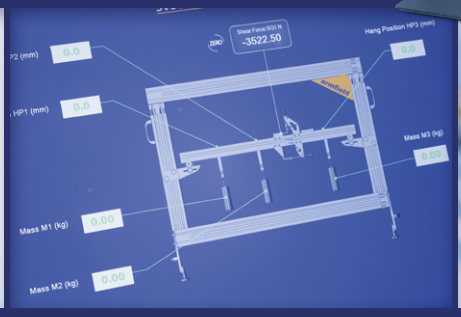
Link to SV Series

SV SERIES

Structures

A range of experiment frameworks that teach the principles of Structures for Mechanical, Civil, and Structural Engineering. This allows the experimental investigation into Forces in a Truss, Strength of Materials, Forces & Moments, Bridges, Beams, Arches, Cables, Torsion & Buckling.

The experiments are easily attached to the frame with secure fixings. Weights in excess of 500 N can be applied safely



The Armfield SV structures range consists of a modular, highly stable frame-based range of teaching equipment for covering all the major principles of structural engineering. Covering topics such as forces in a truss, strength of materials, forces, moments, bridges, beams, arches cables, bulking and torsion.

The complete range consists of 23 individual kits and is supplied with armBUS software as standard.

Forces in a Truss

- SV200 - Pin Jointed Frameworks (Roof and Warren Truss)
- SV201 - Forces in a Truss and Redundant Truss
- SV202 - Deflection of Trusses

Bridges, Beams, Arches & Cables

- SV300 - Combined Shear Force and Bending Moment Apparatus
- SV301 - Shear Force in a Beam
- SV302 - Bending Moments in a Beam
- SV303 - Deflection of Beams and Cantilevers
- SV304 - Equilibrium of Forces
- SV305 - Suspension Cable
- SV306 - Bending Stress in a Beam

Forces & Moments

- SV400 - Simple Suspension Bridge
- SV401 - Deflection of a Frame
- SV402 - Suspended Centre Span Bridge
- SV403 - Three-Pinned Arch
- SV404 - Two-Pinned Arch
- SV405 - Semi Circular Arch

Strength of Materials

- SV500 - Continuous and Indeterminate Beams
- SV501 - Plastic Bending of Beams
- SV502 - Plastic Bending of Portals
- SV503 - Deflection of Curved Bars

Torsion and Buckling

- SV600 - Buckling of Struts
- SV601 - Unsymmetrical Bending and Shear
- SV602 - Torsion of Rods and Tubes

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armBUS Software

Supplied as standard with all Armfield SV Structures experiments

Features of the armSOFT SV Series Educational Software

Features

The Structures range utilises the **Armfield armBUS** software system to collect, display and store the data from the instrumentation. Each experiment has its individual GUI called on from a simple to use menu system.

The details are exercise specific, but typically the following interfaces are available:

- Full Graphical User Interface (GUI) for each experiment with display screens tailored for each exercise
- Individual experiments of the utilised kit can be accessed without restarting the software
- All strain gauges and load cell assemblies are displayed on a diagrammatic representation of the equipment in real time
- Allows manual input of data from DTI gauges and digital callipers
- Sensor data is collated, and calculations are displayed in a data-log, a tabulation function provided with the armBUS software. The data is in tabulated format and can be saved and accessed through a .csv file compatible with software such as Microsoft Excel
- Data sampling intervals can be user defined in seconds when the automatic sampling method is chosen
- The data from the sensors is plotted and displayed in a user configurable graphing function of the software. It can be displayed separately from the data logging and each sensor output can be viewed independently. The power graphing software provides the following functionality:

  - Date: Displays the data log date
  - Range: Displays the current chart range (Minute / Hour / Day)
  - Offset: Offset displays the step number back from the measured timestamp
  - Sensor Selection Window
  - Pan: Allows users to change the scale for the chosen unit by scrolling up and down on the axis
  - User defined scale: Set the min and max values for axes of measured parameters
  - Back: Step backward through the chart from the latest timestamp
  - Forward: Step forward through the chart to the latest timestamp
  - Time (Range)
  - User configuration of background colour
  - Line / dots: User definable line types

