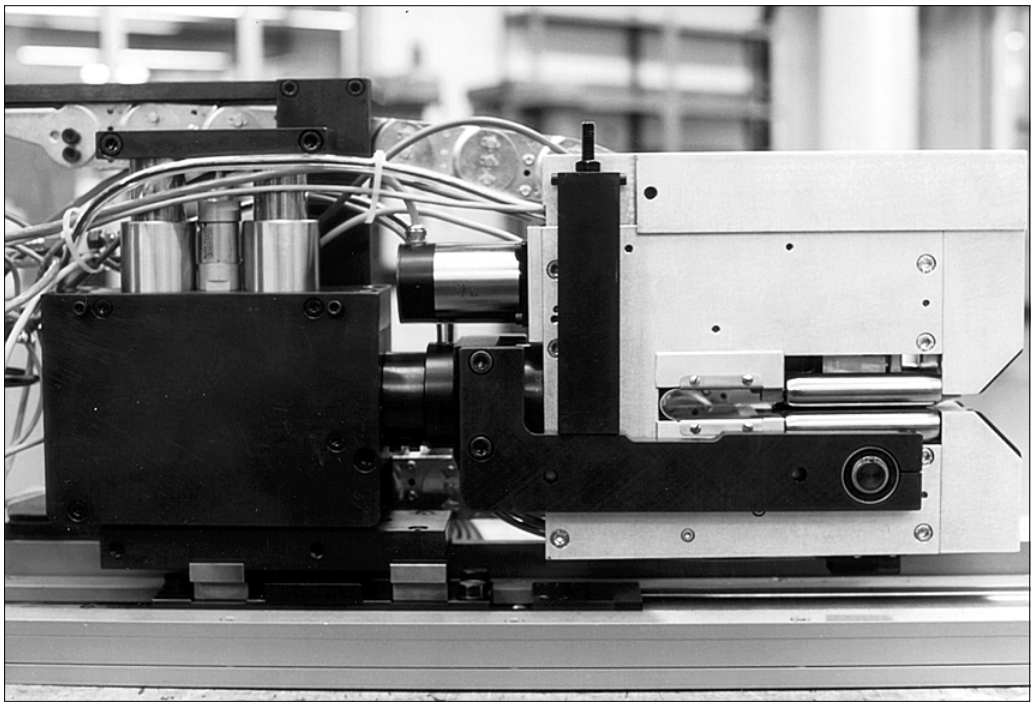
Automatic Thickness Gauge
for
fast running cold strip

VBM 1065



Operation and Service Manual

1065-e4 Rev.02 Seiten:34	erstellt am 1.4.98 Name: Rietdorf	geprüft am Name:	freigegeben am Name:	Bemerkungen

Table of Content

Safety Precautions, please read carefully!

This manual has to be handed to the machine operator, and one copy must be permanently available to operator and service personnel.

Nobody is allowed to work on or with this gauge, before he has read and understood this manual. Feel free to call the Vollmer company in case of any questions (phone +49 2334 507 0).

Warning , Crushing Hazard !This gauge has a hydraulic traverse unit. It has to be switched to the mode 'Service I', before anybody enters the danger zone. When operating in the standard mode ('Service 0') the gauge might rush back or forward unexpected and uncontrollable.

The warning sign "Crushing Hazard ...." which was sent with the gauge must be installed on a sensible and well visible position after the machine was installed. Contact the manager in charge for safety in the production department for installation of the sign. The sign 'Somebody is working on the gauge...' must lay in the electronic cabinet, so that it is always at hand to be hung up onto the service switch or close to it.

WE CARE ABOUT YOUR HEALTH.

PLEASE FOLLOW THE SAFETY PRECAUTIONS.

ESPECIALLY IF YOU HAVE MANY YEARS OF PROFESSIONAL EXPERIENCE, YOU WILL BE A GOOD EXAMPLE FOR YOUNGER COLLEAGUES

Hands or fingers which are put into the vertical guide behind the gauge or into the slidebase below the gauge, might get caught and heavily injured if the gauge head moves up/down or is traversed.

The pneumatic vertical guide and pneumatically operated guide rollers might cause injuries on hands and fingers. In case of a pressure drop, the vertical guide with the gauge head might leap up. Under certain conditions, the guide rollers might close the gap unexpectedly. Therefore the pneumatic system must be depressurized before anybody starts to work on the gauge.

The aluminium gauge head might get hot. Therefore check the temperature before trying to handle the gauge head. The gauge head is heavy (up to 30 kgs). Therefore get a secure footing and if possible work with two persons when you have to handle the gauge head without lifting device.

If the gauge head is operated automatically or semiautomatically, the documentation contains a description of the control program for this application. Nobody is allowed to work on the gauge unless he knows the control program sequences. For your own safety, please make sure to get familiar with the control program sequences before you start to work on the gauge !

Intended use of this machine

This gauge must be used exclusively for the measurement of cold strip. It must be firmly installed in its intended position and electrically, electronically, hydraulically and pneumatically connected as intended by the Vollmer company. Any alteration might cause severe damage.

Operation mode selector switch 'Service I/0'

The electronic cabinet for this gauge contains a selector switch labelled 'Service I/0'.

'Service 0' is the position for the normal operation mode in which the gauge is traversed back and forward automatically. If e.g. when the strip tension breaks down or when the strip moves laterally the gauge head is traversed off the strip into its rear limit position with double speed. Danger: Crushing Hazard! Nobody is allowed in the danger zone as long as the system in the 'Service 0' mode.

When switching to 'Service 1', hang up the warning sign 'Somebody is working on the gauge...' onto the service switch or close to it.

'Service I' is the position for service operation. The gauge head can only be traversed by inching service by manual controls in the operator's desk. The automatic traverse controlling is switched off, so that the gauge will not move automatically. Caution: crushing hazard for hands and fingers! Do not put hands or fingers into the vertical guide or the slidebase while the gauge head is moving.

Design and function

The VBM 1065 (2065/2565) is designed to measure strip thickness on high quality strip in fast running cold rolling mills. The gauge measures the passing material continuously in its measurement mouth which has a depth of 100 (200/250) mm.

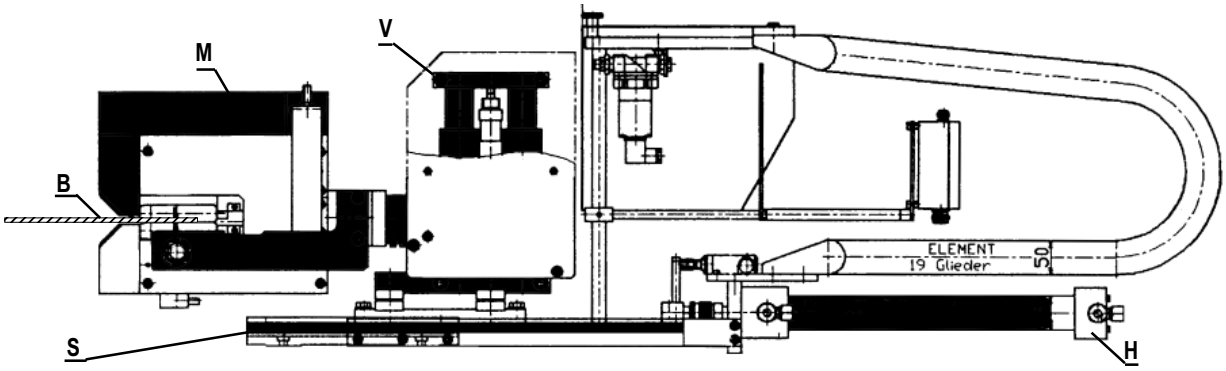
The strip passes the C-shaped thickness measurement frame with two thickness feelers which are measuring the passing strip simultaneously from the top and from the bottom. Due to strip thickness changes, the transducer tips are pushed apart or come closer. The transducer tips are crowned and polished diamonds, which do not leave any marks on the strip.

Each transducer has a differential transformer at its rear end. The movable core of this transformer is connected to the measurement tip which is sliding on the strip surface. In this way any movement of the measurement tip is measured inductively.

All changes within the two transducers are passed to a VMF measurement amplifier, where they are added (sum measurement). The amplifier indicates a measurement result as deviation from zero, i.e. the difference to the preset nominal size. Depending on the type of the gauge, there are several ways for electronic or mechanical nominal size setting, so that the measurement amplifier indicates 0 when the measured strip thickness matches the nominal thickness.

The C-shaped measurement frame in the VBM 1065 gauge has an extremely low temperature extension. This leads to an optimum reproducibility of the measurement results. The gauge head is held in the passline by a spring suspended and pneumatically operated vertical guiding. Guide rollers hold it always parallel to the strip surface.

