# RSF Elektronik

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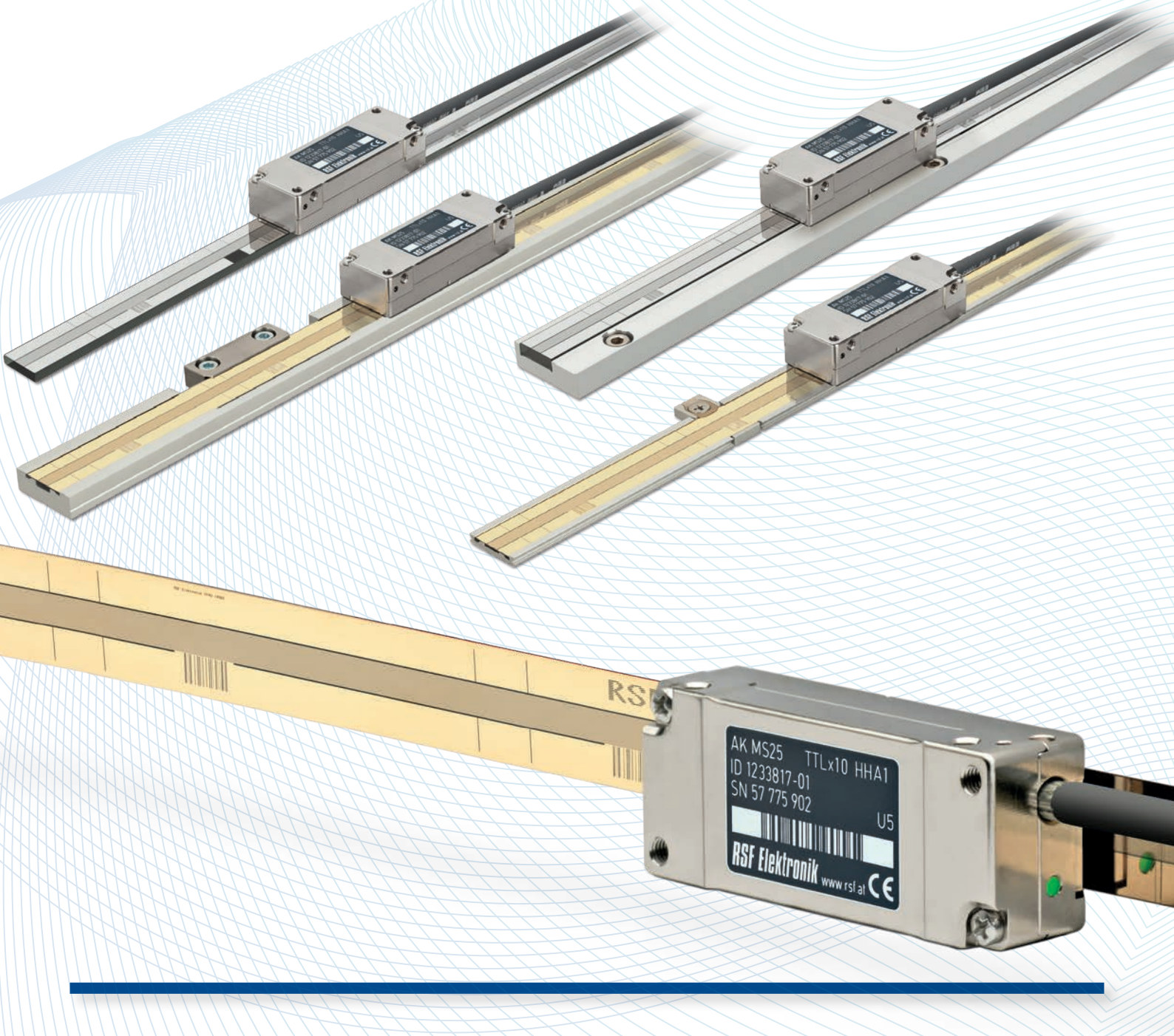
## MS 25

## EXPOSED LINEAR ENCODERS WITH SINGLEFIELD SCANNING



# CONTENTS



# TERM-EXPLANATIONS

**Grating period**
A grating is a continuous series of lines and spaces printed on the graduation carrier. The width of one line and one space is called the period of the grating. The lines and spaces are accurately placed on the graduation carrier.

**Signal period**
When scanning the grating, the scanning head produces sinusoidal signals with a period equal to the grating period.

**Interpolation**
The sinusoidal signal period can be electronically divided into equal parts. The interpolation circuitry generates a square-wave edge for each division.

**Measuring step**
The smallest digital counting step produced by an encoder.

**Yaw angle, pitch angle, roll angle, displacement, gap tolerance**
Mounting tolerances of the scanning head relative to the graduation carrier.

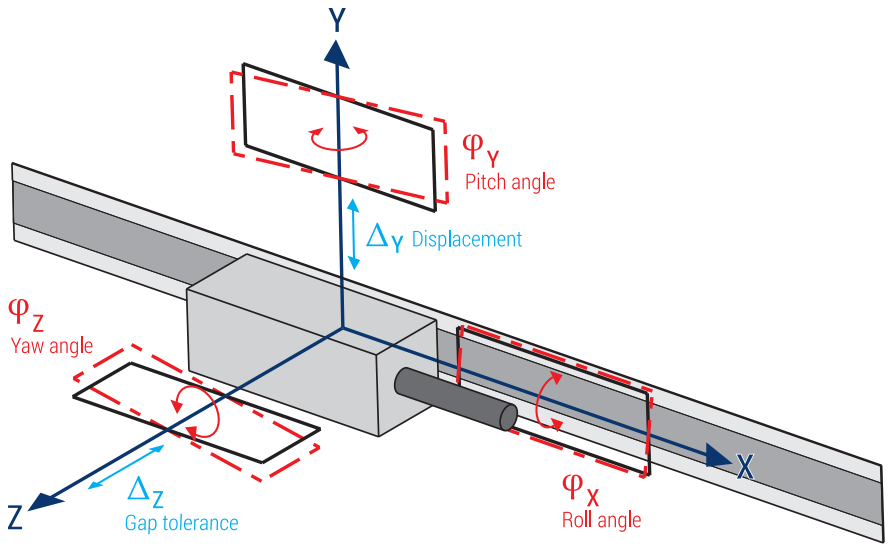
**Reference pulse (reference mark)**
There is an additional track of marks printed next to the grating to allow a user to find an absolute position along the length of the graduation carrier. A one increment wide signal is generated when the scanning head passes the reference mark on the graduation carrier.
This is called a “true” reference mark since it is repeatable in both directions. Subsequent electronics use this pulse to assign a preset value to the absolute reference mark position.

**Error signal ($\overline{US}$)**
This signal appears when a malfunctioning encoder generates faulty scanning signals.

**Online signal stabilization (HSP)**
During moving the amplitude, offset-error, amplitude differences and phase shift error are measured and stabilized cyclic.