Forces in a Truss

Requirements

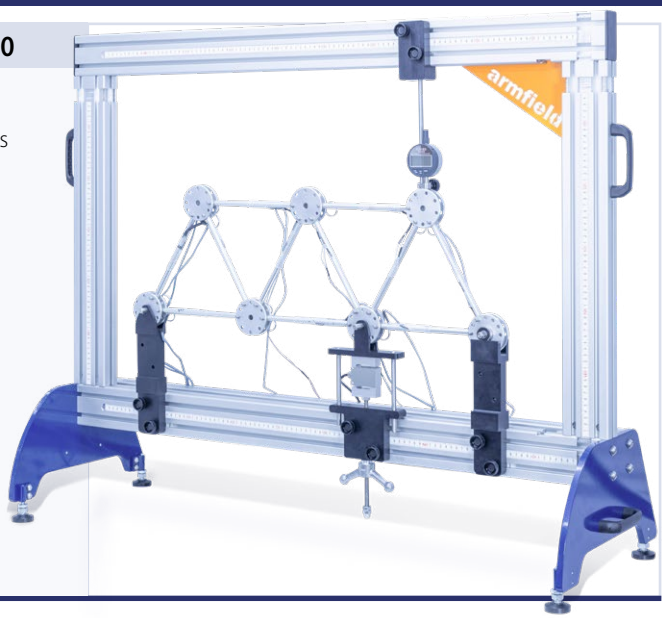
1Ph
SV 100
SV101 Interface
SV103 Mounting Kit

Pin-Jointed Frameworks (Roof and Warren Truss) – SV200

The Pin-Jointed Frameworks experiment is intended for use with the Armfield Universal Bench Mounted Frame and allows the experimental investigation of deflection of trusses under load. This then allows Castigliano theorems to be proven.

The experimental content has the following properties:

- Assembly of both a basic Roof and Warren Truss via various length members, detent pins and joint hubs
- Up to 10 members possible in one joint hub
- Members suitable for use with both trusses



Requirements

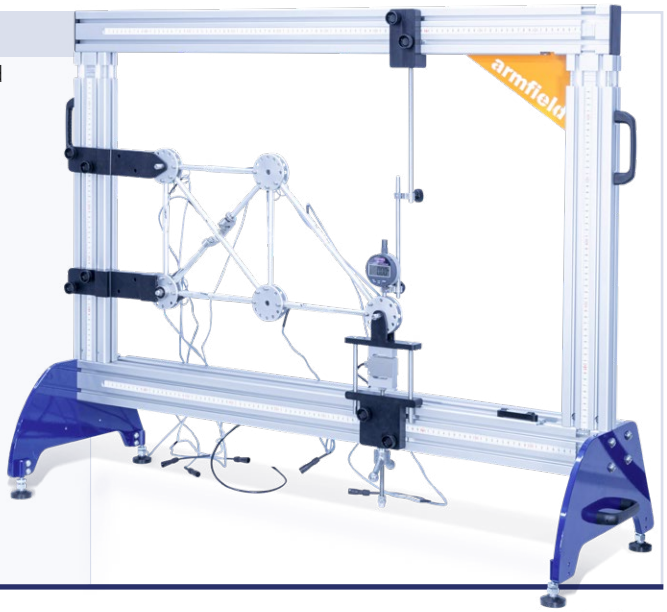
1Ph
SV 100
SV101 Interface
SV103 Mounting Kit

Forces in a Truss and Redundant Truss – SV201

The Forces in a Truss and Redundant Truss experiment is intended for use with the Armfield Universal Bench Mounted Frame and enables the experimental investigation of deflection of trusses under load. This then allows Castigliano theorems to be proven.

