| S-WP-4020-07.03/24 | 824 | 990 | 41.21 | 32.95 | | | |
| S-WP-4020-08.00/24 | 853 | 1023 | 42.64 | 36.31 | | | |
| S-WP-4020-08.01/24 | 879 | 1055 | 43.94 | 36.70 | | | |
| S-WP-4020-08.02/24 | 905 | 1087 | 45.24 | 37.09 | | | |
| S-WP-4020-08.03/24 | 931 | 1118 | 46.54 | 37.49 | | | |
| S-WP-4020-09.00/24 | 959 | 1151 | 47.97 | 40.85 | | | |
| S-WP-4020-09.01/24 | 985 | 1183 | 49.27 | 41.24 | | | |
| S-WP-4020-09.02/24 | 1011 | 1215 | 50.57 | 41.63 | | | |
| S-WP-4020-09.03/24 | 1037 | 1246 | 51.87 | 42.02 | | | |
| S-WP-4020-10.00/24 | 1066 | 1279 | 53.30 | 45.60 | 636 | 616 | 612 |
| S-WP-4020-10.01/24 | 1092 | 1311 | 54.60 | 45.97 | | | |
| S-WP-4020-10.02/24 | 1117 | 1343 | 55.90 | 46.34 | | | |
| S-WP-4020-10.03/24 | 1143 | 1374 | 57.20 | 46.72 | | | |
| S-WP-4020-11.00/24 | 1172 | 1407 | 58.63 | 50.16 | | | |
| S-WP-4020-11.01/24 | 1198 | 1439 | 59.93 | 50.53 | | | |
| S-WP-4020-11.02/24 | 1224 | 1471 | 61.23 | 50.90 | | | |
| S-WP-4020-11.03/24 | 1250 | 1502 | 62.53 | 51.28 | | | |
| S-WP-4020-12.00/24 | 1279 | 1535 | 63.96 | 54.72 | | | |
| S-WP-4020-12.01/24 | 1305 | 1567 | 65.26 | 55.09 | | | |
| S-WP-4020-12.02/24 | 1331 | 1598 | 66.56 | 55.46 | | | |
| S-WP-4020-12.03/24 | 1357 | 1630 | 67.86 | 55.84 | | | |
| S-WP-4020-12.04/24 | 1383 | 1662 | 69.15 | 56.21 | | | |
| S-WP-4020-12.05/24 | 1409 | 1693 | 70.45 | 56.58 | | | |
| S-WP-4020-12.06/24 | 1435 | 1725 | 71.75 | 56.96 | | | |
| S-WP-4020-12.07/24 | 1460 | 1757 | 73.05 | 57.33 | | | |
| S-WP-4020-12.08/24 | 1486 | 1788 | 74.35 | 57.70 | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) natural frequency at nominal load 3.5 Hz
3) spring elements are prestressable
4) 2x4 mm adhesive pads are included

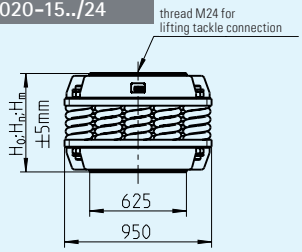
# Spring element type: S-WP-4020.../24

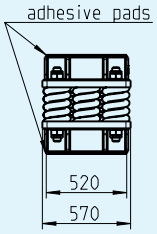
LEGEND

$H_0$: unloaded height $H_n$: height at nominal load $H_b$: height at maximum load