**Abbe error**
Measuring error due to lateral distance between the measuring system and the machining level.

Δ .....Delta
φ .....Phi



# PERFORMANCE CHARACTERISTICS

- CONTAMINATION RESISTANCE
- IMMUNITY AGAINST AGING AND TEMPERATURE CHANGES
- HIGH TRAVERSING SPEED
- EASY MOUNTING
- COMPACT DIMENSIONS
- NO MECHANICAL BACKLASH
- NO FRICTIONAL FORCE
- TWO SEPARATE SWITCH SIGNALS
- HIGH ACCURACY
- RESOLUTION: 10 µm – 0.05 µm

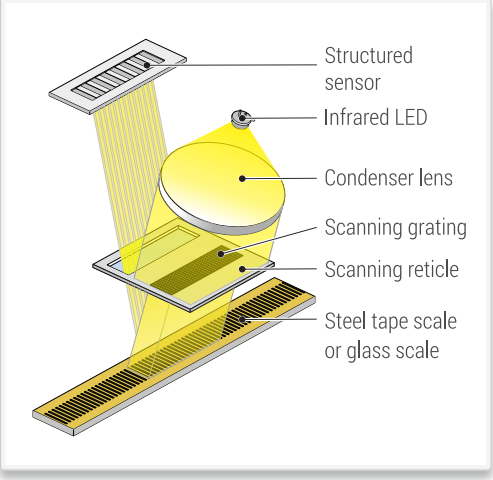
# SCANNING PRINCIPLE

The incremental MS 25 linear encoders work with a photoelectric measuring principle and a **singlefield reflective scanning** method. A graduation pattern on a steel tape (gold grating) or a glass scale (chrome grating) with 40 µm grating period is used.

The regulated light of an infrared LED is collimated by a condenser lens and passes through the grid of the reticle. After being reflected from the grating, the light generates a periodic intensity distribution on the structured sensor.

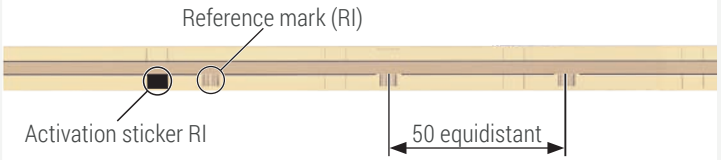
The sensor generates high quality sinusoidal signals which are highly insensitive to possible contaminations.

The regulation of the LED ensures a constant signal amplitude, guaranteeing stability in the case of temperature fluctuations and with long-run operation.

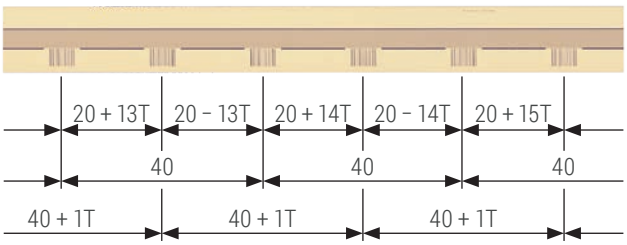



# REFERENCE MARKS

Principle of the standard reference marks




Principle of the distance-coded reference marks



# ACCURACY DEFINITION

The accuracy of a linear encoder is mainly determined by the baseline error of the graduation carrier, the interpolation error of the optoelectronic scanning and the position noise.

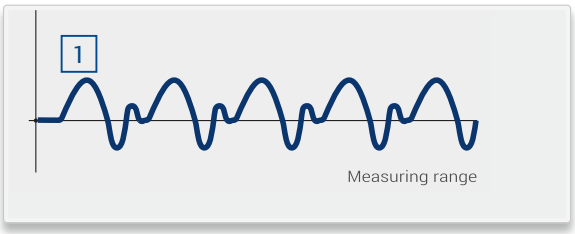
The baseline error is the error of the graduation carrier identified in a measurement room under optimum conditions, along a determined measuring length, without any interpolation error and position noise.

The indicated accuracy grade represents the maximum possible baseline error.
It is calculated within any section with a maximum length of one meter.