The experimental content has the following properties:

- Assembly of both a determinate and indeterminate truss framework via various length members, detent pins and joint hubs
- Quick and easy assembly of members via detent pins and joint hubs
- Up to 10 members possible in one joint hub
- Loading unit with spindle drive and universal load cell for force measurement
- Members suitable for use with both trusses



Requirements

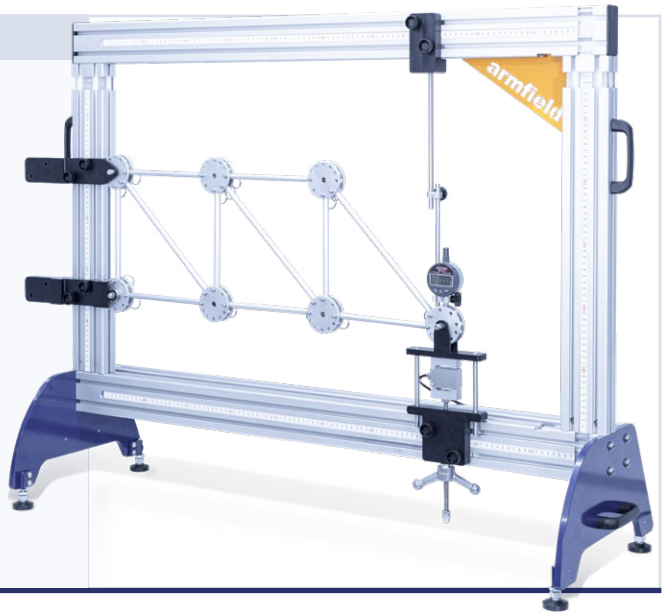
1Ph
SV 100
SV101 Interface
SV103 Mounting Kit

Deflection of Trusses – SV202

The Deflection of Trusses experiments allows the experimental investigation of deflection in trusses under load. This then allows Castigliano theorems to be proven.

The experimental content has the following properties:

- Assembly of three 3-bay trusses via various length members, detent pins and joint hubs
- Up to 10 members possible in one joint hub
- Common members between all three trusses
- Digital indicator used to measure frame deflection



Bridges, Beams, Arches and Cables

Combined Shear Force and Bending Moment Apparatus – SV300

Requirements: 1Ph | SV 100 | SV101 Interface

The Shear Force and Bending Moment in a beam allows the experimental investigation of the internal shear force and bending moment of a simply supported beam under different point loads.

The experimental content has the following properties:

- Split beam allows the internal shear force and bending moment at the split to be measured
- Up to 3kg of point loads can be applied to the beam across three movable weight hangers
- Adjustable simple supports

Shear Force in a Beam – SV301

Requirements: 1Ph | SV 100 | SV101 Interface

The Shear Force in a Beam allows the experimental investigation of the internal shear force of a simply supported beam under different point loads.

The experimental content has the following properties:

- Split beam allows the internal shear force at the split to be measured
- Up to 3kg of point loads can be applied to the beam across three movable weight hangers
- Adjustable simple supports

Bending Moments in a Beam – SV302

Requirements: 1Ph | SV 100 | SV101 Interface

The Bending Moment in a Beam allows the experimental investigation of the internal bending moment of a simply supported beam under different point loads.

The experimental content has the following properties:

- Split beam allows the internal bending moment at the split to be measured
- Up to 3kg of point loads can be applied to the beam across three movable weight hangers
- Adjustable simple supports

Bridges, Beams, Arches and Cables

Requirements

SV 100

Deflection of Beams and Cantilevers – SV303

The Deflection of Beams and Cantilevers allows the experimental investigation of the deflection of beams of different section sizes under different loads and types of support.

The experimental content has the following properties:

- Assembly of multiple different beam experiments via 2 adjustable supports, point load weight hangers and UDL weight sleeves
- 3 different beam specimens of different section sizes and material

Requirements

SV 100

Equilibrium of Forces – SV304

The Equilibrium of Forces allows the experimental investigation of non-concurrent forces creating equilibrium in a system.

The experimental content has the following properties:

- Ability to show non-concurrent equilibrium in a system using an equilibrium beam
- Ladder type beam with multiple locations to add additional weight up to a total beam weight of 470g
- Adjustable simple supports allowing the angle of the ladder beam to be adjusted
- Up to 1500g of reaction weights to measure the vertical and horizontal reaction forces at each end of the beam

Requirements

SV 100

Suspension Cable – SV305

This Suspension Cable allows the experimental investigation of a cable free-hanging between 2 roller supports under its own dead-weight.