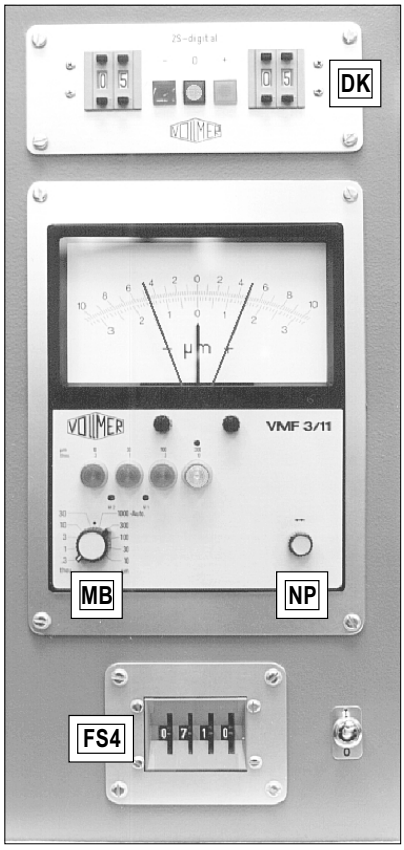
Amplifier measurement data can be used as signal for controlling and for quality monitoring documentation according to ISO 9000. It is available on two analog voltage outputs. Some VMF amplifiers do additionally provide digital data outputs.



Lateral view on a VBM 1065: The Gauge head M is suspended by vertical guide V. The vertical guide is traversed in the slidebase S by the hydraulic cylinder H between the rear limit position and the measurement position on strip B.

System

The VBM 1065 gauge is always installed with a VMF measurement amplifier. This measurement amplifier indicates the difference between measured strip thickness and selected nominal size.

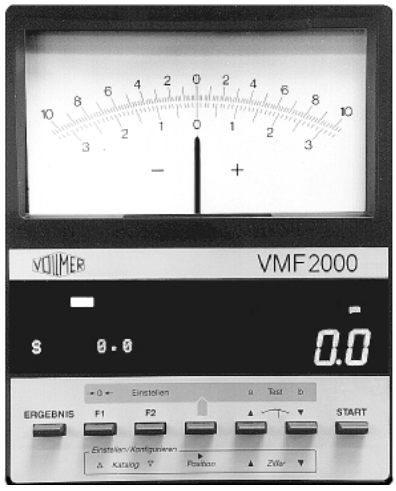


Measurement amplifier VMF 311 with electronic classifier 2S (top) and nominal size selector FS4 (bottom).

The measurement amplifier continuously indicates the difference between nominal and actual strip thickness . The operator can select the resolution of the analogue indicator by the measurement range selector MB. Full deflection can indicate from 1000 microns (.030") down to 10 microns (.0003"). The zero potentiometer NP allows to eliminate small deviations of the gauge zero.

Tolerance limits can be set by the two-digit switches DK of the electronic classifier. Coloured control lamps indicate whether the measurement value is in, over or below tolerance. Such classifiers are optional equipment, their operation is described in a separate manual.

The (optional) nominal size selector FS4 shows the selected nominal size in microns (or steps of 0.0001", depending on the FS4 type).



The amplifier VMF 2000 includes all components described above. It puts out the measurement data with statistic evaluation ready for quality control documentation according to ISO 9000. Its internal automatic adjustment provides the best possible measurement accuracy at any time.

The VMF 2000 amplifier is capable of processing transducer signals of overall 4 mm measurement stroke (instead of 2 mm like the VMF 3/11 and 3/22 types). Those Transducers and the VMF 2000 amplifier can be used to upgrade nearly all Vollmer gauges.

A separate instruction of the measurement amplifier as well as of the positioning device is part of the documentation. They are only mentioned here because this manual refers to both of them on some pages.

Nominal size setting

If the required material thickness - e.g. 500 µm - is entered as nominal size and if the measurement is 501 µm, the amplifier will indicate + 1 µm.

So it is possible to stay within the highest sensitivity range of the indicator no matter of the material thickness. In this range the full deflection of the indicator covers a range of +/-10 microns.

Nominal size can be set in several ways:

- **mechanically** (sum measurement adjustable transducer):
  The adjustable transducer is set to the selected nominal size on its micrometer thread. Depending on the model, the nominal size is indicated by a digital turns counter (mod. Di) or a scale (mod. Scale) or via an electronic pulse encoder on a separate digital indicator (mod. ME).

- **electronically** (sum measurement with two transducers and FS 3/4):
  there is no mechanical transducer adjustment, but the measurement value is electronically compensated for the nominal value by the setting of a thumb wheel switch, so that the selected nominal size is indicated as zero.

The electronic adjustment is limited to 1,5 or 3 mm, depending on the transducer type. It can be combined with an adjustable transducer (mod. Di, Scale or ME) i.e. the upper transducer is mechanically adjusted to one nominal size, and from that position it can be adjusted electronically to different nominal sizes.

Depending on the application there are additional control, indicator or data processing devices which can be connected to the measurement electronics.

Types

According to individual requirements of our customers, Vollmer gauges are produced in many different types. The gauge card in the documentation shows the type of your gauge. The following list is a general overview about the available items:

e.g.:**VBM 1065 E/Su/FS4/pn/ka/pV-B/T/K/A0/DAV/AS/BCD-in/BCD-out/Hwst 500.**

Meaning of the abbreviations:

VBM1065 E:
Electronic strip thickness gauge for high quality strip on fast cold rolling mills, measurement depth up to 100 mm from the strip edge (Gauges of the types 2065 and 2565 have a measurement depth of 200 resp. 250 mm but are designed in the same way).

Su:
Measurement by 2 transducers in sum; accurate measurement values even in case of strip vibration.

FS4:
4 digit nominal size selection by thumbwheel switch

pn:
The upper guide rollers are pneumatically pushed down onto the strip (i.e. the gap between upper and lower guide rollers is closed) when the gauge is in On Strip position (measuring position).

ka:
With this cardanic suspension the gauge measures precisely, even when the strip lies in a hollow shape.

pV-B:
Pneumatically operated vertical guiding, passline adjustment by pressure variation in the pneumatic cylinder; guiding is installed behind (not beside) the gauge head.

pV-S:
same as pV-B, only that the vertical guiding is installed behind (not beside) the gauge head.

T:
Heating elements in the gauge head for keeping a constant temperature, against long-term drift because of heat coming from the strip into the gauge.

K:
Air cooling of the transducer's measurement tips, against short-term drift if the measurement tips are heated by the strip.

A0:
Electronic adjustment system, which works when the gauge is in its rear

limit position. The gauge is set to nominal size zero. Then the amplifier adjusts itself to zero. This procedure is started either by pressing a key or by time automatic, available only in combination with VMF 3/22 or VMF 2000.

DAV:
The diamond measurement tips of the two transducers are pneumatically pulled apart when the gauge is traversed, in order not to damage them at the strip edge. For measurement of wavy strip or vibrating strip the measurement pressure can be pneumatically increased to prevent the measurement tips from losing contact to the surface.

AS:
Automatic symmetry adjustment, the transducer tips can be moved up/down pneumatically instead of manual manipulation

BCD-In:
External nominal size input, potential-free contact via opto-couplers, BCD coded

BCD-Out:
External nominal size output, potential-free contact via opto-couplers, BCD coded

Hwst 500:
Hydraulic traverse unit consisting of a control unit and a slidebase, stroke of the hydraulic cylinder is 500 mm

Operation

Depending on the application the gauge operates manually or automatically controlled.

During manual operation the most important thing is, to move the gauge off the strip before the strip end runs through it.

If - in automatic mode - the gauge is set to „On Strip“, it moves automatically to the measurement position. If it is ready to measure, the measurement electronic puts out a start signal.

Mostly the measurement position is detected by a light barrier at the front of the measurement head. As soon as the light beam is interrupted when the gauge head is crossing the strip edge, a timer starts which stops the movement after a preselected time (set during commissioning).

Instead of the timer it is also possible to use a pulse encoder for the controlling of the measurement depth. In that case the measurement depth can be set by a decade switch and the selected measurement depth is digitally indicated.

“Off strip“ makes the gauge moving back to its rear position immediately, independent of the actual position.

Before the strip end passes through and would damage the gauge, an external signal is given and the gauge automatically moves off the strip. Various electronic interlocks are possible to avoid damage. For example a strip tension breakdown may be the trigger for moving back the gauge. Or the gauge moves only on strip and remains there, if a certain rolling speed is exceeded. Each gauge is provided with a limit switch. If the strip reaches too far into the measurement mouth, the gauge is moved back.

While the gauge moves forward or backwards, the DAV (Diamond Lifting Device) operates automatically. The transducers are lifted in order to avoid the diamonds scratching over the strip edge or click together when the gauge moves back. The process is specified in the records of PLC (if the gauge has an automatic traversing device).

In the "Service I" mode the gauge head can be hydraulically moved back and forward by inching operation. In this mode the compressed air supply is switched off, i.e. the pneumatic guide rollers cannot be closed and the DAV is not operational.

When pressing the A0 button (option for an automatically traversed gauge), the gauge is traversed to its rear limit position and is automatically set to zero. After the amplifier has adjusted itself to zero the gauge is traversed On Strip again.