## DIMENSIONS

S-WP-4020-14../24
S-WP-4020-15../24




## S-WP-4020

| Type | Nom. load [kN] | Max. load [kN] | Ver.[1] stiffness [kN/mm] | Hor.[1] stiffness [kN/mm] | Height [mm] | | |
|---|---|---|---|---|---|---|---|
| | | | | | $H_0^*$ | $H_n^*$ | $H_b^*$ |
| S-WP-4020-14.00/24 | 1492 | 1791 | 74.62 | 63.84 | 636 | 616 | 612 |
| S-WP-4020-14.01/24 | 1518 | 1822 | 75.92 | 64.21 | | | |
| S-WP-4020-14.02/24 | 1544 | 1853 | 77.22 | 64.58 | | | |
| S-WP-4020-14.03/24 | 1570 | 1884 | 78.52 | 64.96 | | | |
| S-WP-4020-15.00/24 | 1599 | 1919 | 79.95 | 68.40 | | | |
| S-WP-4020-15.01/24 | 1625 | 1950 | 81.25 | 68.77 | | | |
| S-WP-4020-15.02/24 | 1651 | 1981 | 82.55 | 69.14 | | | |
| S-WP-4020-15.03/24 | 1677 | 2012 | 83.85 | 69.52 | | | |
| S-WP-4020-15.04/24 | 1703 | 2044 | 85.15 | 69.89 | | | |
| S-WP-4020-15.05/24 | 1729 | 2075 | 86.44 | 70.26 | | | |
| S-WP-4020-15.06/24 | 1755 | 2106 | 87.74 | 70.63 | | | |
| S-WP-4020-15.07/24 | 1781 | 2137 | 89.04 | 71.01 | | | |
| S-WP-4020-15.08/24 | 1807 | 2168 | 90.34 | 71.38 | | | |
| S-WP-4020-15.09/24 | 1833 | 2199 | 91.64 | 71.75 | | | |
| S-WP-4020-15.10/24 | 1859 | 2230 | 92.93 | 72.13 | | | |
| S-WP-4020-15.11/24 | 1885 | 2262 | 94.23 | 72.50 | | | |
| S-WP-4020-15.12/24 | 1911 | 2293 | 95.53 | 72.87 | | | |
| S-WP-4020-15.13/24 | 1937 | 2324 | 96.83 | 73.25 | | | |
| S-WP-4020-15.14/24 | 1963 | 2355 | 98.13 | 73.62 | | | |
| S-WP-4020-15.15/24 | 1988 | 2386 | 99.42 | 73.99 | | | |
| S-WP-4020-15.16/24 | 2014 | 2417 | 100.72 | 74.36 | | | |
| S-WP-4020-15.17/24 | 2040 | 2448 | 102.02 | 74.74 | | | |
| S-WP-4020-15.18/24 | 2066 | 2480 | 103.32 | 75.11 | | | |
| S-WP-4020-15.19/24 | 2092 | 2511 | 104.61 | 75.48 | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) natural frequency at nominal load 3.5 Hz
3) spring elements are prestressable
4) 2x4 mm adhesive pads are included

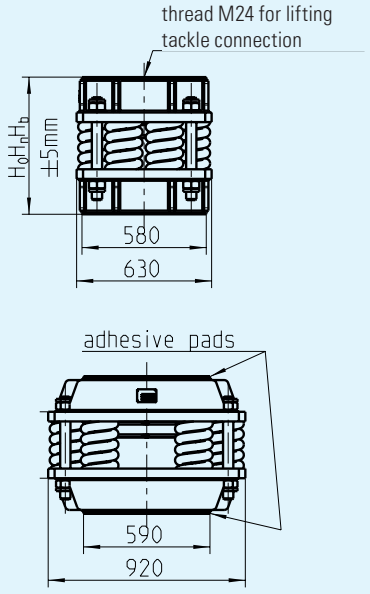
# Spring element type: S-WPV-4020.../24

LEGEND

$H_o$: unloaded height $H_n$: height at nominal load $H_m$: height at maximum load

## DIMENSIONS

S-WPV-4020-05../24
S-WPV-4020-06../24
S-WPV-4020-07../24
S-WPV-4020-08../24




## S-WPV-4020

| Type | Nom. load [kN] | Max. load [kN] | Vert.[1] stiffness [kN/mm] | Hor.[1] stiffness [kN/mm] | Height [mm] | | | Damping parameter [kNs/m] | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | $H_o$* | $H_n$* | $H_b$* | $d_v$ [6] | $d_h$ [6] |
| S-WPV-4020-05.00/24 | 533 | 640 | 26.65 | 22.69 | 636 | 616 | 612 | 350 | 950 |
| S-WPV-4020-05.01/24 | 559 | 671 | 27.95 | 23.09 | | | | | |
| S-WPV-4020-05.02/24 | 585 | 702 | 29.25 | 23.48 | | | | | |
| S-WPV-4020-06.00/24 | 640 | 768 | 31.98 | 27.23 | | | | | |
| S-WPV-4020-06.03/24 | 718 | 861 | 35.88 | 28.41 | | | | | |
| S-WPV-4020-07.00/24 | 746 | 895 | 37.31 | 31.92 | | | | | |
| S-WPV-4020-07.01/24 | 772 | 927 | 38.61 | 32.29 | | | | | |
| S-WPV-4020-07.02/24 | 798 | 958 | 39.91 | 32.66 | | | | | |
| S-WPV-4020-07.03/24 | 824 | 989 | 41.21 | 33.04 | | | | | |
| S-WPV-4020-08.00/24 | 853 | 1023 | 42.64 | 36.48 | | | | | |
| S-WPV-4020-08.01/24 | 879 | 1055 | 43.94 | 36.85 | | | | | |
| S-WPV-4020-08.02/24 | 905 | 1086 | 45.24 | 37.22 | | | | | |
| S-WPV-4020-08.03/24 | 931 | 1117 | 46.54 | 37.60 | | | | | |
| S-WPV-4020-08.04/24 | 957 | 1148 | 47.83 | 37.97 | | | | | |
| S-WPV-4020-08.05/24 | 983 | 1179 | 49.13 | 28.34 | | | | | |
| S-WPV-4020-08.06/24 | 1009 | 1210 | 50.43 | 38.72 | | | | | |
| S-WPV-4020-08.07/24 | 1035 | 1242 | 51.73 | 39.09 | | | | | |
| S-WPV-4020-08.08/24 | 1061 | 1273 | 53.03 | 39.46 | | | | | |
| S-WPV-4020-08.09/24 | 1086 | 1304 | 54.32 | 39.83 | | | | | |
| S-WPV-4020-08.10/24 | 1112 | 1385 | 55.62 | 40.22 | | | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) natural frequency at nominal load 3.5 Hz
3) spring elements are fully prestressable
4) 2x4 mm adhesive pads are included
5) $d_v$; $d_h$: min. values are given for height $H_n$ at natural frequencies $f_v$; $f_h$ at 20°C