The experimental content has the following properties:

- Roller chain to simulate flexible cable
- Up to 4kg of additional weight to simulate increased dead-weight of chain
- Adjustable roller supports
- Moveable vertical scale

Requirements

1Ph

SV 100

SV101 Interface

Bending Stress in a Beam – SV306

The Bending Stress in a Beam allows the experimental investigation of the internal stresses of a simply supported beam placed into four-point bending.

The experimental content has the following properties:

- T section beam fitted with five strain gauges to measure the strain at various points on the section
- Load cell assembly to apply any load up to 500N via a load application bracket, evenly distributing the load over two points
- Adjustable simple supports

Forces and Moments

Simple Suspension Bridge – SV400

The Simple Suspension Bridge allows the experimental investigation of the tension in the main cable of a suspension bridge under different load conditions.

The experimental content has the following properties:

- Suspension bridge hung between 2 pulley supports with a rigid bridge deck
- Up to 1.35kg of additional weight to simulate UDLs (uniformly distributed loads) and point loads
- Load cell to measure tension in the main cable at the support

Requirements

- 1Ph
- SV 100
- SV101 Interface

Deflection of a Frame – SV401

The Deflection of Frames allows the experimental investigation of the horizontal thrust and deflection observed when loads are applied to different shaped frames.

The measurements taken can then also be used to validate calculated values for the horizontal thrust and deflections found using Castigliano's Theorem.

The experimental content has the following properties:

- Two different shaped frame specimens
- Up to 1kg of weight hangers to apply loads to the specimens
- Digital indicators to measure deflection at different points on the frame
- Pivoting support capable of measuring horizontal thrust

Requirements

- 1Ph
- SV 100
- SV101 Interface
- SV102 Pinned Support

Suspended Centre Span Bridge – SV402

The Suspended Centre Span Bridge allows the experimental investigation of different forces acting on a bridge with a central section suspended by the two outer cantilever sections of the bridge.

The experimental content has the following properties:

- Ability to show mechanical principles of a centre span bridge
- Ability to show reaction forces at the supports via three load cells covering half of the bridges span
- Point loads, UDLs (uniformly distributed loads) and rolling loads can be applied to the bridge

Requirements

- 1Ph
- SV 100
- SV101 Interface

Forces and Moments

Requirements

1Ph
SV 100
SV101 Interface
SV102 Pinned Support

Three-Pinned Arch – SV403

The Three-Pinned Arch allows the experimental investigation of the horizontal thrust observed when loads are applied to an arch with hinges at each end as well as at the peak of the arch.

The measurements taken can then also be used to validate calculated values for the horizontal thrust found using the static equilibrium equations.

The experimental content has the following properties:

- Ability to show mechanical principles of three hinged arches
- Point loads, UDLs (uniformly distributed loads) and rolling loads can be applied to the arch
- Pivoting support capable of measuring horizontal thrust

Requirements

1Ph
SV 100
SV101 Interface
SV102 Pinned Support

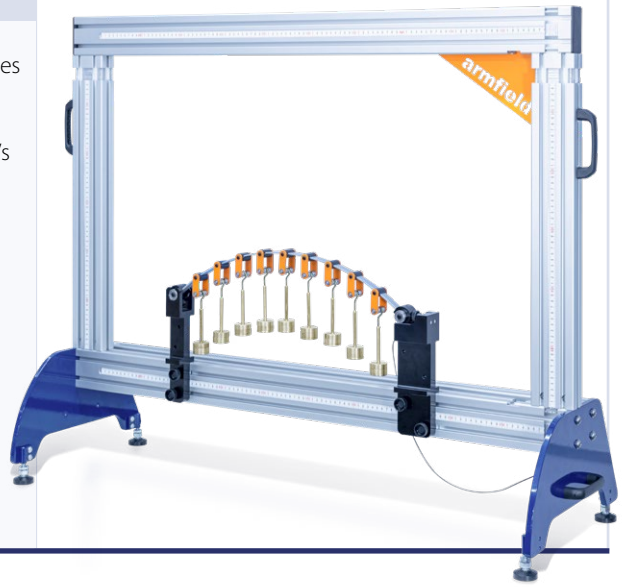
Two-Pinned Arch – SV404

The Two-Pinned Arch allows the experimental investigation of the horizontal thrust observed when loads are applied to an arch with hinges at each end.