After pressing "Insert Adjustment Plate / Calibrate" (optional function) the gauge will set itself to a preset nominal size. Then the adjustment plate with integrated slip gauge is pneumatically inserted between the guide rollers and the transducer tips. This function is only enabled as long as the gauge is in its rear limit position and switched to 'Service I'. If the gauge measures correctly, the indication is near zero. If not, check the symmetry adjustment.

Measurement

Zero check

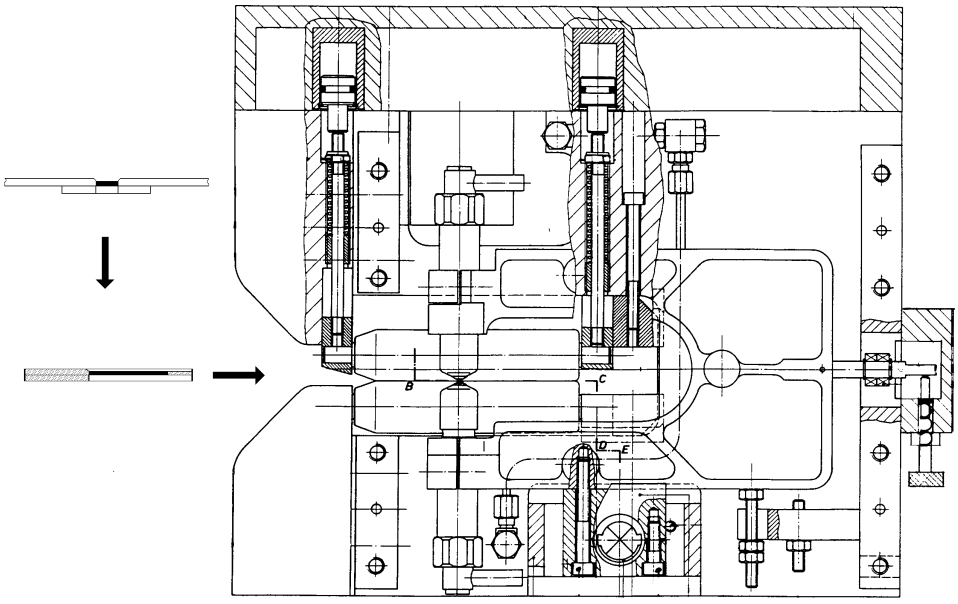
Zero checking should be performed regularly. Set the gauge to nominal size zero and check the VMF indication. It should be zero. Minor deviations can be eliminated by the VMF 3/22 zero potentiometer or by the Master key of the VMF 2000.

Then operate the DAV or put a thin piece of material between the transducer tips and take it out again. The indication must return to zero. If not, check the gauge (see section "Trouble shooting").

Indication check

If the previous test shows a constant zero, check the gauge measurement by means of an adjustment plate with integrated slip gauge (optional addition). This test should be made regularly, especially when rolling with tight tolerances. The gauge must be in its rear limit position and in the "Service I' position.

At first set the nominal size to the thickness of the slip gauge and turn off the working pressure of the pneumatic guide rollers. Then insert the slip gauge plate between the guide rollers as shown in the sketch. When the transducer tips measure the integrated slip gauge, then the indication should be very close to zero (+/- 0,5 µm). If not check the entire gauge adjustment.



To check the gauge with an adjustment plate: The thick part in the center of the plate is pointing downwards. Please follow the safety precautions and set the gauge into the 'Service I' mode, before somebody is allowed to go close to the gauge into the danger zone.

Do not forget to turn back on the working pressure for the pneumatic guide rollers after this test.

Nominal size and tolerance limits

After the zero check, nominal strip thickness is set by the FS4 thumb wheel switch or by the (optional) positioning device. Then press 'Nominal Size Start' and the stepper motor will set the upper transducer to the new nominal size.

Tolerance limits can be entered into the electronic classifier 2S or 4S (optional item, see separate instructions) or by then keys of the VMF 2000.

Measurement start and end

For measurement the gauge is forwarded to the "on strip" position. If it has a DAV, the transducer tips are then lifted automatically until the gauge is in measurement position.

Measurement amplifier and classifier do now indicate the difference between nominal and actual size and whether the measurement value is in or below tolerance, or if it is exceeding the upper limit.

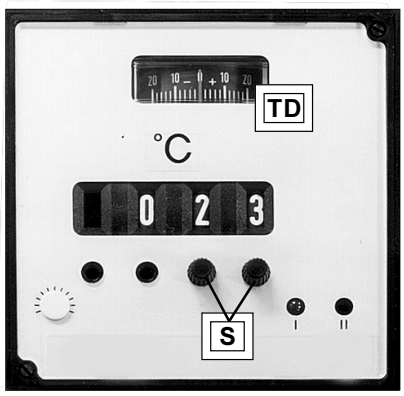
Important note for manually traversed gauges

Please do always move the gauge off the strip before the strip tension is switched off!
The strip end must never pass through the gauge, as it will cause serious damage.

Continuous checking

In between the service intervals, it is recommended to check the gauge regularly:

Temperature: After the gauge was traversed into the rear limit position, the temperature must not change. That means, the temperature deviation indicator TD should remain constantly close to zero. If the temperature is not constant, adjust the heater by setting a new gauge temperature with the two knobs S. Ideally the Lamp H (Heater) at the pneumatic cabinet is indicating, that the 'on' and 'off' periods are of about the same duration.



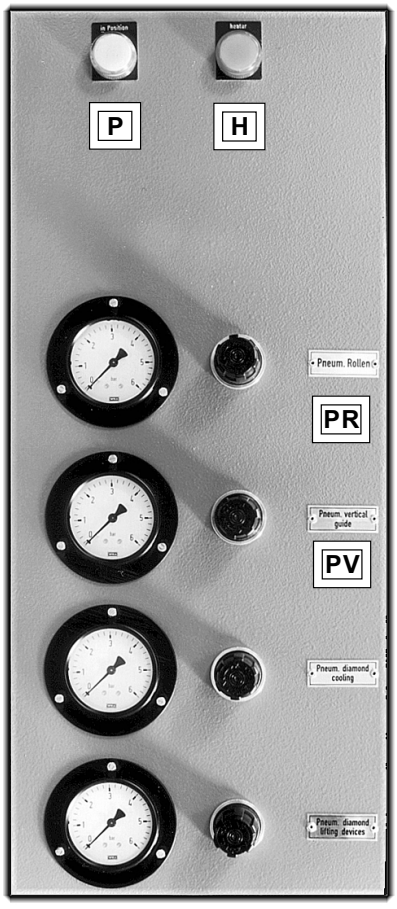
Temperature control device in the electronic cabinet

Compressed air supply: Permanent pressure for the Pneumatic rollers is set to 1 bar on the PR gauge. Working pressure for pneumatic guide rollers (optional) is 3 - 5 bar, depending on the strip material, controlled by a magnetic valve that opens if the light barrier is detecting that the gauge is in measurement position (lamp P = 'In Position' is on).

Transducer lifting device: When the gauge is traversing, the thickness indicator needle must be at the 'minus' limit stop.

Symmetry check: Switch into the 'Service I' mode, set nominal size to 0, move both transducer tips up and down, (indication has to be 0 µm +/-0,5 µm). In case of tight tolerances check daily, otherwise weekly). Gauges with AS do this procedure automatically. Both ways are described in a separate manual for the VMF amplifier.

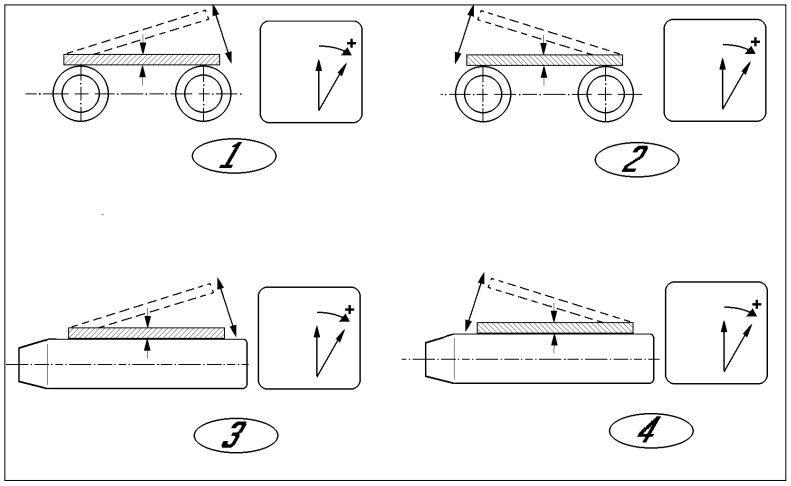
Accuracy check with slip gauge: Set the gauge to the nominal size of the slip gauge, and insert the



Lateral view of the pneumatic cabinet

adjustment plate with integrated slip gauge between the transducer tips. The indication should be zero. In case of tight tolerances check daily, otherwise weekly.

