



Force Measurement Systems

Force Measurement Systems from IMS Your Guarantee of Quality

Modern production equipment is designed for high productivity and quality. To achieve these aims, it is of critical importance that all production parameters are complied with exactly. For this reason force measurement systems are used in, for example, the steel, aluminium, paper and plastic industries to measure strip and web tension, among other applications. IMS force measurement systems offer the highest levels of precision as well as reliability, flexibility and long service life for your quality management purposes. They consist of at least one force transducer and one electronic evaluation unit.

Precise – Dynamic – High-Speed Response

The force transducers – preferably made of a steel or aluminium bellows – are manufactured to customer requirements. The bellows is equipped with wire resistance strain gauges and can be deformed elastically at pre-defined points, the measurement zones, when a force is exerted on it. This changes the resistance value of the strain gauges, which is then converted to a voltage change.

Features of IMS force transducers:

- High dynamics and precision as well as fast reaction to force changes.
- The integrated calibration signal makes a reference measurement on site unnecessary. This facilitates commissioning.
- Manufacturing in accordance with the customer's specific requirements ensures easy installation and simplifies commissioning.
- High overload capacity (standard up to eight times the nominal load), optionally up to 20 times the nominal load.

Force transducers in wire resistance strain gauge technique are passive systems that do not generate their own signals. An electronic evaluation unit is therefore needed to capture and evaluate the force signals. The IMS measuring amplifier MMV was developed especially for this.



*From top to bottom:
Customer-specific force transducer:
support bearing and vertical force transducer
in one component.
Vertical force transducer, type VMK
Horizontal force transducer, type HMK*

*Right:
Enclosure for measuring amplifier, type MMV*



Measuring Amplifier Type MMV

The modular MMV measuring amplifier is delivered in a rugged stainless steel enclosure. It is suitable for connection of all IMS force transducers based on the wire resistance strain gauge technique.

Basic configuration:

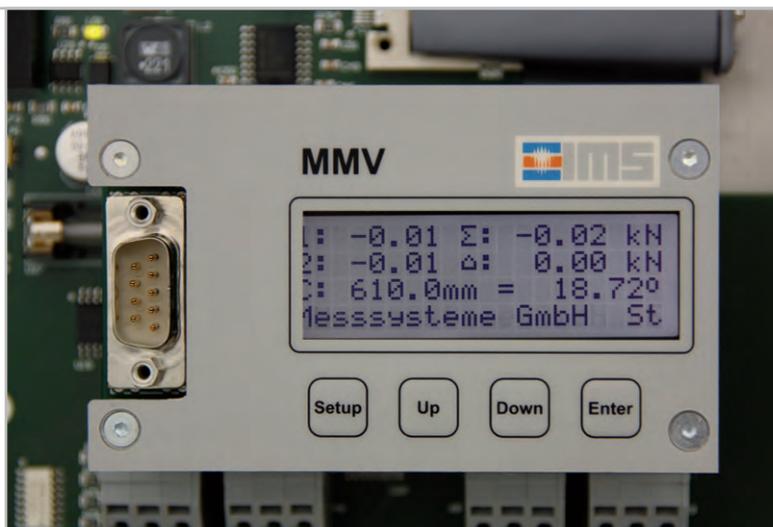
- Two 16-bit input channels for IMS force transducers
- Two 16-bit analog outputs (optionally current or voltage)
- Measurement speed up to 1000 measurements per second
- Four digital inputs and outputs
- 24 VDC power supply
- Enclosure dimensions
- 300 x 350 x 80 mm

Optional extras:

- Mains power supply (100 – 240 VAC / 50 – 60 Hz)
- Flexible field bus system for all common types, e.g. EtherCAT and Profibus-DP
- Customer-specific firmware possible

Flexible Use

The output signal from the force transducer is fed to the A/D converter via an instrument amplifier. The signal is adjusted by software. Due to digitalisation, the measuring amplifier is very user-friendly and flexible in use. Thanks to the modular design, the amplifier may be extended without problem by two further input signals without restricting the measurement



Measuring amplifier, type MMV

Even More Flexibility with Field Bus System

The analog outputs can be set either as current or voltage outputs and must be isolated electrically on the customer side. The measuring amplifier can be equipped optionally with a field bus system. All common field bus systems (incl. EtherCAT and Profibus-DP) are supported. The field bus system can be used not only to output measured values, but also to receive information, e.g. coil diameter. The measuring amplifier can also be operated via the field bus system.