Baseline error

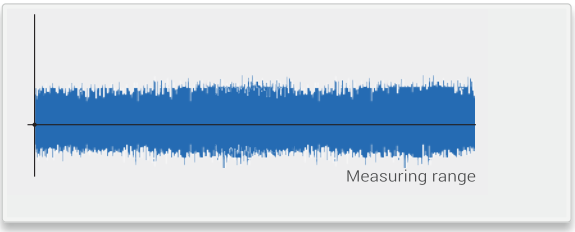

+

Interpolation error



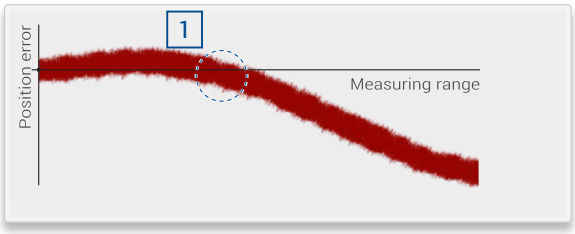

+

Position noise



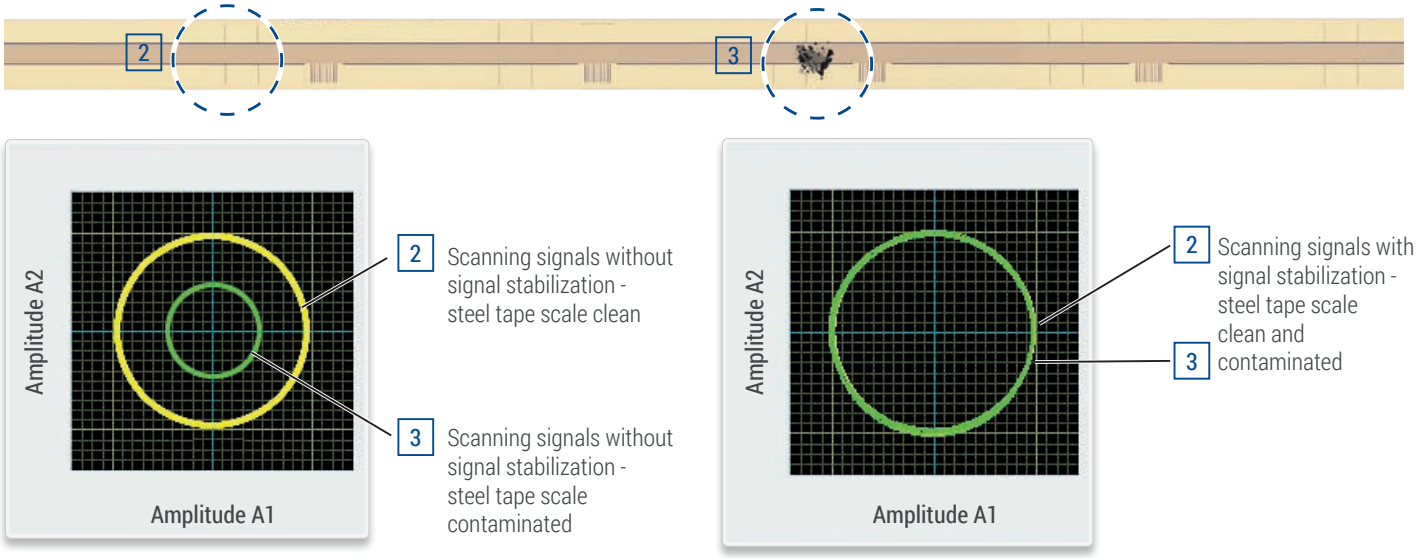

=

Overall error



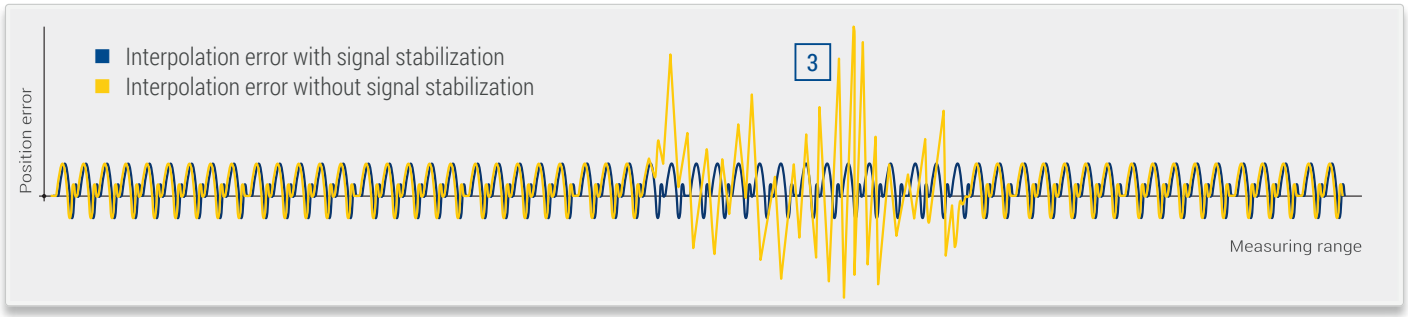
## Effect of contamination on the quality and amplitude of scanning signal

Graduation carrier contaminated by fluids, dust, particles, fingerprints etc.

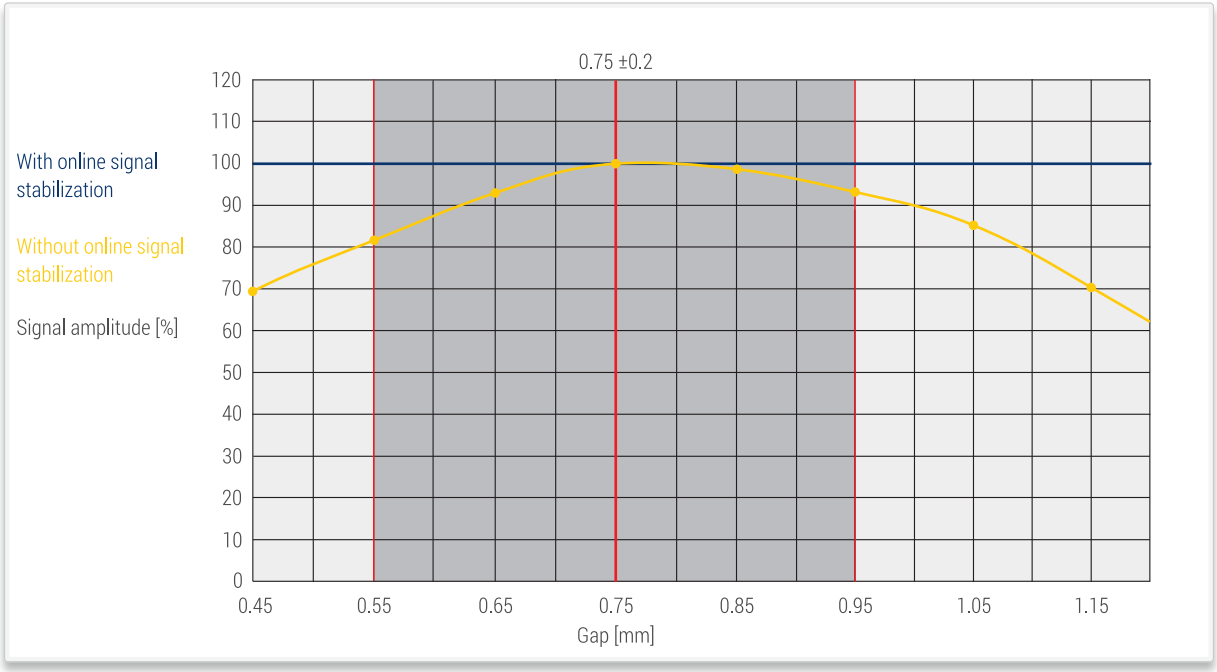



## Effect of contamination on the intepolation error

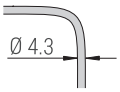
Graduation carrier contaminated by fluids, dust, particles, fingerprints etc.



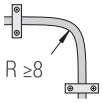

## Effect of the gap between scanning head and graduation carrier on the scanning signal amplitude



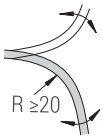
# SHIELDING, PIN ASSIGNMENT



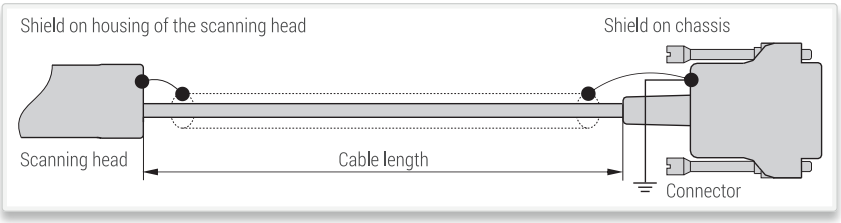

Shielded PUR-cable;
Drag chain qualified.




Bending radius fixed mounting




Bending radius continuous flexing



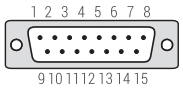

## D-sub connector, male, 15-pin

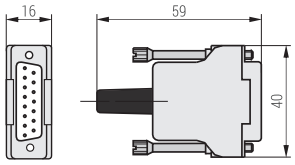
| Pin | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sinusoidal voltage signals 1 Vpp | Test* | 0 V Sensor | Occupied | RI− | A2− | A1− | V+ Sensor | V+ | 0 V | S1*** | S2*** | RI+ | A2+ | A1+ | nc |
| Square-wave signals via line driver | Test** | 0 V Sensor | $\overline{US}$ | $\overline{RI}$ | $\overline{T2}$ | $\overline{T1}$ | V+ Sensor | V+ | 0 V | S1*** | S2*** | RI | T2 | T1 | nc |

RSF standard pin assignment, other pin assignments on request.

- * Test = **Analog signal switch-over for set-up.**
  By applying +5 V to the test pin, the NOT corrected test signals (1 Vpp) are switched to the output connector.
- ** Test = **Analog signal switch-over for set-up.**
  By applying +5 V to the test pin, the test signals (sinusoidal micro-current signals 11 µApp) are switched to the output connector.
- S1, S2 = Switch signals.
- *** Version without switch signals (version K) = without function.
- Sensor: The sensor pins are bridged in the connector chassis with the particular power supply.
- The shield is connected with the connector chassis.
- Pins or wires marked "occupied" or "nc" must not be used by the customer.