Transducer position to the strip: The transducers must stand perpendicular to the strip. Lift or remove the upper guide rollers and put the test plate onto the lower guide rollers. Tip it to both sides as well as to the front and to the back (see sketch 1 through 4). The display may only deflect to the + side. If not, check the whole gauge. This check is recommended after a strip breaking or other hard treatment.



For your convenience, the Vollmer company offers a special adjustment plate with an integrated slip gauge, which is individually selected to match the thickness of that strip which is usually rolled on your mill (see picture under 'Measurement / Indication Check'.

Guide rollers: Check for easy rotation.

Passline: Check the correct height of the gauge to the strip

Safety Precautions

Nobody must work on the gauge unless it has been switched into the 'Service I' mode. This mode makes sure, that the gauge will not be automatically traversed and the pneumatic guide rollers will not close unexpectedly.

Caution: Crushing hazard ! Never traverse the gauge as long as somebody is in the danger zone ! The hydraulic cylinder which is traversing the gauge has great power.

Trouble shooting

If the gauge measures wrong

- Wrong point remeasured ?
  Cross profile strip thickness varies in many cases. If the gauge is checked, strip thickness must be measured at the same distance from the edge as the transducers have measured.

⇨ Check the strip thickness at correct edge distance

- Transducers dirty ?
  In a very dirty environment, the rams of the transducers sometimes get too sticky, so that they do not shut completely. If the gauge is then set to zero, the indication of a following measurement is too low. After cleaning, any transducer ram should slide easy in its bushing or bearing for a quite long period of time.

⇨ Increase cleaning frequency

- Transducers clamped too hard?
  If the clamp screws in the C-frame are tightened too hard, they possibly distort the transducer housing which increases the friction in the ram guiding.

⇨ Loosen the clamp screw and re-tighten with moderate force

- Oil in the flexible cable protection hose?
  The oil increases the friction of the ram guide bushing or ball bearing. In that case the transducers cannot continuously keep contact to a vibrating strip. The measurement then indicates “too thick”. Much oil in the protection hose does additionally choke the diamond lifting. Drain the oil from through the brass drain screw (10 mm spanner) at the transducers cable entry. Remove the Allen bolt from the white DAV plastic connector peace and blow in compressed air (see extra DAV instruction manual).

⇨ Clean the transducer and possibly improve compressed air quality.

- Gauge zero not constant?
  If the screws, which connect the measurement tip with the guide ram, are not tight, the measurement ram might move against the guide ram. If, for example, DAV was activated or material was placed between the transducers and then removed, the zero point changes. The indication is incorrect even if the symmetry is correct.

⇨ Fasten the grub screws in the guide ram (see transducer manual)

- Long-term drift of the zero point?
  An integrated heater heats the gauge so that the temperature does not change whether the gauge is measuring or not. The temperature control should be adjusted so that the gauge always keeps the same temperature when it is moved off the strip or when the measurement starts after a long stop. The temperature should not drift for more than 2°C degrees.

- Short-term drift of zero point?
  Can be noticed, if the rolling has been finished and the gauge in its rear position is directly moved set to nominal size zero without pushing A0. If then the indication drifts away to + or -,the cooling of the diamonds does not work correctly. Check, if the small air pipes are not bent. Com-

ing from the ingoing side of the gauge the jet has to meet exactly the tip of the transducer. Readjust the cooling at the 'pneumatic diamond cooling' valve in the pneumatic cabinet.

⇨ Connect the air supply correctly or adjust air pressure (if the display drifts away to minus - increase cooling, if the display drifts away to plus - reduce it).

❍ Indication too low?
If the transducers in the C-frame are clamped not tight enough, they might be shifted in their bore. Gauge zero is then shifted too.

❍ Indication wrong?
If the fine thread of the upper transducer is defective or worn, the nominal size setting is disturbed.

❍ Indication wrong?
Check the transducer symmetry by moving up and down both transducer tips. If the indication does not stay 0

⇨ Readjust the transducer symmetry

❍ Additional check for gauges with decade switch (type FS3/FS4): After symmetry adjustment or after a new transducer was installed, the adjustment of the measurement amplifier to the nominal size selector has to be checked by a slip gauge. Set the gauge to 0 and insert 500 or 800 µm slip gauge. Then set the decade switch to 500 (resp. 800) and check, if the gauge measures zero. If not,

⇨ adjust the VMF to the nominal size selector switch by the X9 sensitivity potentiometer (only for VMF 3/11 and 3/22)

❍ Indication too high ?
Put an adjustment plate onto the lower guide rollers and set the gauge to zero. Tip the plate it to both sides as well as forward and backward. The indication should deflect only towards +. If not,

⇨ check the complete gauge (measurement tips for wear, C-frame for 90° position and C-frame distortion)

❍ Indication too high ?
After strip breaking or when the strip end passed through the gauge, the C-frame is possibly bent. The indication is too high. Check as before and

⇨ check the alignment of transducer clamping bores with a 20 mm inspection pin.

If the gauge marks the strip ?

❍ Diamond with small cracks ?
If hit too hard, the diamonds in the transducer measurement tips might get tiny ring-shaped cracks, which are hardly visible. Sometimes such cracks mark the strip

⇨ Replace the measurement tip

- Diamond broken out?
  In case of strip breaking a diamonds might break out of a transducer measurement tip.
- ⇨ Replace the measurement tip

- Roller blocked ?
- ⇨ Replace the roller. If the roller surface is not damaged, replace only the bearings.

Maintenance

The thickness gauge does not need much maintenance. Only the measurement tips with the diamonds and the guide rollers are subject to wear. The gauge should be cleaned regularly in order to avoid dirt deposits which might block movable parts.

Safety Precautions

Nobody must work on the gauge unless it has been switched into the 'Service I' mode. This mode makes sure, that the gauge will not be automatically traversed and the pneumatic guide rollers will not close unexpectedly.

Caution: Crushing hazard ! Never traverse the gauge as long as somebody is in the danger zone !

At least the following points must be checked regularly, even if measurement results and symmetry are correct

Guide rollers

- ❍ Clearance?
  The rollers have to move freely. They should have only little axial clearance. Blocking rolls mark the strip.
- ⇨ Replace defective rollers

- ❍ Deposits on the surface?
  Some strip materials tend to leave deposits on the rollers. They cannot run smooth and might mark the strip.
- ⇨ Replace rollers (rework if possible)

- ❍ Roller support defective?
  On strip, the pneumatic guide rollers are pressed down (working pressure 3-5 bar). Check regularly, if the upper guide rollers move up to their mechanical limit stop when the compressed air is switched off.

  Check the lower guide rollers for parallel adjustment (see under ‘Continuous checking / Transducer position to strip’. The plate indicates if the rollers are not parallel. This happens very rarely, sometimes after strip breaking.
- ⇨ Replace and or adjust (see under 'Maintenance/Repairs').

Measurement frame

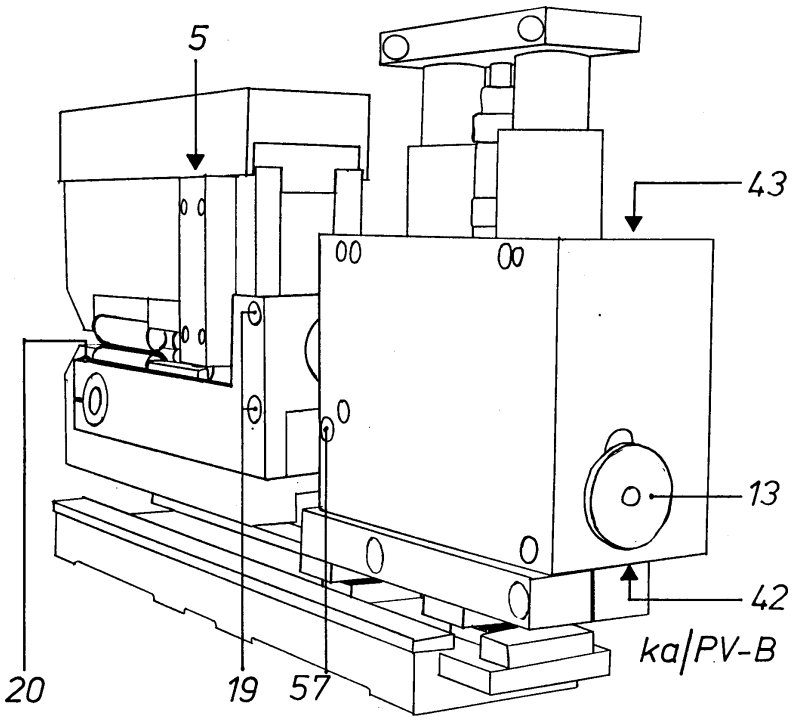
- ❍ Easy movable?
  The C-frame might get stuck because of large dirt deposits in the gauge mechanics. The measurement frame must rest against its bottom limit stop. In that position, the alignment pin must slide easily into the adjustment hole on the left side of the gauge head.
- ⇨ Clean the gauge

Repairs

To remove the gauge from the support

First undo all plug connections at the connector board behind the gauge and remove the plugs and sockets from the board.