The measurements taken can then also be used to validate calculated values for the horizontal thrust and deflections found using Castigliano's Theorem.

The experimental content has the following properties:

- Ability to show mechanical principles of two hinged arches
- Both point loads and UDLs can be simulated
- Pivoting support capable of measuring horizontal thrust
- Digital indicator used to measure arch deflection



Requirements

1Ph
SV 100
SV101 Interface
SV102 Pinned Support

Semi Circular Arch – SV405

The Semi Circular Arch allows the experimental investigation of the horizontal thrust observed when loads are applied to a semi circular arch with hinges at each end.

The measurements taken can then also be used to validate calculated values for the horizontal thrust and deflections found using Castigliano's Theorem.

The experimental content has the following properties:

- Ability to show mechanical principles of semi circular arches
- Both point loads and UDLs can be simulated
- Pivoting support capable of measuring horizontal thrust
- Digital indicator used to measure arch deflection

Structures - SV Series

Strength of Materials

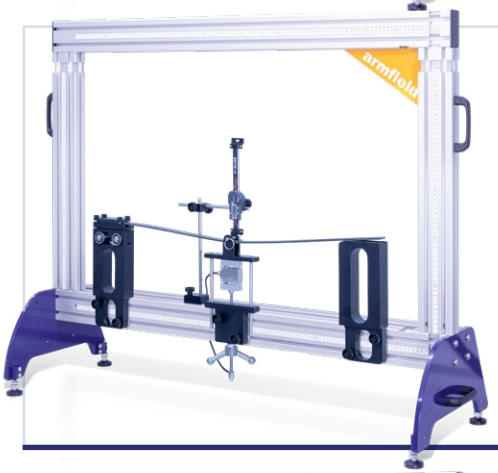
Continuous and Indeterminate Beams – SV500

The Continuous and Indeterminate Beams allows the experimental investigation of the deflection of beams and the resulting reaction forces at the supports for multiple different continuous and indeterminate set-ups.

The experimental content has the following properties:

- Assembly of multiple different beam experiments via two sinking and one fixed support capable of measuring reaction loads, a fixed support capable of measuring fixing moment, point load weight hangers and UDL weight sleeves
- 3 different beam specimens of different section sizes and material
- Measurement of beam deflection using a digital indicator

Requirements: 1Ph | SV 100 | SV101 Interface



Plastic Bending of Beams – SV501

The Plastic Bending of Beams allows the experimental investigation of how beams behave when placed under a vertical load that causes plastic bending.

The experimental content has the following properties:

- Assembly of a simply supported, propped cantilever or encastre beam set-up
- 3 different beam specimens with additional spare beam kits available
- Load cell assembly for applying vertical loading
- Linear scale to measure the deflection of the beam at the point of loading

Requirements: 1Ph | SV 100 | SV101 Interface

Plastic Bending of Portals – SV502

The Plastic Bending of Portals experiment allows the experimental investigation of portal frames placed under horizontal and/or vertical loads resulting in plastic deformation.

The experimental content has the following properties:

- Two load cell assemblies for independent vertical and horizontal loading
- Adjustable pulley assembly to maintain true vertical and horizontal loading
- Two different portal types, rectangular and pitched portals, 3 of each type supplied with each kit and additional portal kits available
- Linear scales to measure the deformation of the portal at each load point

Requirements: 1Ph | SV 100 | SV101 Interface

Deflection of Curved Bars – SV503

The Deflection of Curved Bars allows the experimental investigation of the deflection observed when a load is applied to different shaped curved bars as well as being able to validate calculated deflections found using Castigliano's Theorem.

The experimental content has the following properties:

- Six different curved bar specimens
- Up to 1.5kg of weight hangers to apply load to the specimens
- Two digital indicators to measure vertical and horizontal deflection

Requirements: 1Ph | SV 100

Torsion and Buckling

Requirements

1Ph
SV 100
SV101 Interface

Buckling of Struts – SV600

The experiment Buckling of Struts allows the experimental investigation of the loads needed to cause buckling between different fixing conditions and lengths of sample.