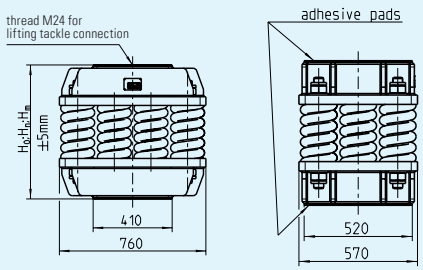
# Spring element type: S-WP-4020.../32

LEGEND

$H_0$: unloaded height $H_n$: height at nominal load $H_m$: height at maximum load

## DIMENSIONS

S-WP-4020-10../32
S-WP-4020-11../32
S-WP-4020-12../32




## S-WP-4020

| Type | Nom. load [kN] | Max. load [kN] | Ver.[1] stiffness [kN/mm] | Hor.[1] stiffness [kN/mm] | Height [mm] | | |
|---|---|---|---|---|---|---|---|
| | | | | | $H_0$* | $H_n$* | $H_m$* |
| S-WP-4020-10.00/32 | 1119 | 1279 | 40.0 | 23.6 | 691 | 663 | 659 |
| S-WP-4020-10.01/32 | 1146 | 1309 | 40.9 | 23.7 | | | |
| S-WP-4020-10.02/32 | 1172 | 1340 | 41.9 | 23.8 | | | |
| S-WP-4020-10.03/32 | 1199 | 1370 | 42.8 | 23.8 | | | |
| S-WP-4020-11.00/32 | 1231 | 1407 | 44.0 | 25.9 | | | |
| S-WP-4020-11.01/32 | 1258 | 1437 | 44.9 | 26.0 | | | |
| S-WP-4020-11.02/32 | 1284 | 1468 | 45.9 | 26.1 | | | |
| S-WP-4020-11.03/32 | 1311 | 1498 | 46.8 | 26.2 | | | |
| S-WP-4020-12.00/32 | 1343 | 1535 | 48.0 | 28.3 | | | |
| S-WP-4020-12.01/32 | 1370 | 1565 | 48.9 | 28.4 | | | |
| S-WP-4020-12.02/32 | 1396 | 1596 | 49.9 | 28.5 | | | |
| S-WP-4020-12.03/32 | 1423 | 1626 | 50.8 | 28.6 | | | |
| S-WP-4020-12.04/32 | 1449 | 1656 | 51.8 | 28.7 | | | |
| S-WP-4020-12.05/32 | 1475 | 1686 | 52.7 | 28.7 | | | |
| S-WP-4020-12.06/32 | 1502 | 1716 | 53.6 | 28.8 | | | |
| S-WP-4020-12.07/32 | 1528 | 1747 | 54.6 | 28.9 | | | |
| S-WP-4020-12.08/32 | 1555 | 1777 | 55.5 | 29.0 | | | |
| max. weight approx.: 923kg | | | | | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) natural frequency at nominal load 3.0 Hz
3) spring elements are fully prestressable
4) 2x4 mm adhesive pads are included

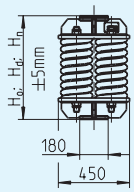
# Spring element type: S-WLP-3021.../150
# S-WLP-3030.../150