**Pin assignment**
(view on pins)




Mass: 28 g

# INTERFACES

## SINUSOIDAL VOLTAGE SIGNALS 1Vpp

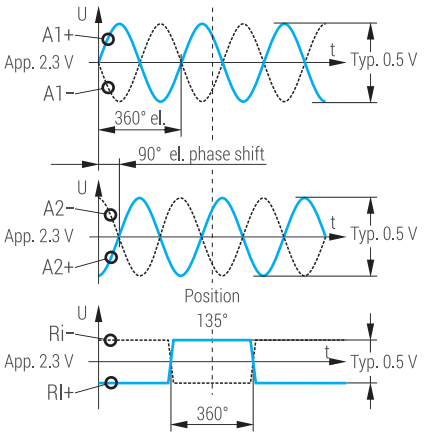
(drawing shows "positive counting direction")

**Power supply:** +5 V ±10 %, max. 130 mA (unloaded)
**Track signals** (differential voltage A1+ to A1− resp. A2+ to A2−):
Signal amplitude 0.6 Vpp to 1.2 Vpp; typ. 1 Vpp
(with terminating impendance Zo = 120 Ω between A1+ to A1− resp. A2+ to A2−)

**Reference mark** (differential voltage RI+ to RI−):
Square-wave pulse with an amplitude of 0.8 up to 1.2 V; typical 1 V
(with terminating impedance Zo = 120 Ω between RI+ to RI−)

**Advantage:**
- High traversing speed with long cable lengths possible.

Voltage signals (1 Vpp)




## SQUARE-WAVE SIGNALS

(drawing shows "positive counting direction")
With an interpolation electronics (for times -1, -2, -5, -10, -20, -25, -50, -100 or -200) the photoelement output signals are converted into two square-wave signals that have a phase shift of 90°. The output signals are „differential" via line driver (RS 422). One measuring step reflects the measuring distance between two edges of the square-wave signals.

The controls/DRO´s must be able to detect each edge of the square-wave signals. The minimum edge separation $a_{min}$ is listed in the technical data and refers to a measurement at the output of the interpolator (inside the scanning head). Propagation-time differences in the line driver, the cable and the line receiver reduce the edge separation.

**Propagation-time differences:**
Line driver: max. 10 ns
Cable: 0.2 ns per meter
Line receiver: max. 10 ns referred to the recommended line receiver circuit

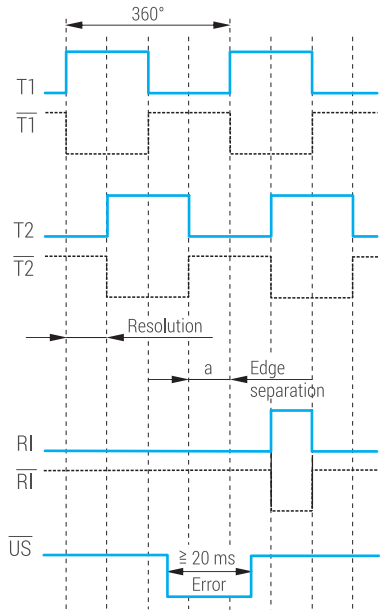
To prevent counting errors, the controls/DRO´s must be able to process the resulting edge separation.

**Example:**
$a_{min}$ = 200 ns, 10 m cable
200 ns - 10 ns - 10 x 0.2 ns - 10 ns = 178 ns

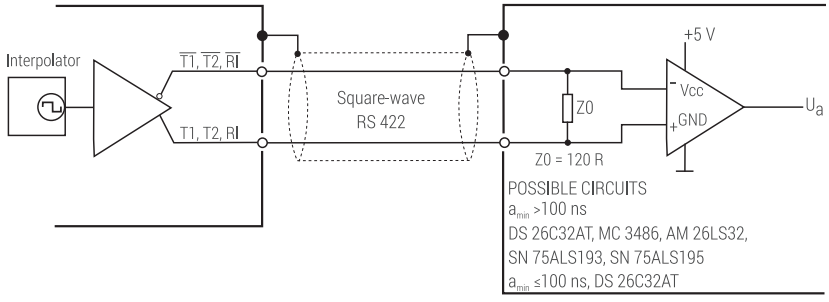
**Power supply:** +5 V ±10%, max. 165 mA (unloaded)

**Advantage:**
- Noise immune signals
- No further subdividing electronics necessary

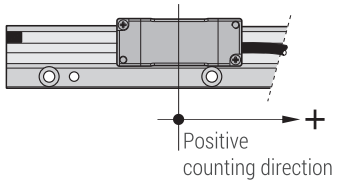
Square wave signals „differential"




Recommended line receiver circuit




Counting direction



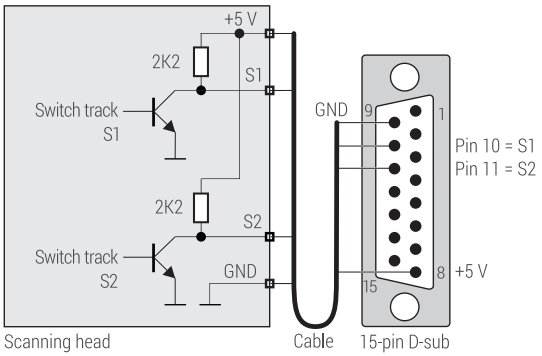
# SWITCH SIGNAL OUTPUT

For individual special functions there are two additional switch tracks on the glass scale/metal tape.
The switching point position can be chosen by the user by placing self-adhesive covering tapes.

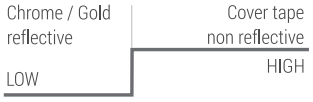
For version with selectable reference mark there is just one switch signal available.
The second track of this version is used to select the reference mark.
This feature makes the selection of the reference mark position, by the user, very easy.

## VERSION H

TTL output (active high)

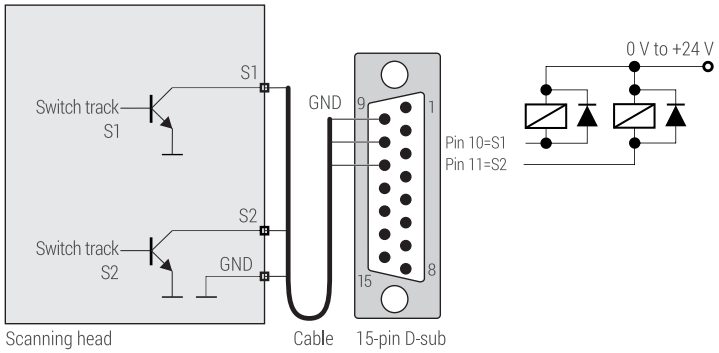



S1, S2 = TTL output
$I_{SOURCE}$ = 1 mA (high level >2 V)
$I_{SINK}$ = 20 mA (low level <0.8 V)

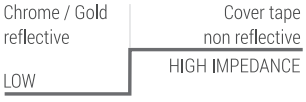



## VERSION Z

Open collector output (active high impedance)

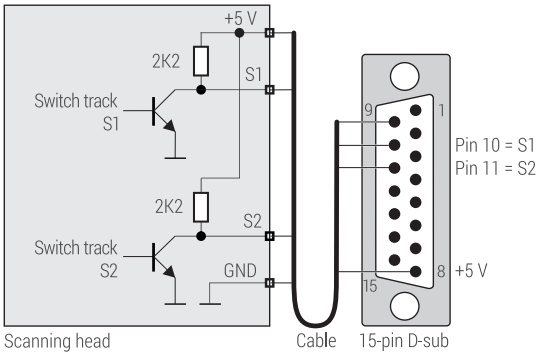



S1, S2 = open collector output
$I_{SINK}$ = 20 mA (low level <0.8 V)

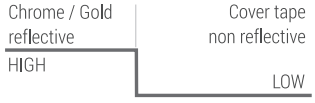



## VERSION L

TTL output (active low)