Now loosen clamping screw 57 and pull the gauge out of the rotation bearing.



At all types the rotation bearing is clamped with screw 57.

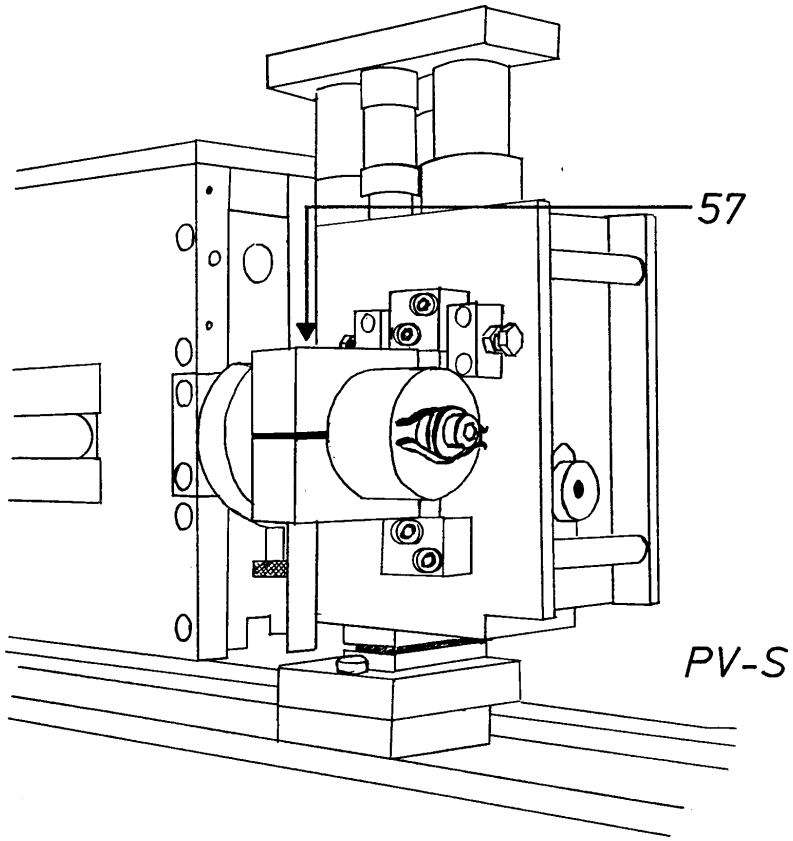
To remove the transducers

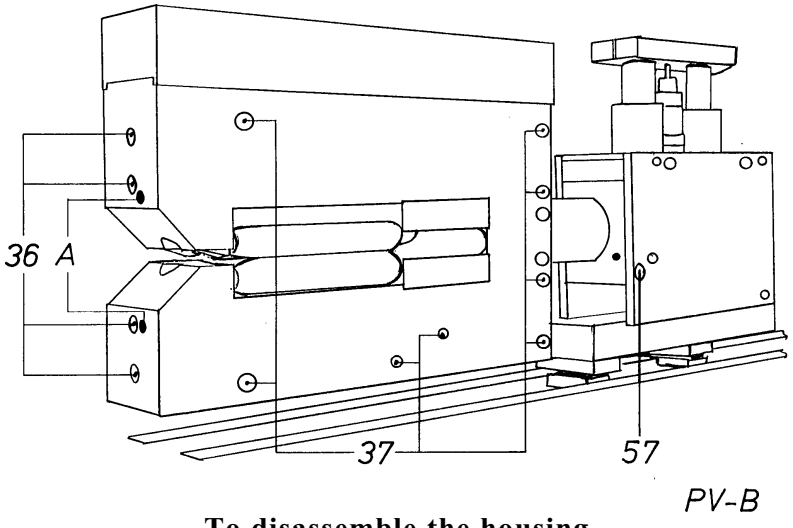
First unscrew the lid from the housing and then loosen the transducer clamps in the C-frame by inserting a spanner through holes A in the front of the gauge housing.

The housing is open at its bottom side, only the small cable guide bar at the rear has to be opened.

To remove the guide rollers

Remove both screws 36 and then take off the roller support with its two guide rollers.





To disassemble the housing

Type „ka/PV-B“ requires to remove the right side arm of the „ka“ device (see sketch ka/PV-B) before the gauge head is ready to be disassembled.

First turn out grub screw 5 and then loosen clamp screw 20 on both sides of the gauge head. Then remove the two screws 19 and take off the right arm of the „ka“ device.

Now remove the eight screws 37 (see sketch PV-B) and take off the right side of the housing, eventually give a push with a plastic hammer. Do not remove the left side of the gauge.

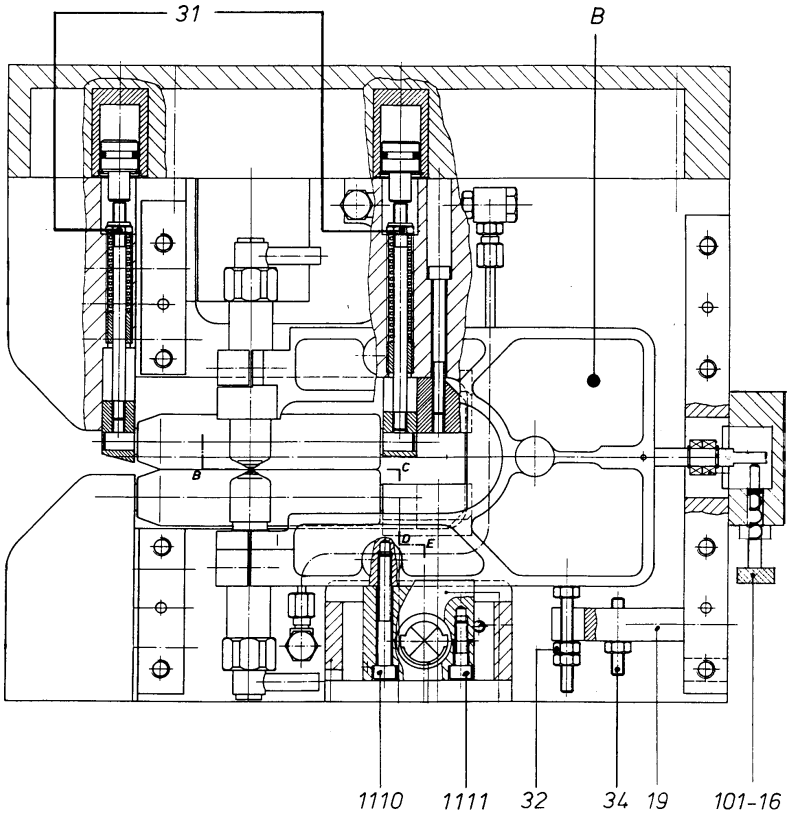
If there was any wrong measurement result, e.g. after a strip break, the alignment of the transducer clamps must be checked with an inspection bolt (available at Vollmer). It has easily to slide through both clamps. If not, get the C-frame aligned at Vollmer.

To change the Teldix bearing

The Teldix bearing needs only to be replaced if it is broken.

First remove the right side panel and then spring set screw 101-16 together with its spring and pressure ram.

When all five screws 1111 are removed from below, the Teldix spring can be pulled out to the side. Now the C-frame with the middle piece of the bearing can be taken off. The middle piece is connected to the C-frame by screw 1110.



VBM 1065 sectional view: 5 screws 1111 clamp the Teldix-bearing.

When re-installing the bearing, stand the gauge body upright and rotate the Teldix spring in a position, where the C-frame does not hang down at its front but rests in a levelled position when the transducers are installed (loosen all clamps screws and turn the whole Teldix spring).

Insert the locking pin in its adjustment hole B before tightening the clamp screws for the Teldix spring, in order to ensure that the C-frame is exactly installed into its former position.

The set screw 101-16 should be adjusted to its former position, where it puts a firm pressure under the C-frame against limit stop 32.

Assembly of the housing

First insert the side panel, then the lower guide rollers and afterwards the transducers. The upper guide rollers can only be reinstalled after the transducer position has been corrected and the levelling of the C-frame was checked.

Spares

Each component of the VBM 1065 is identified by the position number and the drawing number.

Example: A guide roller of the VBM 1065 is part 9 in drawing W80/172

Note

For spare parts orders please use the complete drawings in the documentation and not the details in this manual.

To check the transducer alignment

If there was any wrong measurement result, e.g. after a strip break, the alignment of the transducer clamps should be checked with an inspection bolt (available from Vollmer). It must slide easily through the two clamps. If not, have the C-frame aligned at Vollmer, or replace it.

Transducer check

This is just a basic check of the transducer function. Please read the separate transducer service manual for service and repair.

- Ram easy movable ?
  The transducer rams must be easy to be pushed in and spring back immediately.