LEGEND

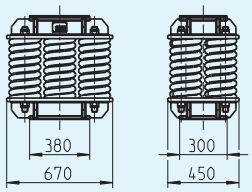
$H_0$: unloaded height  $H_n$: height at nominal load  $H_d$: delivery height (according to customer specifications)

## DIMENSIONS

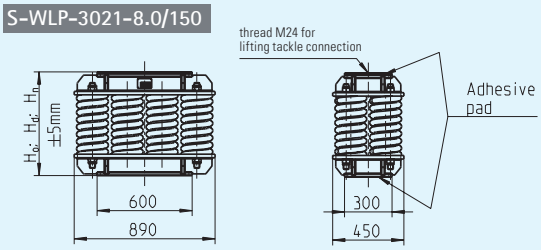
S-WLP-3021-4.0/150



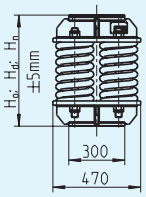

S-WLP-3021-6.0/150



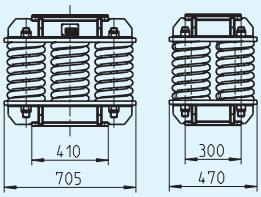

S-WLP-3021-8.0/150



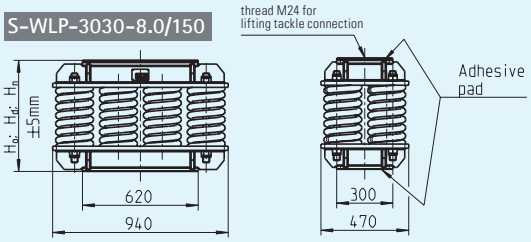

S-WLP-3030-4.0/150




S-WLP-3030-6.0/150




S-WLP-3030-8.0/150




## S-WLP

| Type | Max. load [kN] | Ver. stiffness[1)] [kN/mm] | Hor. stiffness[1)] [kN/mm] | Height [mm] | | |
|---|---|---|---|---|---|---|
| | | | | $H_0$* | $H_d$* | $H_n$* |
| S-WLP-3021-4.0/150 | 314 | 2.10 | 0.36 | 730 | - | 580 |
| S-WLP-3021-6.0/150 | 472 | 3.14 | 0.53 | | | |
| S-WLP-3021-8.0/150 | 630 | 4.19 | 0.71 | | | |
| max. weight approx.: 554kg | | | | | | |
| S-WLP-3030-4.0/150 | 236 | 1.58 | 0.61 | 665 | - | 515 |
| S-WLP-3030-6.0/150 | 355 | 2.37 | 0.91 | | | |
| S-WLP-3030-8.0/150 | 473 | 3.16 | 1.22 | | | |
| max. weight approx.: 505kg | | | | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) 2x4 mm adhesive pads
3) spring elements are prestressable

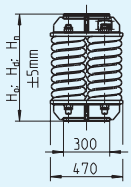
# Spring element type: S-WLP-4030.../150
# S-WLP-5010.../150

LEGEND

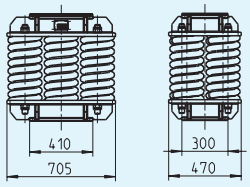
$H_0$: unloaded height  $H_n$: height at nominal load  $H_d$: delivery height (according to customer specifications)