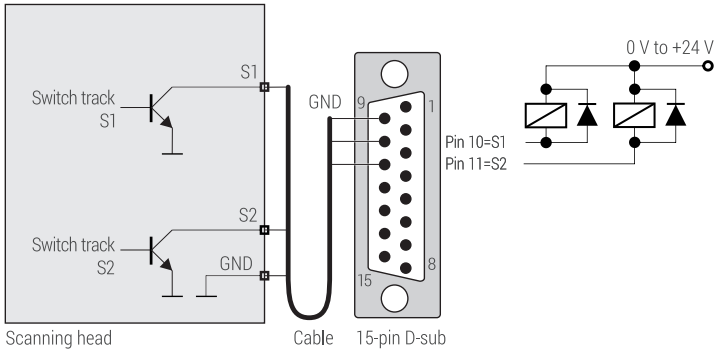



S1, S2 = TTL output
$I_{SOURCE}$ = 1 mA (high level >2 V)
$I_{SINK}$ = 20 mA (low level <0.8 V)

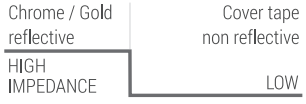



## VERSION C

open collector output (active low)




S1, S2 = open collector output
$I_{SINK}$ = 20 mA (low level <0.8 V)



# TECHNICAL DATA

## SCANNING HEAD

| Model | AK MS 25 1 Vpp | AK MS 25 TTLx1u | AK MS 25 TTLx2 | AK MS 25 TTLx5 | AK MS 25 TTLx10 | AK MS 25 TTLx20 | AK MS 25 TTLx25 | AK MS 25 TTLx50 | AK MS 25 TTLx100 | AK MS 25 TTLx200 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Interface** | ~ | ⎍ | ⎍ | ⎍ | ⎍ | ⎍ | ⎍ | ⎍ | ⎍ | ⎍ |
| Measuring step [µm] | Depending on external interpolation | 10.00 | 5.00 | 2.00 | 1.00 | 0.50 | 0.40 | 0.20 | 0.10 | 0.05 |
| Integrated interpolation | -- | Times 1 | Times 2 | Times 5 | Times 10 | Times 20 | Times 25 | Times 50 | Times 100 | Times 200 |
| Max. velocity [m/s] | 10.00 | 10.00 | 10.00 | 6.40 | 3.20 | 2.40 | 1.92 | 1.92 | 0.96 | 0.96 |
| Max. output frequency | 250 kHz | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Edge separation $a_{min}$ | -- | 500 ns | 250 ns | 300 ns | 300 ns | 200 ns | 200 ns | 100 ns | 100 ns | 50 ns |
| Interpolation error with signal stabilization | Typical ±65 nm (peak-peak) | | | | | | | | | |
| Electrical connection | Cable, 0.5 m, 1 m or 3 m with D-sub connector, male, 15-pin | | | | | | | | | |
| Voltage supply | +5 V ±10 % | | | | | | | | | |
| Power consumption | ▪ 1 Vpp: max. 715 mW (without load)<br>▪ TTL: max. 907 mW (without load) | | | | | | | | | |
| Current consumption | ▪ 1 Vpp: 130 mA (without load)<br>▪ TTL: 165 mA (without load) | | | | | | | | | |
| Vibration 55 Hz – 2000 Hz<br>Shock 8 ms | ≤ 150 m/s² (EN 60 068-2-6)<br>750 m/s² (EN 60 068-2-27) | | | | | | | | | |
| Operating temperature<br>Storage temperature | 0 °C to 60 °C<br>–20 °C to 70 °C | | | | | | | | | |
| Mass | Scanning head: 21 g (without cable), cable: 30 g/m, connector: D-sub connector: 28 g | | | | | | | | | |

## GRADUATION CARRIER

| Model | MS 25 MO/MK | MS 25 MA/MS | MS 25 MP | MS 25 MT | MS 25 GK | MS 25 BK | MS 25 GA |
|---|---|---|---|---|---|---|---|
| Graduation carrier | Steel tape scale | | | | Glass scale | Glass ceramic scale | Glass scale |
| Coefficient of linear expansion | α ≈ 10 x $10^{-6}$/K | α ≈ 10 x $10^{-6}$/K | α ≈ 10 x $10^{-6}$/K | α ≈ 10 x $10^{-6}$/K | α ≈ 8,5 x $10^{-6}$ | α ≈ 0 x $10^{-6}$ / K | α ≈ 8,5 x $10^{-6}$ |
| Grating period | 40 µm | | | | | | |
| Accuracy grades * | ±5, ±15 µm/m | | | | ±3, ±5 µm/m | | |
| Non-linearity | ±3 µm/1000 mm | | | | ≤±1 µm/70 mm<br>≤±3 µm/1000 mm | | |
| Baseline error | ≤ ±0.75 µm/50 mm (typical) | | | | ≤ ±0.30 µm/10 mm | | |
| Measuring length ML | 20 000 mm | 3640 mm | 20 000 mm | 20 000 mm | 3140 mm | 1920 mm ** | 3140 mm |
| Reference marks | ▪ Standard: 50 mm equidistant<br>▪ At any location, on request | | | ▪ Position selectable by customer<br>▪ Optional: distance-coded | | | |
| Mass | MO: 20 g/m<br>MK: 25 g/m | MA: 530 g/m<br>MS: 1525 g/m | 90 g/m<br>+ 2 g clamping | 325 g/m<br>+ 30 g clamping | 100 g/m | 70 g/m | 515 g/m |