Ideal for Retrofitting

The four digital inputs and outputs enable flexible adaptation of the MMV measuring amplifier to the specific measuring task even if a field bus system is not available. Use of the amplifier is therefore

also beneficial when replacing older measuring amplifiers as the existing force transducers (if in wire resistance strain gauge technique) do not also need to be replaced as a result.

Quick and Easy Configuration

The measuring amplifier can be configured and started up from the control panel in a few steps. The systems are supplied pre-configured. This reduces commissioning work on site to a minimum. The software program "MMV Configurator" is available as optional extra. Running under Windows, it simplifies configuration of the IMS measuring amplifier and enables archiving of the configuration data and offline editing of them.

Strip / Web Tension Measurement Systems in Use

It is necessary in the continuous production of steel, aluminium, paper or foil to measure the tension in the strip at various points of a production line. Only then is it possible to achieve a constant standard of quality. Since it is not possible to measure the tension directly in the strip, it is determined indirectly. To this end, the strip is diverted around a deflection roller and the resultant bearing reaction forces are measured.

Measuring Principle

To measure these forces, force transducers are inserted between the plummer block of the deflection roller and the machine foundation (one each on the drive and operator side). The signals of the force transducers are then digitalised in the IMS measuring amplifier of the type MMV. The strip or web tension is calculated taking the deflection angle of the deflection roller into ac-

count. The output signals are made available for further processing.

Force Transducers

Two basic types of force transducer are available for measurement of the bearing reaction forces:

Horizontal Force Transducer, Type HMK

The HMK force transducer is sensitive to forces parallel to the mounting plane of the force transducer.

Vertical Force Transducer, Type VMK

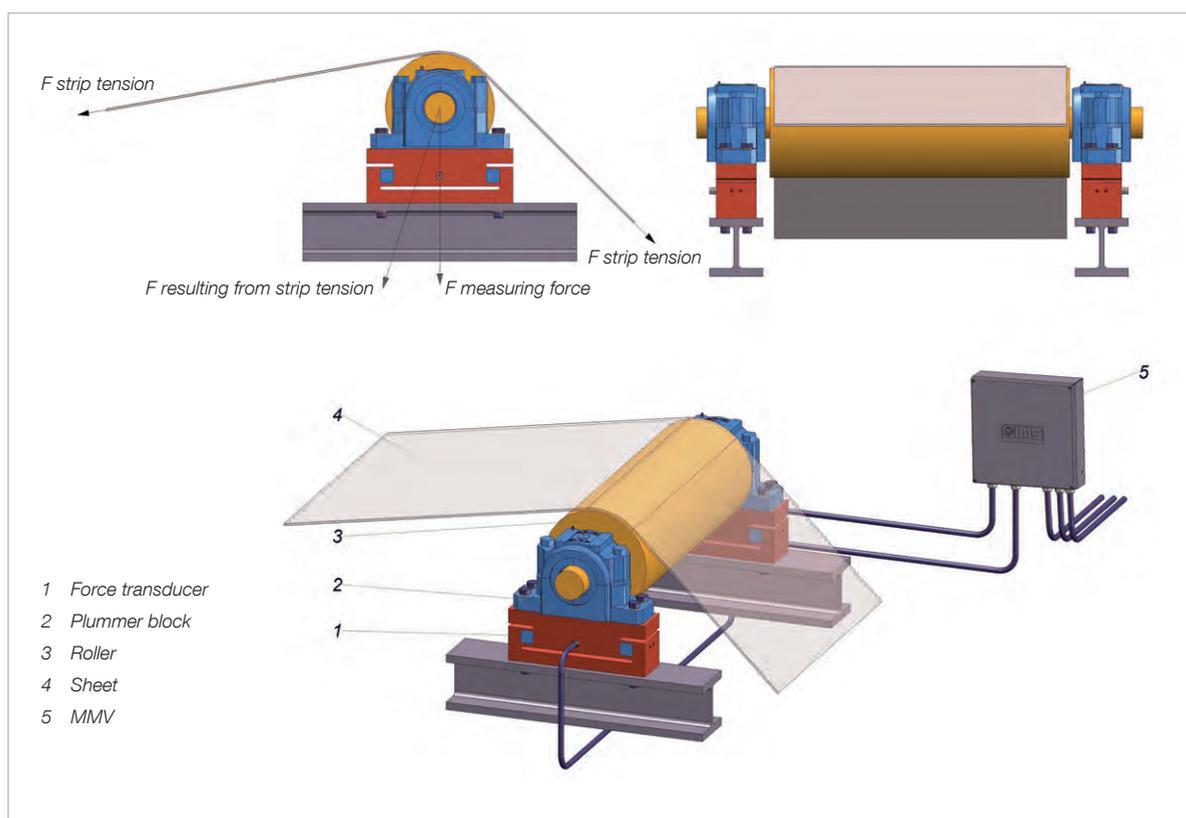
The VMK force transducer is sensitive to forces square to the mounting plane of the force transducer.