## DIMENSIONS

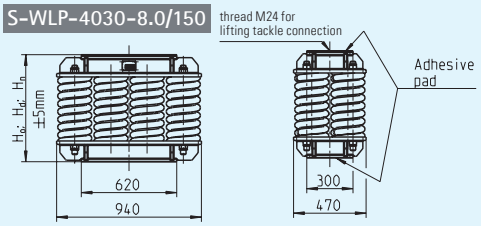
S-WLP-4030-4.0/150



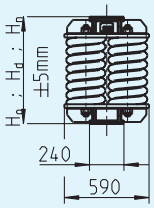

S-WLP-4030-6.0/150



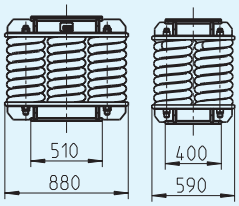

S-WLP-4030-8.0/150



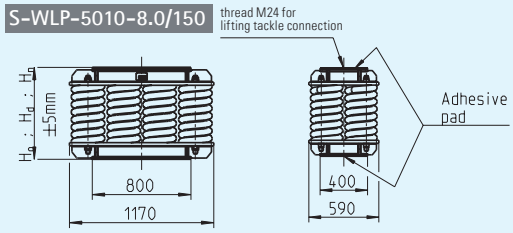

S-WLP-5010-4.0/150




S-WLP-5010-6.0/150




S-WLP-5010-8.0/150




## S-WLP

| Type | Max. load [kN] | Ver. stiffness[1)] [kN/mm] | Hor. stiffness[1)] [kN/mm] | Height [mm] | | |
|---|---|---|---|---|---|---|
| | | | | $H_0$* | $H_d$* | $H_n$* |
| S-WLP-4030-4.0/150 | 394 | 2.63 | 0.53 | 765 | - | 615 |
| S-WLP-4030-6.0/150 | 591 | 3.94 | 0.80 | | | |
| S-WLP-4030-8.0/150 | 788 | 5.25 | 1.06 | | | |
| max. weight approx.: 685 kg | | | | | | |
| S-WLP-5010-4.0/150 | 640 | 4.26 | 1.26 | 840 | - | 700 |
| S-WLP-5010-6.0/150 | 960 | 6.40 | 1.89 | | | |
| S-WLP-5010-8.0/150 | 1279 | 8.53 | 2.52 | | | |
| max. weight approx.: 1191 kg | | | | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) 2x4 mm adhesive pads
3) spring elements are prestressable

# Spring element type: S-WLP-50.../160
# S-WLPV-50.../160

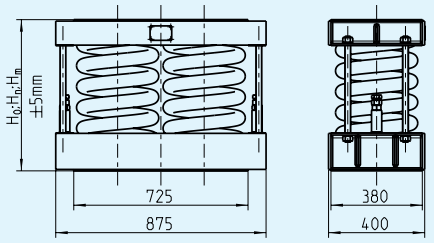
LEGEND

$H_0$: unloaded height $H_n$: height at nominal load $H_m$: height at maximum load

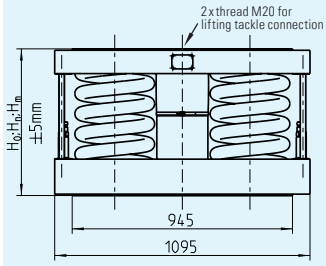
$H_1$: delivery height (according to customer specifications)

## DIMENSIONS

S-WLP-5010-2.0/160 to
S-WLP-5020-2.2/160




S-WLPV-5010-2.0/160 to
S-WLPV-5020-2.2/160




## S-WLP

| Type | Nom. load [kN] | Ver. stiffness[1)] [kN/mm] | Hor. stiffness[1)] [kN/mm] | Weight approx. [kg] | Height [mm] | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | $H_0$* | $H_n$* | $H_m$* | $H_1$* |
| S-WLP-5020-2.0/160 | 198 | 1.20 | 0.62 | 340 | 629 | 469 | 427 | - |
| S-WLP-5010-2.0/160 | 226 | 1.38 | 0.77 | 380 | | | | |
| S-WLP-5020-2.1/160 | 225 | 1.40 | 0.65 | 380 | | | | |
| S-WLP-5010-2.1/160 | 252 | 1.58 | 0.79 | 420 | | | | |
| S-WLP-5020-2.2/160 | 264 | 1.61 | 0.67 | 420 | | | | |
| S-WLP-5010-2.2/160 | 292 | 1.78 | 0.81 | 460 | | | | |

## S-WLPV

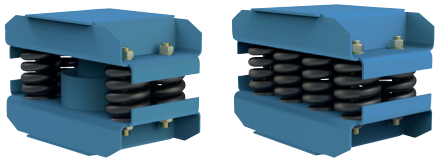
| Type | Nom. load [kN] | Ver. stiffness[1)] [kN/mm] | Hor. stiffness[1)] [kN/mm] | Weight approx. [kg] | Height [mm] | | | | Damping parameter [kNs/m] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | $H_0$* | $H_n$* | $H_m$* | $H_1$* | $d_v$ [4)] | $d_h$ [4)] |
| S-WLPV-5020-2.0/160 | 198 | 1.20 | 0.62 | 400 | 629 | 469 | 427 | - | 150 | 215 |
| S-WLPV-5010-2.0/160 | 226 | 1.38 | 0.77 | 430 | | | | | | |
| S-WLPV-5020-2.1/160 | 225 | 1.40 | 0.65 | 440 | | | | | | |
| S-WLPV-5010-2.1/160 | 252 | 1.58 | 0.79 | 470 | | | | | | |
| S-WLPV-5020-2.2/160 | 264 | 1.61 | 0.67 | 480 | | | | | | |
| S-WLPV-5010-2.2/160 | 292 | 1.78 | 0.81 | 510 | | | | | | |