The sample material will remain the same throughout to encourage consistency.

The experimental content has the following properties:

- Buckling specimens secured between two fixing conditions that are attached to mounting blocks
- Load cell to measure the applied load and digital linear scale to measure the displacement caused by buckling. The digital linear scale can be placed anywhere along the strut to find maximum buckling

Requirements

1Ph
SV 100

Unsymmetrical Bending and Shear – SV601

This experiment allows the experimental investigation of the deflection observed when a load is applied to unsymmetrical bars as well as being able to assess the location of the shear centre of these beams.

The experimental content has the following properties:

- Three different bar section specimens
- Up to 1000g of weight hangers to apply load to the specimens
- Two digital indicators to measure total horizontal deflection

Requirements

1Ph
SV 100

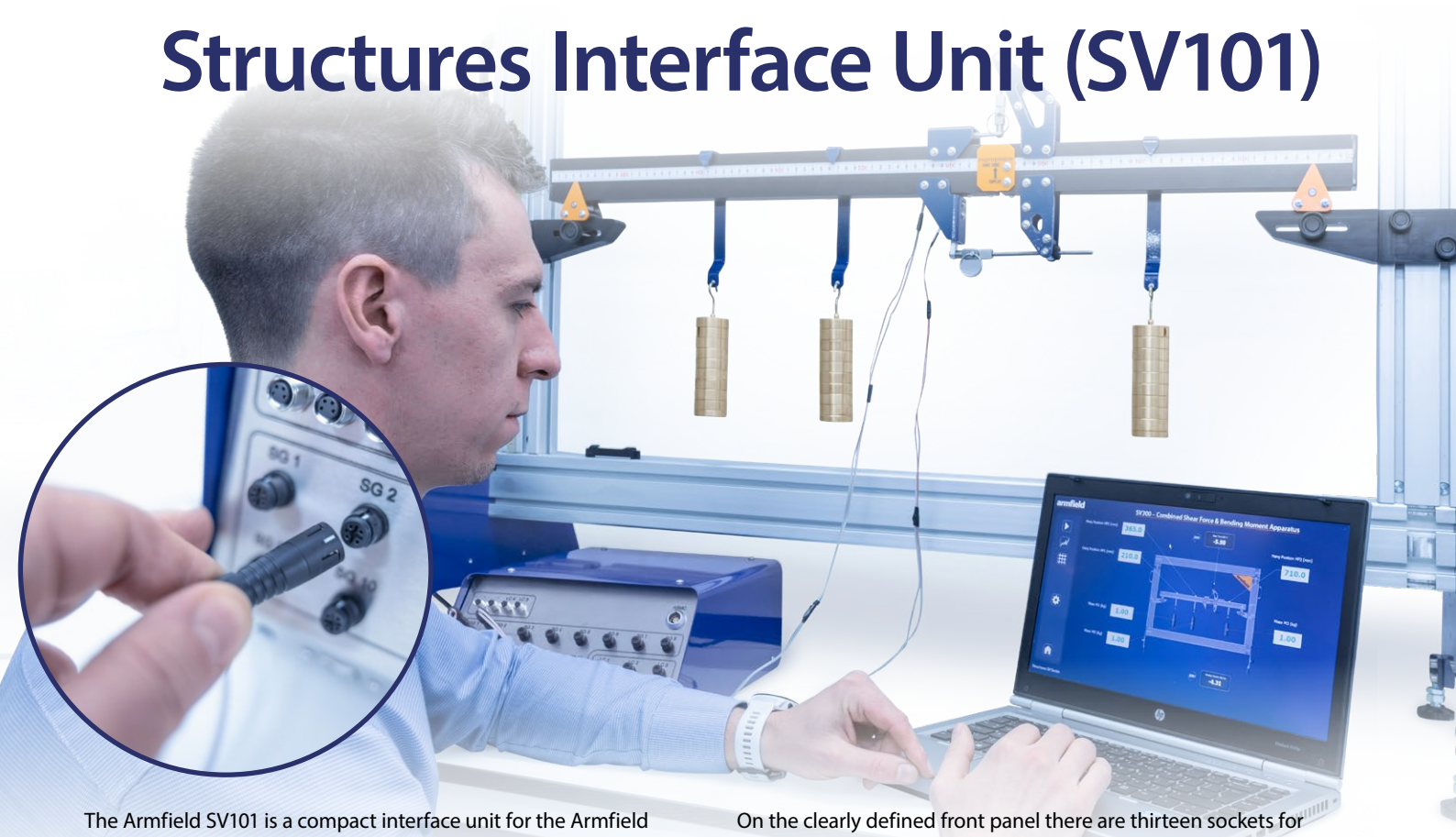
Torsion of Rods and Tubes – SV602

The experiment torsion of rods and tubes allows the experimental investigation of the torsional differences between specimens of various material properties under different load conditions.