- Measurement tips worn or damaged?
  If the measurement result of the slip gauge plate is not 0, but the other checks are all right, remove the transducers and check the measurement tips:

- Diamonds worn?
  The diamonds should be crowned to achieve accurate measurement results. Worn diamonds with flat spots may cause measurement errors.
- ⇨ Replace and possibly get the old diamonds reworked

- Broken diamonds?
  Cause incorrect measurement results and mark the strip
- ⇨ Replace

- Measurement tips with broken-out diamonds? (after strip breaking or when the strip end has passed through the gauge)
- ⇨ Replace

- Micrometer thread damaged?
  Worn micrometer threads cause measurement errors. Check: Set the transducer to zero, select a nominal size and insert the correspondent slip gauge. Try with several slip gauges. The indication has to be very close to zero. If not,
- ⇨ send the transducer to Vollmer for repair without trying to repair the thread by yourself.

C-Frame Adjustment

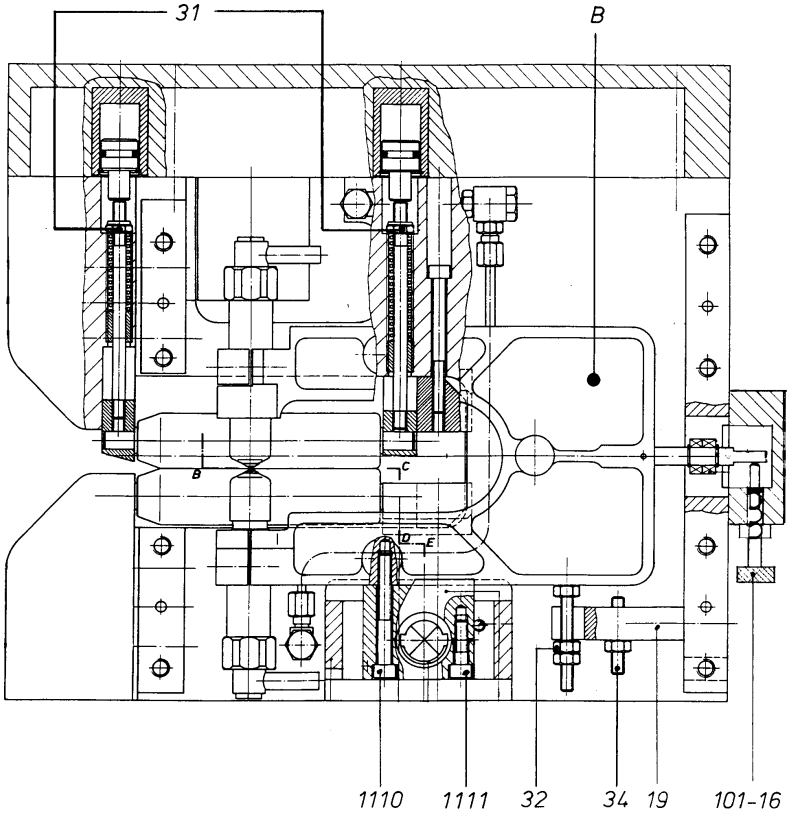
Insert setscrew 101-16 with spring and ram and adjust it to its old position where it puts a firm pressure on the C-frame against limit stop 32. The front of the C-frame can be lifted against a firm pressure.

Then insert the supplied locking bolt from the left side into the drill trough both sides of the housing and the C-frame.

Now the C-frame is levelled in the housing, so that the transducer clamps stand perpendicular to the lower guide rollers.

Then adjust limit stop nut 32: Loosen the locking nut and the screw nut 32 easy against part 19 and lock it again. If now the locking bolt is pulled out, the front of the C-frame may not move down. The screw is adjusted correctly, when the VMF indication does not change when the alignment pin is pulled off. Screw 34 forms a limit stop for the upward movement of the C-frame. It is adjusted so that the front of the C-frame can move up about 3 millimetres from the level position.

The C-frame is hold revelled by spring set screw 101-16 against nut 32. The C-frame can only move up as protection against damage. Screw 101-16 with its spring suspension puts an adjustable pressure under the C-frame in order to prevent it from swinging.



Hole B, nut 32, pin 34 and setscrew 101-16 determine the C-frame position inside the measurement head.

Transducer installation

After cleaning or diamond changing the transducers can easily be reinstalled into the C-frame:

① set the C-frame into the 90° position by inserting the supplied adjustment pin into the adjustment hole J. Put the adjustment plate P into the measurement mouth with the step pointing towards the bottom.

② connect the lower transducer B (no gear wheel) to cable/socket X2 switch on the VMF measurement amplifier, select the 1000 µm measurement range, set the FS4 nominal size selector (if there is one) to zero

③ insert the lower transducer into its holding and push it up against the adjustment plate until the amplifier indicates the required value. That value depends on the type of the gauge (see gauge card in the documentation) and the application:

We marked the paragraph with the optimum values for your application:

☐ Transducers with 1 mm stroke (20-MUBE-0/20 MOBE-0) and measurement amplifier VMF 3/11 or 3/22 or 2000: clamp lower transducer at +500 µm

☐ Transducers with 1 mm stroke (two 20-MUBE-0) and measurement amplifier VMF 3/11 or 3/22 or 2000: clamp lower transducer at +800 µm. If measuring only strip below 1 mm, clamp the lower transducer at +500 µm

☐ Transducers with 2 mm stroke (series -90 or -92, 20-MUBE/20 MOBE), and measurement amplifier VMF 2000: clamp lower transducer at +1000 µm

☐ Transducers with 2 mm stroke (series -90 or -92, two 20-MUBE), and measurement amplifier VMF 2000: clamp lower transducer at +1500 µm. If measuring only strip below 1 mm, clamp the lower transducer at +1000 µm

④ Then take off the adjustment plate, select measurement range 10 µm, connect the second transducer and push it into the upper hole against the lower transducer until the measurement amplifier indicates nearly zero. Minor deviations can be eliminated by the zero point potentiometer (VMF 3/22 + 3/22) or the Master key (VMF 3/2000). Before inserting, screw the upper part of the transducer clockwise down to the limit stop, and then turn it back for one full turn.

Important note

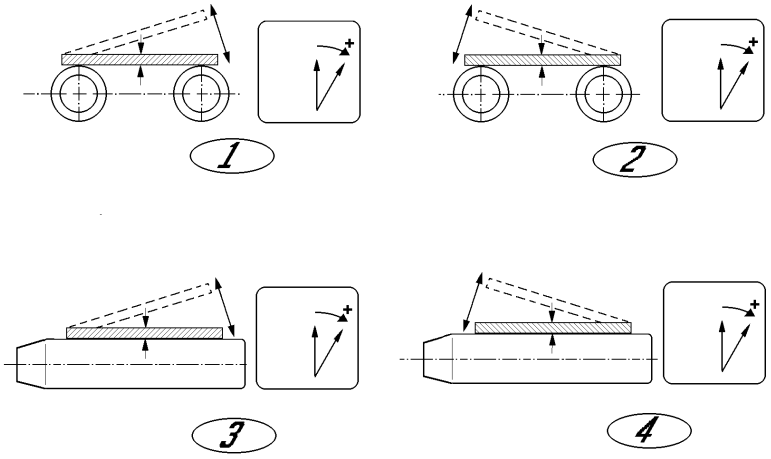
*With measurement amplifiers VMF 3/11 and VMF 3/22 please do always use a transducer together with its own **extension cable**, which was individually adjusted to the transducer measurement characteristics. With another cable the gauge accuracy might be affected.*

*Please do always check the transducer **symmetry** after a transducer was re-inserted (see separate VMF manual)*

If there was any soldering done on the cable or the transducer coil, check the compensation resistor in the transducer cable connector as well as the VMF phase and sensitivity adjustment. On gauging systems with transducers of the ../90 series and VMF 3/2000 amplifiers, parts of these procedures are performed automatically (see separate manual).

To check the transducer position

The upper guide rollers must be lifted or removed for this check. Put the adjustment plate onto the lower guide rollers and tip it to all four directions, see sketch 1 through 4. The indicator must be deflected at any time exclusively towards the + side. If not, the gauge needs service:



If "minus" is indicated when the plate is tilted towards one side (sketches 1+2), either the transducer tips are worn, the C-frame is distorted or the lower guide rollers are not parallel.

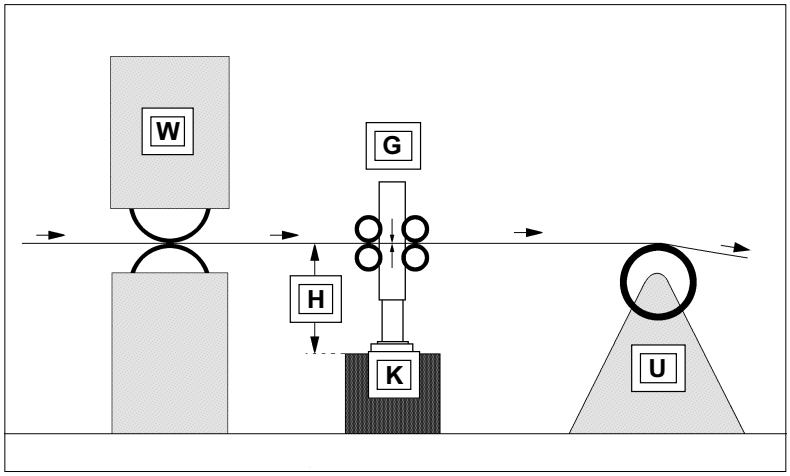
If "minus" is indicated when the plate is tilted towards the front or the back sketches 3 + 4), it is also possible, that the 90°-position of measurement frame was not correctly adjusted.