(*) heights and weights exclude allowances for adhesive pads and shims

REMARKS:
1) calculated according to DIN EN 13906-1
2) 2 x 4 mm adhesive pads are included
3) $d_v$, $d_h$: min. values, measured at test frequency 1Hz, amplitude ± 1 mm, ambient temperature 20°C

# Installation and Operation Manual

SPRING ELEMENT (WITH VISCOELASTIC DAMPER) S-WP(V)




## Safety Instructions

Pages 19 - 20

General Safety Information Page 19
Special Safety Warnings Page 19
Qualified Personnel Page 20
Intended Use Page 20
Disclaimer Page 20

## Spring Elements

Page 21

General Arrangement Drawing Page 21
Standard Corrosion Protection Page 21

## Handling and Pre-Commissioning

Page 22

Handling and Shipping Procedure Page 22
Unpacking Procedure / Delivery Conditions Page 22
Lifting Arrangement Page 22

## Erection and Installation Procedure

Pages 23 - 25

Installation with Formwork Construction Page 24
Releasing of spring elements Page 25

## Operating

Page 25

Travel Scale (optional) Page 25
Maintenance Page 25

# Safety instructions

Safety instructions are used for personal safety and protection from serious injury that can lead to death.
The following instructions are intended to protect the product from damage.

## General Safety Information

Before installation, operation or service, read and understand this installation and operational manual.
Failure to follow installation and operating instructions could result in death or serious injury.

## Special Safety Warnings

CAUTION

CAUTION CONTUSION / CRUSHING

CAUTION UPRIGHT TRANSPORT AND STORAGE

# Safety Instructions

## Qualified Personnel

The product described in this document may be operated only by qualified personnel. Compliance with the required safety regulations according to the country of use is required. Qualified personnel must be based on their training and experience to recognize risks associated with this product and to avoid possible hazards.

## Intended Use

The product described here may only be used for the intended application. If products and third-party components are used, they must be recommended or approved by LISEGA. The successful and safe operation of the product presupposes proper transportation, proper storage, installation, assembly, installation, commissioning, operation and maintenance.

All additional works that are not described in this document must be performed by authorized LISEGA personnel only. Any system changes that are not authorized by LISEGA or any kind of additional works might cause damage to the spring element and the warranty will be void.

## Disclaimer

We have checked that the contents of this document are applicable to the described products. However, since deviations cannot be entirely precluded, we cannot guarantee full agreement. The information contained in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

# Spring Elements

VICODA® spring elements are used for vibration isolation in technical applications. They are mounted between the vibration source and the sub-structure to reduce vibrations. The system consisting of vibration source and VICODA® spring elements is characterized by its natural frequency. The usage of adequate spring elements leads to optimal vibration isolation.

The spring element consists of springs with an additional viscoelastic damper. Its main field of application is in plant engineering, being used to isolate machines and reduce resonant vibrations. The spring elements system is composed of the following major parts: A casing and helical coil steel compression springs and an additional viscoelastic damper.

## General Arrangement Drawing

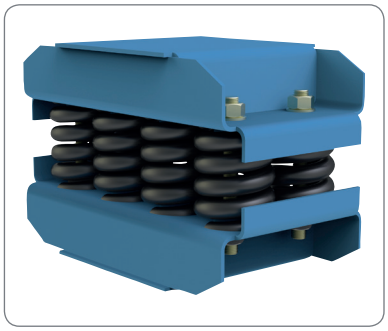


Fig. 1: Spring element S-WP type

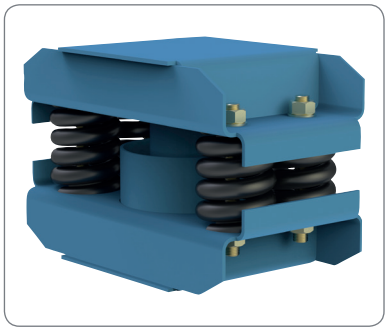


Fig. 2: Spring element S-WPV type

The main parts of the spring element are:
1) Lower casing (with viscoelastic damper for S-WPV type spring element)
2) Upper casing (with piston for S-WPV type spring element)
3) Helical coil steel compression springs
4) 4 bolts, 8 washers and 8 nuts to lock spring element during transport, installation and commissioning
5) Bitumen adhesive pads for top and bottom
6) Steel shims according to data sheet

## Standard Corrosion Protection

The components receive the following standard surface treatment. Alternative corrosion protection may be agreed separately.