The experimental content has the following properties:

- Torsion specimens secured between 2 chucks fixed to a pair of supports
- Inclinometers to measure angular displacement of rod specimens at varying torsional loads, effective lengths and cross-sectional areas

Structures Interface Unit (SV101)



The Armfield SV101 is a compact interface unit for the Armfield Structures range which can be placed in a convenient position beside the test equipment.

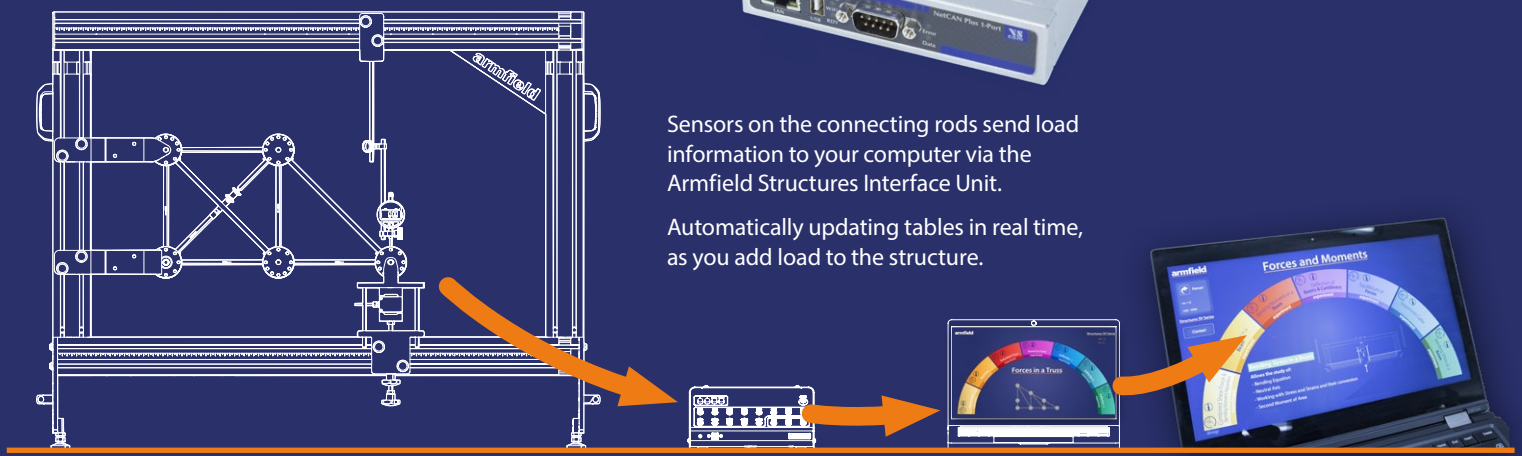
The unit provides direct integration between a compatible structures experiment and the Armfield armBUS software. Connection to the users computer is made through the front mounted USB socket.

On the clearly defined front panel there are thirteen sockets for connecting strain-gauges, three sockets for connecting 5.4kg load cells and two sockets for connecting 100kg load cells.

If required, the number of strain-gauge and load cell sockets can be doubled by joining two SV101 consoles via the armBUS Multi Channel (ABMC) connection.

Connection to computer

armBUS NetCan, 20 users can connect to view the live readings within the local network.