If a diamond is not supported exactly in its center, the indication deflects to minus. In this seldom case the mistake changes with the transducer when rotating it by 90 or 180 degrees.

Installation

When the gauge is installed into an inspection line, installation height and levelling of the gauge are derived from the inspection table. If the gauge was removed from its position, take care to reinstall the slidebase angular to the passline.

In rolling mills the gauge should be installed as described in the following sketch:



If possible, the gauge should be positioned between the roll gap (mill = W) and the deflector roll U. Base and the bracket K are so high that they lie under the strip by the "passline height" H (see data drawing in the documentation). Here the stroke of the vertical guiding is able to follow the expected range of strip movement.

Additional conditions are:

- base parallel to roll axes in the mill
- slidebase rectangular to the strip
- gauge must be able to traverse towards the roll middle

Levelling

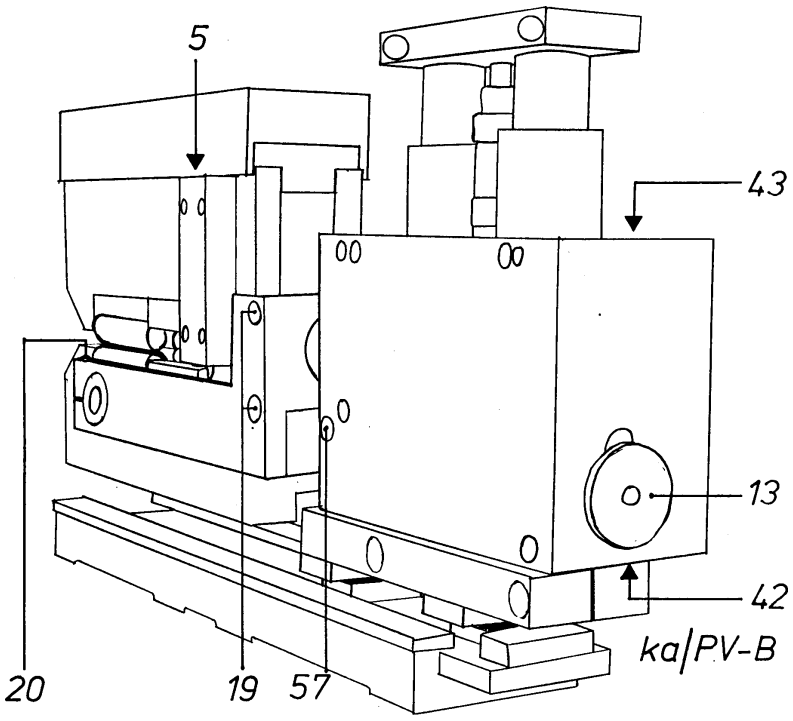
If the strip does not run horizontally the gauge head can be turned: Loosen clamp screw 57 at the rear of the gauge. Lift the gauge at the front, adjust it to the strip passline angle and clamp it again.

Passline adjustment

The gauge is suspended by pressure springs in the vertical guide which push it up. There is no need to change the spring adjustment done at Vollmer. A pneumatic cylinder pushes the gauge down into the passline height. Adjust the height of the gauge pneumatically, so that the bottom guide rollers are just turned by the strip when the gauge is moved onto the strip. The strip should not pull the gauge down.

The lower limit stop of the vertical guide is adjusted to the lowest possible passline (see sketch ka/PV-B).

Push the gauge head pneumatically down to the lowest possible passline. Now fasten sliding part 13 in this position by the two grub screws 43 and 42 beginning at the top side. Working pressure of the pneumatic cylinder should not exceed 3 bar, in order to ensure that the gauge is able to follow the strip movements easy enough.



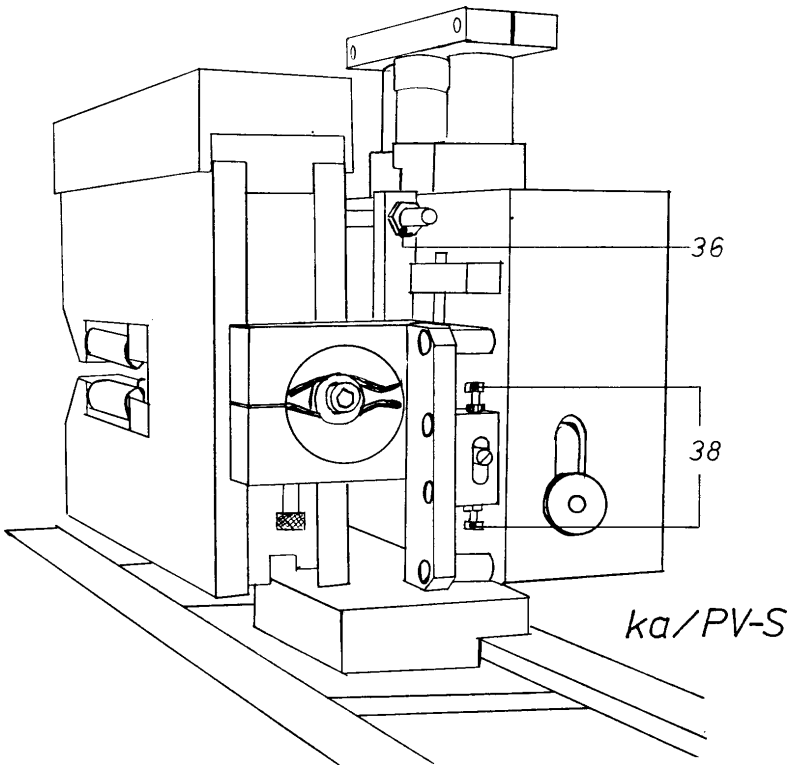
Items for levelling and passline adjustment. Please read the text for details.

Inclination of the gauge head to the strip surface

Pneumatic guide rollers and cardan supension (pn/ka)

Gauges with „pn/ka“ equipment hold on to the strip by pneumatic guide rollers. They incline within the „ka“-suspension, so that the transducers stand always perpendicular to the strip surface. There are two versions:

- pn/ka with the vertical guide aside the gauge ka/PV-S)



The inclination of the gauge head within the ka-suspension can be adjusted by nut 36. The two set screws 38 form the limit stops for the inclination movements of the measurement head, and they can also be used to lock the inclination movements.

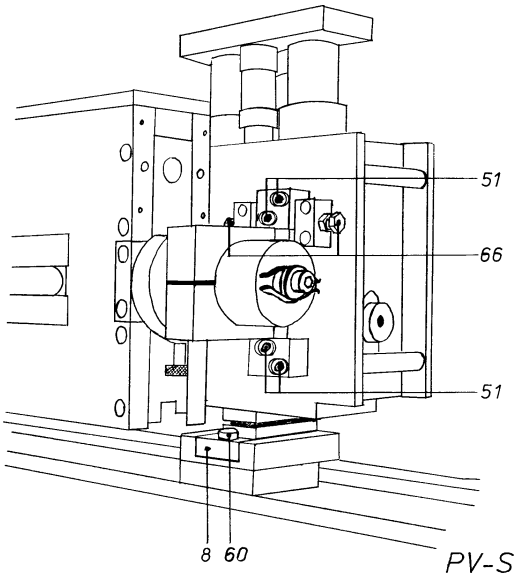
- pn/ka with vertical guide behind the gauge (ka/PV-B)

The inclination is adjusted at grub screw 5 (see sketch on previous page). The limit stop (and lock) within the „ka“-device is situated at the opposite side of the gauge head.

Spring suspended upper guide rollers without ka-suspension

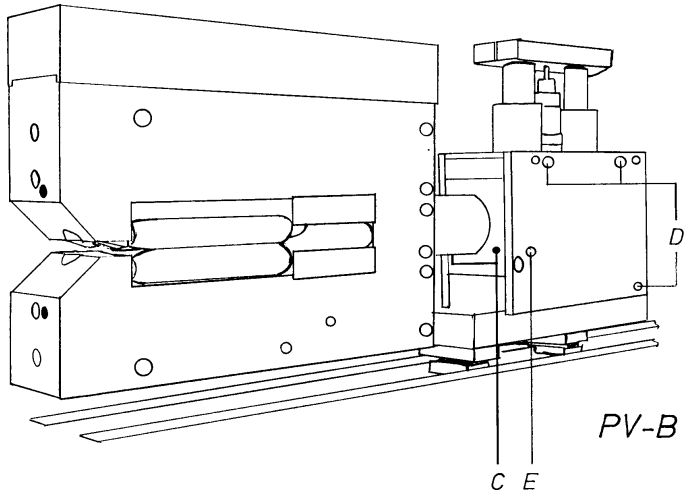
Gauges of this version (without „pn/ka“) are used at mills with very flat strip. Here the inclination of the gauge head is adjusted only once during the installation in order to adjust the gauge head parallel to the sled. There are two versions:

- vertical guide aside the gauge (PV-S)



The inclination of the gauge head can be adjusted by the two set screws 66 when the four screws 51 have been loosened.