Casing:
- Surface treatment C3 medium according to ISO 12944
- Steel grit blasting according to EN ISO 12944-4 grade SA 2 1/2
- Undercoat zinc-rich primer, dry film thickness 60 µm
- Final coating with dry film thickness of 60 µm, color shade RAL 5012, light blue. The total dry film thickness of the system amounts to approx. 120 µm

Springs:
- Surface treatment C4 high according to ISO 12944
- Cathodic electrophoretic dip coating, thickness 20µm

# Handling and Pre-Commissioning

## Handling and Shipping Procedure

The standard marking and transportation procedure is specified in:
QP002-Standard LISEGA packaging, marking and transportation procedure.

These spring elements must be upright at all times! This also applies during transport, storage and operation.

## Unpacking Procedure / Delivery Conditions

Prevent from shocks during unpacking. Be careful with sharp tools during unpacking so that the surface of the element will not be damaged.

They are usually delivered with shim plates for compensation of floor irregularities and settlements of concrete. Furthermore, VICODA® spring elements are usually protected from dust and water, ingress at the construction site by means of a PE cover.

The spring element is delivered pre-stressed according to customer specification. It is recommended to deliver spring elements with low pre-stress for transportation to reduce transportation risks. Then prestressing to the installation height is carried out on site with hydraulic jacks and a frame.

The default data are stamped on a name plate .

## Lifting Arrangement

For transport by crane use the eye bolt or suitable sling lifting magnet. Consider the total mass of the product to choose the correct load size. Make sure that the sling is correctly mounted to the casing and not cause damage. The bolts must not be removed at this stage.

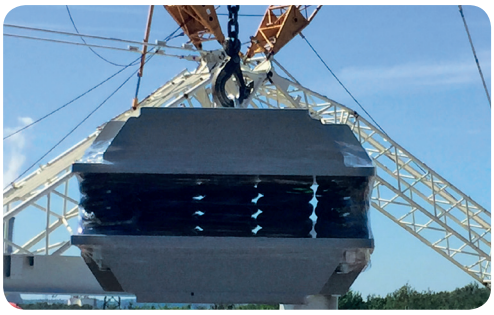


Fig. 3 Lifting of spring element with eye bolt

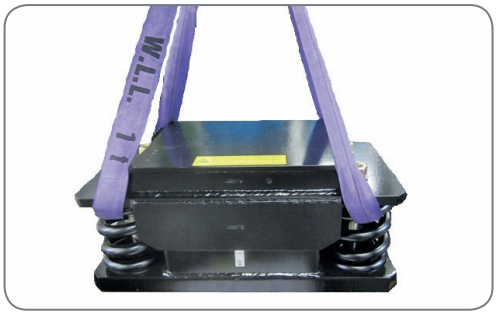



Fig. 4: Lifting of spring element with sling

# Erection and Installation Procedure

Depending on the machine to be installed, the erection and installation procedure will vary. The aim to achieve vibration isolation, though, is the same. The final arrangement of the installed spring element between foundation or column and the machine or turbine table is shown in Figure 5 below.