Armfield Bench Mounted Frame (SV100)

Sensors on the connecting rods send load information to your computer via the Armfield Structures Interface Unit.

Automatically updating tables in real time, as you add load to the structure.

Armfield Structures Interface Unit (SV101)

PC or laptop

Choose your experiment in the Armfield software

Requirements

Bench Mounted Frame – SV100

A lightweight aluminium bench mounted frame that enables quick and easy attachment of the interchangeable experiment modules from the Armfield SV Structures range.

The frame is supplied with a fixing system that has been designed to be quick and easy to use. It allows students to change, position and secure each experiment.

Adjustable feet support the frame to allow students to level the apparatus before use.

The experiments are easily attached to the frame with secure fixings. Loads in excess of 50kg can be applied safely.

Requirements

1Ph

SV 100

Structures Interface Unit – SV101

The Armfield SV101 is a compact interface unit for the Armfield Structures range which can be placed in a convenient position beside the test equipment.

The unit provides direct integration between a compatible structures experiment and the Armfield armBUS software.

- 2 x 100kg Load Cell Ports
- 13 x Strain Gauge Ports
- 3 x 5.4kg Load Cell Ports

Requirements

1Ph

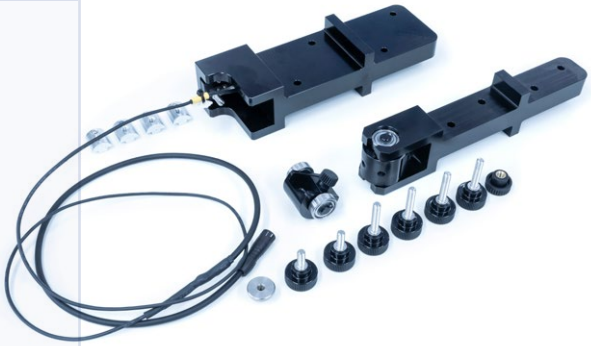
SV 100

Pinned Support Kit - SV102

This kit is required for four SV400 series kits.

The kit has the following components:

- Pivoting Support Assembly to act as a pinned support
- Horizontal Reaction Force Support Assembly which simulates a sliding support to measure horizontal thrust on arches and beams (up to 5.4kg)
- Frame connecting hardware



Requirements

1Ph

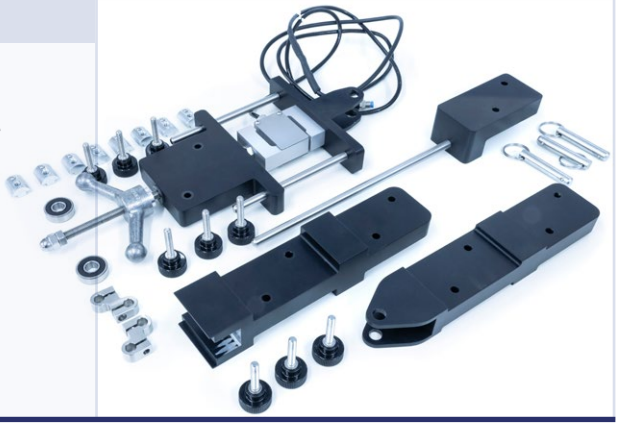
SV 100

Frame Mounting Kit – SV103

This kit is a requirement for all SV200 series truss frameworks.

The kit has the following components:

- Two supports - a pinned support and sliding support to hold the truss frameworks in position on the Bench Mounted Frame
- A load application assembly - capable of applying loads up to 100kg to the truss frameworks
- A DTI and DTI holder assembly to measure vertical deflection of truss frameworks under load
- Truss framework connecting hardware



armfield

Our Commitment to you

Armfield recognises that it is not enough to just supply quality engineering equipment, but that it must also ensure a complete range of services both pre and post-sale:

- Supplied equipment meets global curriculum requirements
- Expert consultation in laboratory design and layout
- In house trials (industrial and research)
- Two year warranty on all products
- Dedicated after-sales service
- Comprehensive training for all products in house or on site available
- Professional installation and commissioning service available
- Detailed learning outcomes and experiments supplied with all equipment

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