- vertical guide behind the gauge (PV-B)

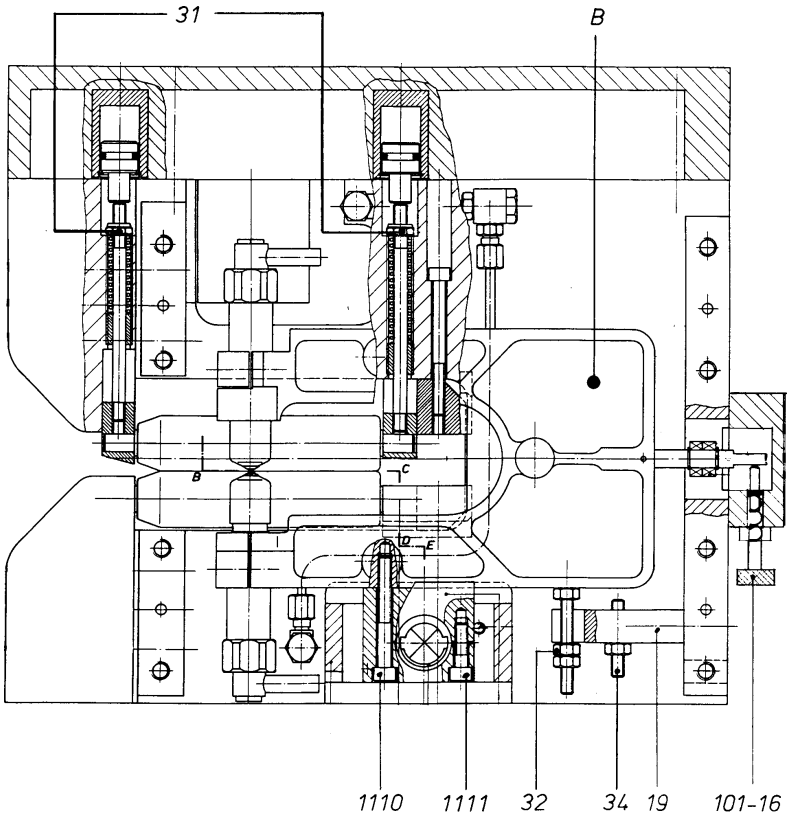


By tightening the two grub screws C right and left below the rotation bearing it is possible to lift the front of the gauge head a little.

Pneumatic guide rollers (pn)

The upper guide rollers are pressed down pneumatically. Working pressure is between 3 and 5 bar, depending on the kind of material which is being measured. Pressure is set by the valve 'Pneumatic Guide Rollers' at the pneumatic cabinet (see section 'Guide Rollers' under 'Maintenance').

If their pneumatic cylinder is not under pressure, the upper rollers should be easy to move up by hand and should be pushed down by spring pressure.

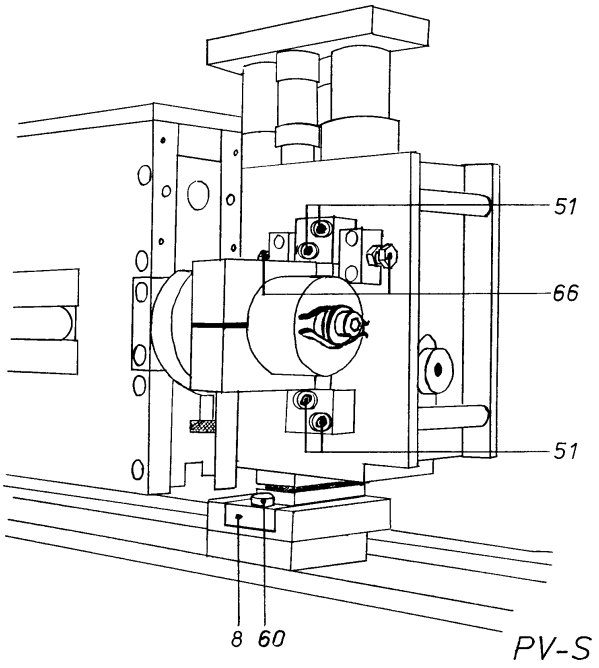


The two nuts 31 form the limit stop for the upper guide rollers: Remove the lid of the gauge housing and turn the nuts clockwise until an even gap of 1 mm occurs between the upper and the lower guide rollers.

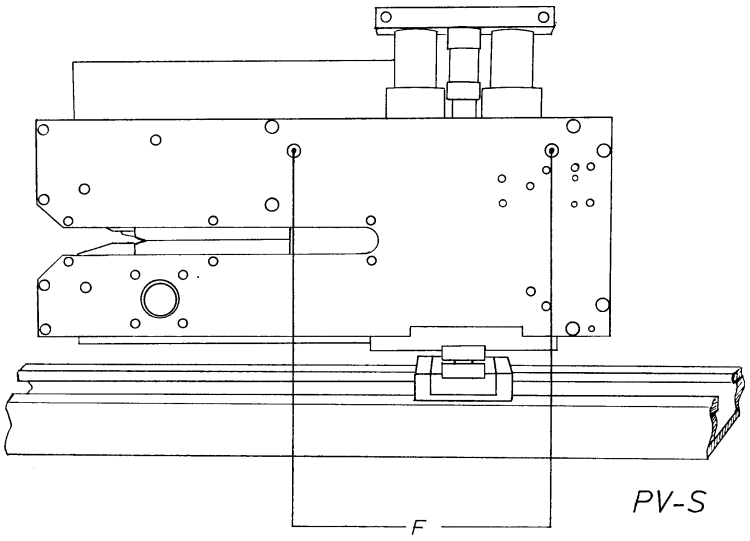
Strip Breakings

The gauge support has got a breaking point below their vertical guiding in order to protect gauge and support in case of strip breaks. The shear blocks from cast material are easy to replace.

Replacement of the shear block at vertical guide aside the gauge (PV-S)

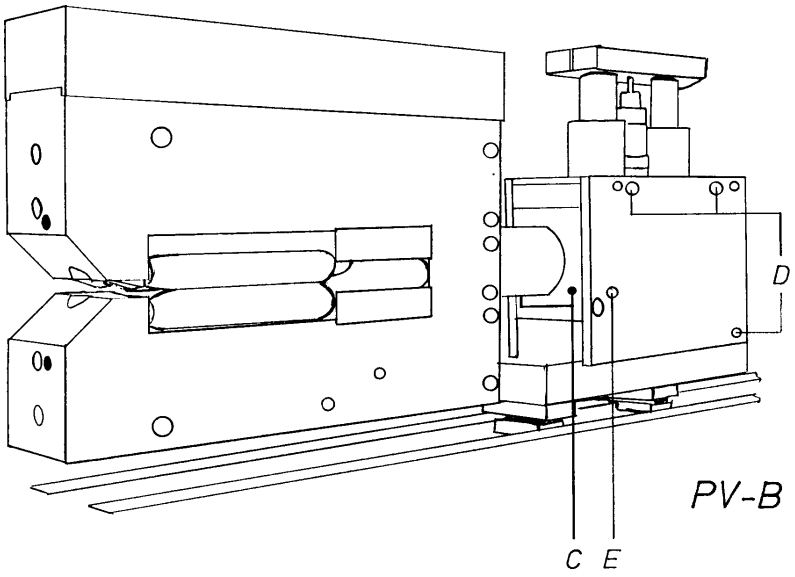


Remove screw 60 and slide out part 8 laterally. Now replace the remains of the old shear block against a new one.



After that unscrew the two screws F and lift the housing of the vertical guide for about 50 millimetres. Now the other part of the shear block is accessible.

Replacement of the shear block at vertical guide behind the gauge (PV-B)



At gauges without „ka" device at first the two grub screws C have to be loosened far enough in order to take all load off them. After the shear block was replaced, the inclination of the gauge head has to be newly adjusted.

Now unscrew the three screws D from both sides of the vertical guide, but remove screw E only at one side. Now take off the side panels of the vertical guide and remove the upper part of the shear block.

The bottom screws of the shear blocks are accessible from the bottom side of the sled.

Please set the top transducer mechanically to zero after each strip break and check the zero point. If it has not changed, the measurement can continue immediately.

If the gauge does not indicate 0 after the top transducer has been set to the zero position, set the measurement amplifier to zero and check the symmetry. Check a sample, which is integrated into the test plate (available at Vollmer). If these points are all right, measurement can go on.

If the symmetry is disturbed, or if the measurement does not indicate the exact thickness of the sample, check the whole gauge. Take special care of the diamonds, the easy movement of the transducer rams and the alignment of the transducer holes in the C-frame.