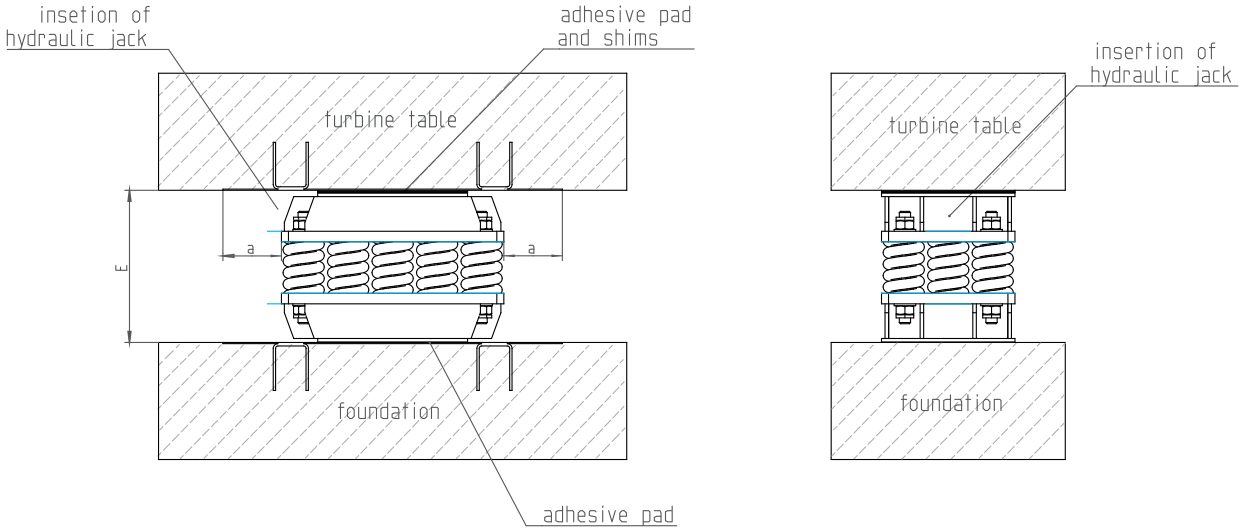



Fig. 5: Sketch of installed spring element

The spring elements are usually prestressed to height (E) and will be compressed by at least two hydraulic jacks during installation, see Fig. 5. The space (a) next to the spring element should be available to grant access for the hydraulic jacks on both sides. The length (a) is communicated separately and may be shared by two adjacent spring elements.

The following sections describe the installation of spring elements. The steps are recommendations, based on LISEGA experience in the installation of spring elements. If the installation will be carried out in a different way, the alternative installation method has to be agreed with LISEGA beforehand.

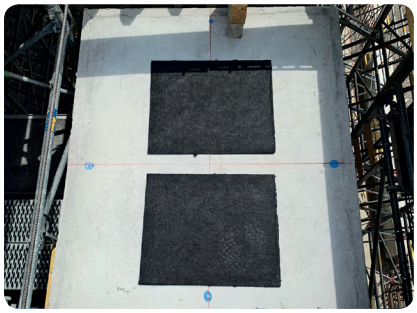
# Installation with Formwork Construction

The situation is, that the column heads or foundation below the spring elements are ready but the turbine table still has to be built in a concrete formwork construction. In this case, the spring elements are inserted when the formwork is done and the turbine table is still to be built.

**01.** Make sure, the spring elements are prestressed to installation height (E), i. e. compression under static load.

**02.** Make sure the foundation or column heads are clean, oil-free and levelled horizontally.

**03.** Position the bottom adhesive pad on the foundation through the recess in the formwork.



**04.** Place the spring element through the recess in the formwork and align its bottom part centered on top of the adhesive pad.

**05.** Place and align the upper adhesive pad on the top of the spring element.

**06.** Measure the spring element height and align with steel shims, if necessary. The steel shims can be placed in single layers on the upper adhesive pad. Please note to put shims of different thickness to facilitate adjustment later. At least a total of 8mm of shims need to be used.

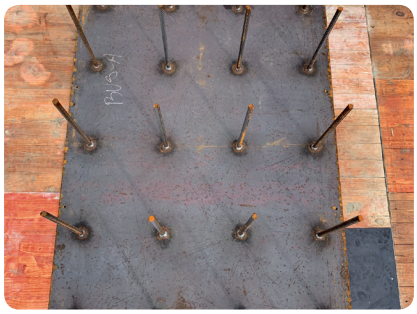
**07.** The recess in the formwork is closed with an anchor plate that will form part of the turbinetable. Make sure there is a gap between the anchor plate and the upper part of the spring element to compensate for settlement during concrete work. The size of the gap is usually 3 mm and is determined by the construction company. The anchor plate has to be fixed on the formwork to prevent it from shifting during concrete work.

# Installation with Formwork Construction

## Releasing of spring elements

08. For the entire time from insertion, during concrete work until alignment when the turbine table is finished, the spring elements have to be protected from dust, dirt etc. This is usually achieved with a PE cover.

09. After the concrete work is finished and all relevant masses like turbine, generator etc. are mounted, the spring elements are compressed with at least two hydraulic jacks. The jacks are inserted between the turbine table and the upper part of the spring element casing.



10. Loosen the lower nuts of the prestressing bolts. The prestressing bolts should never be used for alignment of the machine. The nuts should be secured by wire, cable ties or similar.

11. For alignment of the entire turbine table, measure the spring element height and align with steel shims, if necessary. This should happen in accordance with the final alignment of the machine components that are attached to the turbine table.

# Operating

## Travel Scale (optional)

The actual position can be seen on the optional travel scale, it shows the actual travel length of the springs. This scale is approximate and not suitable for levelling of spring elements.

## Maintenance

Under specified conditions and normal operation, it is recommended during the normal plant maintenance to perform (visual) check of the element and the actual position. If any deviation or damage is noted, please contact LISEGA.

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