* At 20 °C

** Longer lengths on request

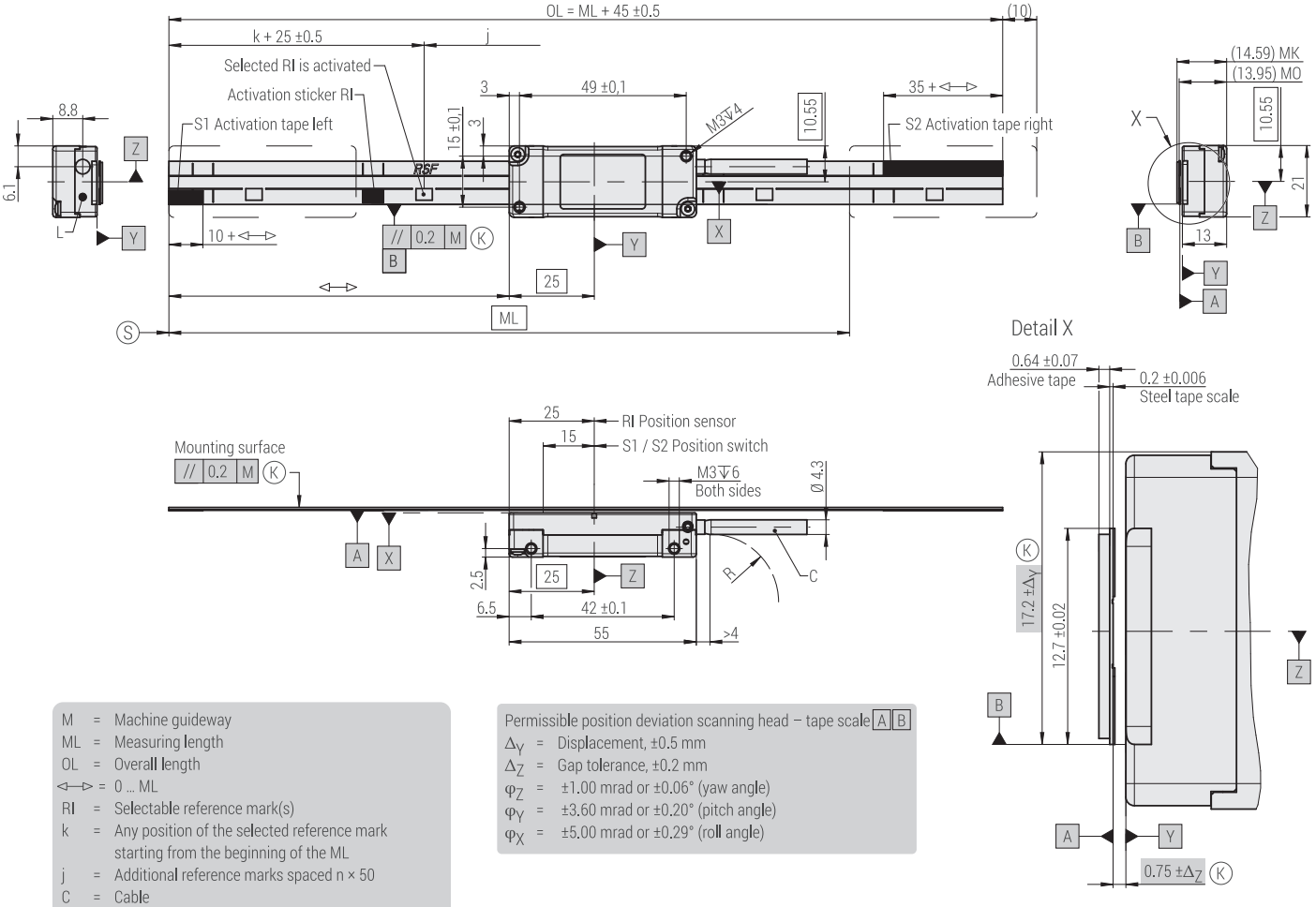
## CONFORMITIES AND CERTIFICATIONS

| | |
|---|---|
| RoHS | 2011/65/EU, 2015/863/EU |
| EMV | 2014/30/EU |
| Product-Certifications | UL, CSA, EN, IEC 61010-1 |

# MS 25 MO/MK

- Version MO: Steel tape scale
- Version MK: Steel tape scale with adhesive tape


Dimensions, mounting tolerances:




M = Machine guideway
ML = Measuring length
OL = Overall length
↔ = 0 ... ML
RI = Selectable reference mark(s)
k = Any position of the selected reference mark starting from the beginning of the ML
j = Additional reference marks spaced n × 50
C = Cable
(K) = Required mating dimensions
L = LED function control
R = Bending radius: stat. R ≥8 mm, dyn. R ≥20 mm
(S) = Beginning of the measuring length
S1, S2 = Switch signal
n = 1, 2, 3, ...

Permissible position deviation scanning head – tape scale A B
$\Delta_Y$ = Displacement, ±0.5 mm
$\Delta_Z$ = Gap tolerance, ±0.2 mm
$\varphi_Z$ = ±1.00 mrad or ±0.06° (yaw angle)
$\varphi_Y$ = ±3.60 mrad or ±0.20° (pitch angle)
$\varphi_X$ = ±5.00 mrad or ±0.29° (roll angle)

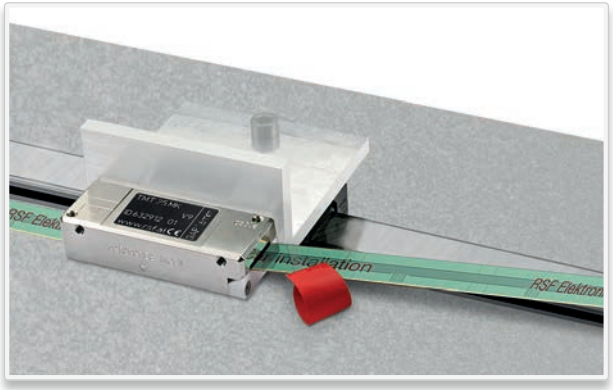
**Mass** (approx.)
- Version MO: 20 g/m
- Version MK: 25 g/m

+ 21 g scanning head + 30 g/m cable

mm
Tolerancing ISO 8015
ISO 2768:1989 - m H
< 6 mm: ±0.2 mm

Tape mounting tool **TMT MS 25 MK** (optional)
For safe and precise mounting of the steel tape scale.

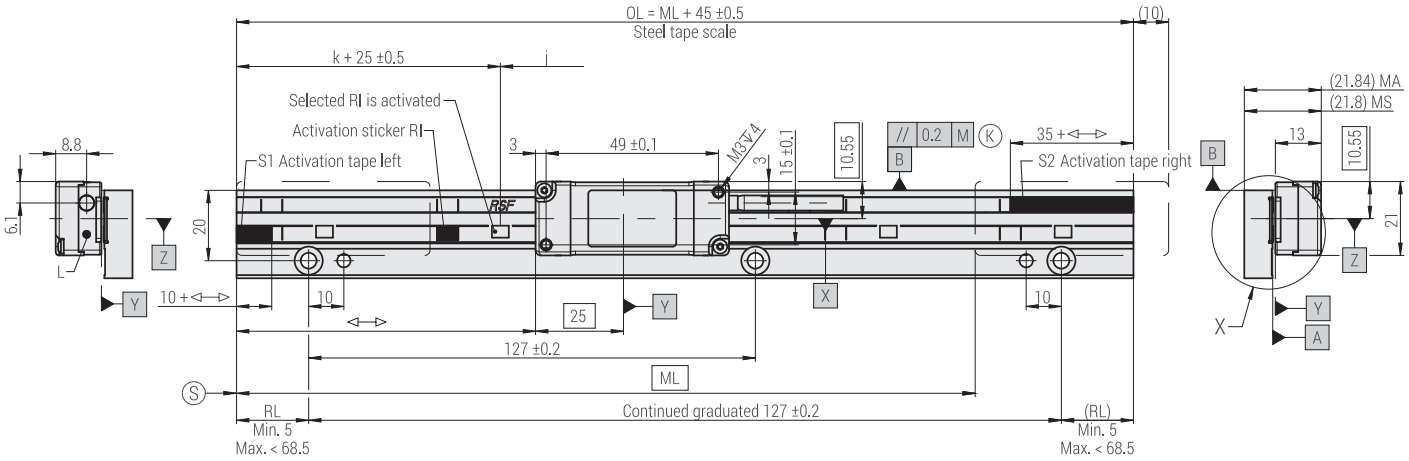
- Mount TMT MS 25 MK instead of the scanning head MS 25
- Thread steel tape scale (version MK) and move along the scale length
- Remove TMT MS 25 MK, mount scanning head MS 25

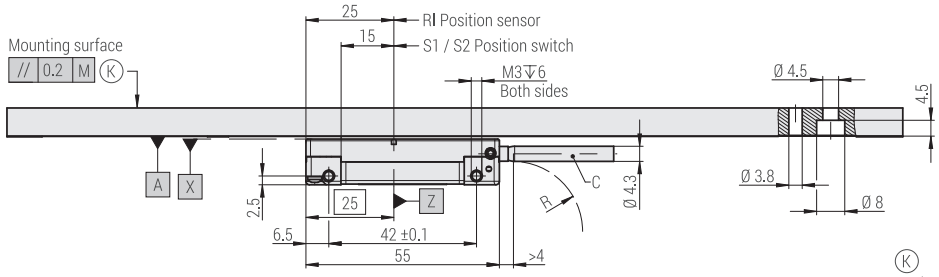


# MS 25 MA/MS

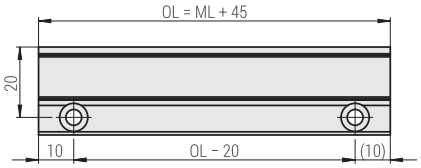
- Version MA: Steel tape scale on aluminum carrier
- Version MS: Steel tape scale on steel carrier
- Version MA, MS: Carrier bolted