Additional properties:

- The support bearing used can be mounted directly to the force transducer without adapter plate.

- The materials used lend the force transducers high spring stiffness, which ensures strip-run stability.

The choice of which force transducer is suitable for a particular application depends on various factors, e.g. the mounting position, strip run and the weight force from the weight of the deflection roller.



IMS Force Transducers

Proven Technology – Your Gain

The force transducers are developed and manufactured exclusively in Heiligenhaus. They are adapted optimally to their later place of use with the help of CAD and FEM systems.

Thanks to modern fabrication techniques, special solutions and user-specific force transducers can also be manufactured in small numbers.

Special solutions, e.g. an integrated support bearing, make it possible to implement systems for applications where it has not been possible so far to install measuring equipment, e.g. for space reasons. The tailor-made solutions from IMS enable use, in particular, there where older systems need to be replaced. They reduce the amount of work required on site to a minimum, thereby also shortening the downtime.

It is also possible to replace older systems step by step so that the

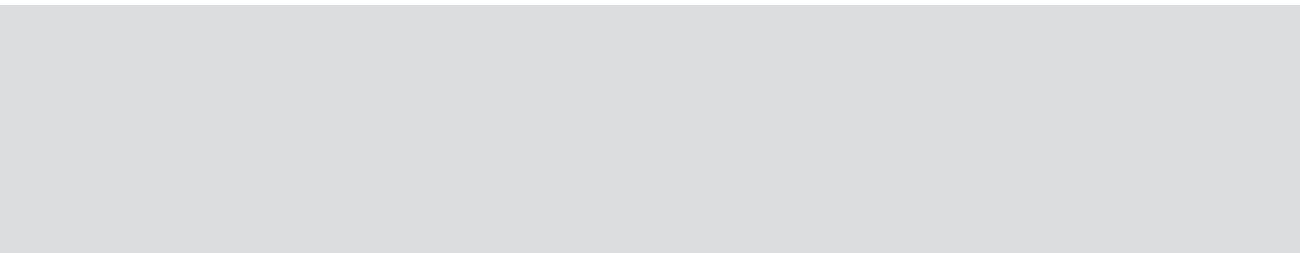
measuring electronics are replaced in the first phase and later then also the force transducers. This option reduces the actual investment sum and provides security in cases of failure.

We work continuously on developing the systems further and keeping them up to date. We have further forward-looking developments in the pipeline:

- Development of special rolling force measurement systems
- Development of customer-specific weighing and force measurement systems
- Introduction of an electronic datasheet for the force transducers to prevent incorrect configuration of the electronics
- Operation of the measuring amplifier via Bluetooth and an app
- Integration of a web server in the measuring electronics



From top to bottom:
Before: Roller without force transducer
After: Roller with force transducer



You can also find brochures on other products in the download section of our internet site at www.ims-gmbh.de.

IMS Messsysteme GmbH

Dieselstraße 55
42579 Heiligenhaus

Postfach 10 03 52
42568 Heiligenhaus

Germany

phone: +49 2056 975-0
fax: +49 2056 975-140
e-mail: info@ims-gmbh.de
internet: www.ims-gmbh.de

© IMS Messsysteme GmbH, Heiligenhaus

All rights reserved. This publication is protected in all parts by copyright. Distribution and reproduction without the prior written consent of IMS Messsysteme GmbH is strictly prohibited. All company and product names used in this documentation may be registered trademarks

AN 014-12-17/12.11