Dimensions, mounting tolerances:

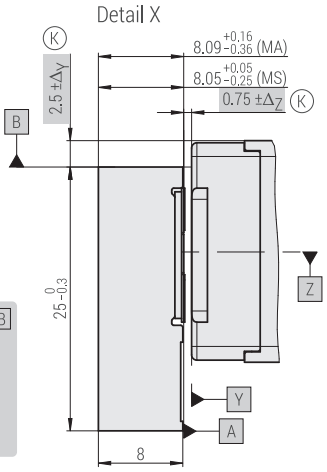



Scale carrier for measuring length < 92mm




Detail X




| | | |
|---|---|---|
| M | = | Machine guideway |
| ML | = | Measuring length |
| OL | = | Overall length |
| ◁▷ | = | 0 ... ML |
| RI | = | Selectable reference mark(s) |
| k | = | Any position of the selected reference mark from the beginning of the ML |
| j | = | Additional reference marks spaced n × 50 |
| C | = | Cable |
| K | = | Required mating dimensions |
| L | = | LED function control |
| R | = | Bendingradius: stat. R ≥8 mm, dyn. R ≥20 mm |
| RL | = | Residual length |
| S | = | Beginning of the measuring length |
| S1, S2 | = | switch signal |
| n | = | 1, 2, 3, ... |

Permissible position deviation scanning head – tape scale A B

| | | |
|---|---|---|
| $\Delta_Y$ | = | Displacement, ±0.5 mm |
| $\Delta_Z$ | = | Gap tolerance, ±0.2 mm |
| $\varphi_Z$ | = | ±1.00 mrad or ±0.06° (yaw angle) |
| $\varphi_Y$ | = | ±3.60 mrad or ±0.20° (pitch angle) |
| $\varphi_X$ | = | ±5.00 mrad or ±0.29° (roll angle) |

**Mass** (approx.)
- Version MA: 530 g/m
- Version MS: 1525 g/m

+ 21 g scanning head + 30 g/m cable

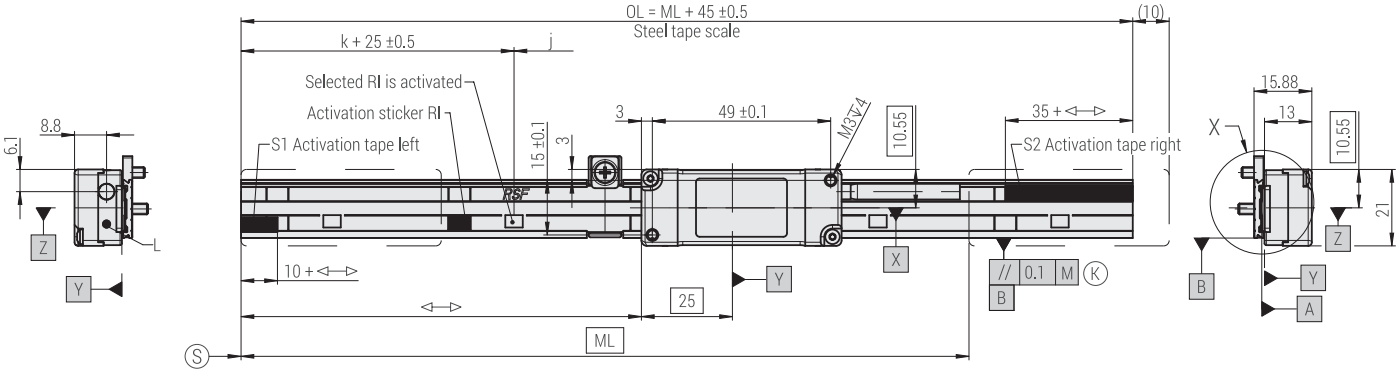
mm

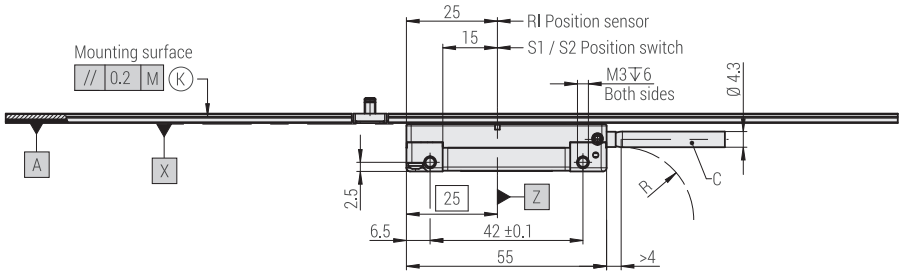
Tolerancing ISO 8015
ISO 2768:1989 - m H
< 6 mm: ±0.2 mm

# MS 25 MP

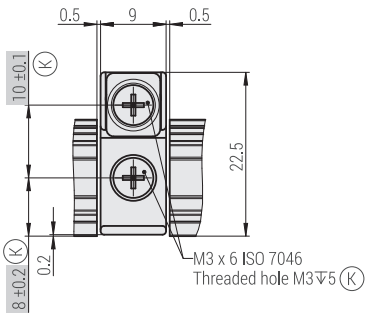
- Steel tape scale in aluminum carrier with clamping element
- Carrier with adhesive tape

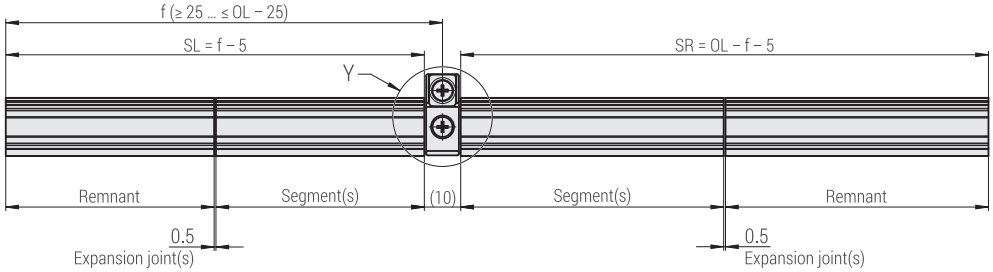

Dimensions, mounting tolerances:



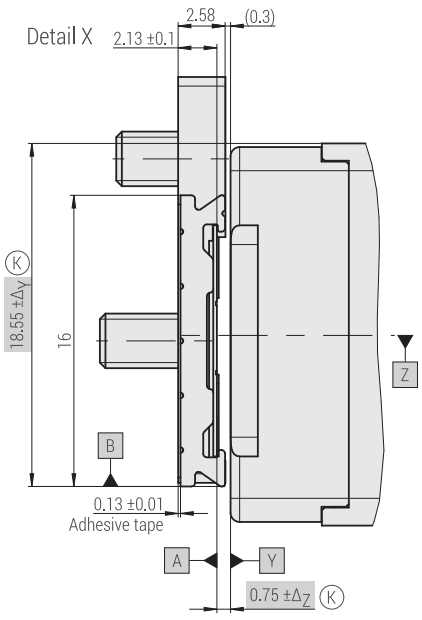




Detail Y




Detail X




M = Machine guideway
ML = Measuring length
OL = Overall length
⟷ = 0 ... ML
RI = Selectable reference mark(s)
k = Any position of the selected reference mark starting from the beginning of the ML
j = Additional reference marks spaced n × 50
f = OL/2 (standard)
Any position of the clamping element (optional)
C = Cable
K = Required mating dimensions
L = LED function control
R = Bending radius: stat. R ≥8 mm, dyn. R ≥20 mm
S = Beginning of the measuring length
S1, S2 = Switch signal
SL, SR = Segment length
n = 1, 2, 3, ...

Permissible position deviation scanning head – tape scale A B
$\Delta_Y$ = Displacement, ±0.5 mm
$\Delta_Z$ = Gap tolerance, +0.2 mm / −0.15
$\varphi_Z$ = ±1.00 mrad or ±0.06° (yaw angle)
$\varphi_Y$ = ±3.60 mrad or ±0.20° (pitch angle)
$\varphi_X$ = ±5.00 mrad or ±0.29° (roll angle)

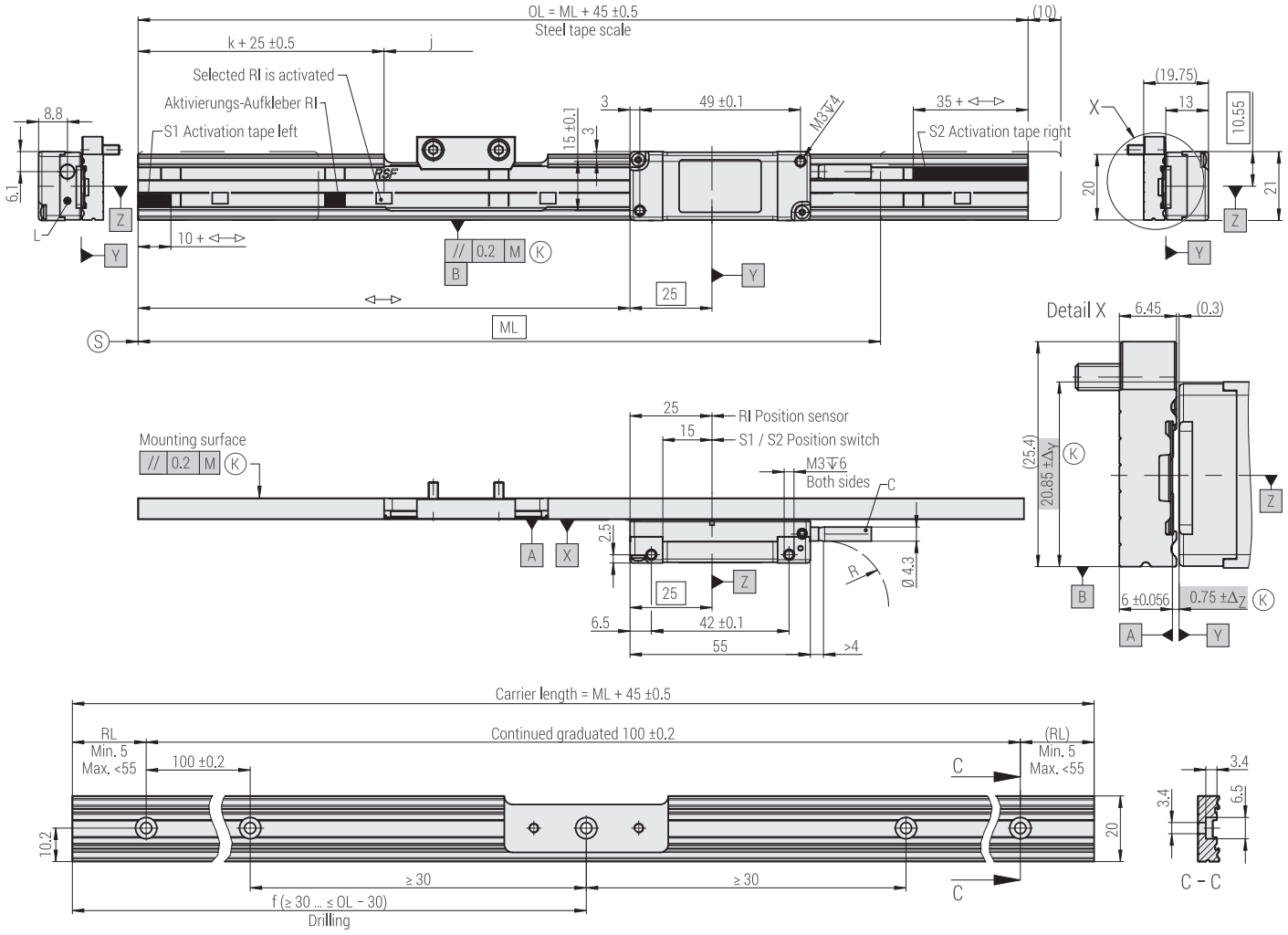
Mass (approx.)
- 90 g/m
+ 15 g clamping
+ 21 g scanning head + 30 g/m cable

mm
Tolerancing ISO 8015
ISO 2768:1989 - m H
< 6 mm: ±0.2 mm

# MS 25 MT

- Steel tape scale in aluminum carrier with clamping element
- Carrier bolted

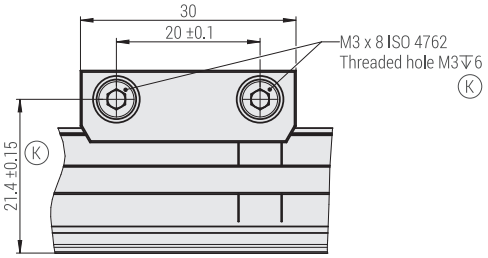

Dimensions, mounting tolerances:




| | | |
|---|---|---|
| M | = | Machine guideway |
| ML | = | Measuring length |
| OL | = | Overall length |
| ⟷ | = | 0 ... ML |
| RI | = | Selectable reference mark(s) |
| k | = | Any position of the selected reference mark starting from the beginning of the ML |
| j | = | Additional reference marks spaced n × 50 |
| f | = | Any position of the clamping element |
| C | = | Cable |
| (K) | = | Required mating dimensions |
| L | = | LED function control |
| R | = | Bending radius: stat. R ≥8 mm, dyn. R ≥20 mm |
| RL | = | Residual length |
| (S) | = | Beginning of the measuring length |
| S1, S2 | = | Switch signal |
| n | = | 1, 2, 3, ... |

Permissible position deviation scanning head – tape scale A B

| | | |
|---|---|---|
| $\Delta_Y$ | = | Displacement, ±0.5 mm |
| $\Delta_Z$ | = | Gap tolerance, +0.2 mm / −0.1 |
| $\varphi_Z$ | = | ±1.00 mrad or ±0.06° (yaw angle) |
| $\varphi_Y$ | = | ±3.60 mrad or ±0.20° (pitch angle) |
| $\varphi_X$ | = | ±5.00 mrad or ±0.29° (roll angle) |




**Mass** (approx.)
- 325 g/m

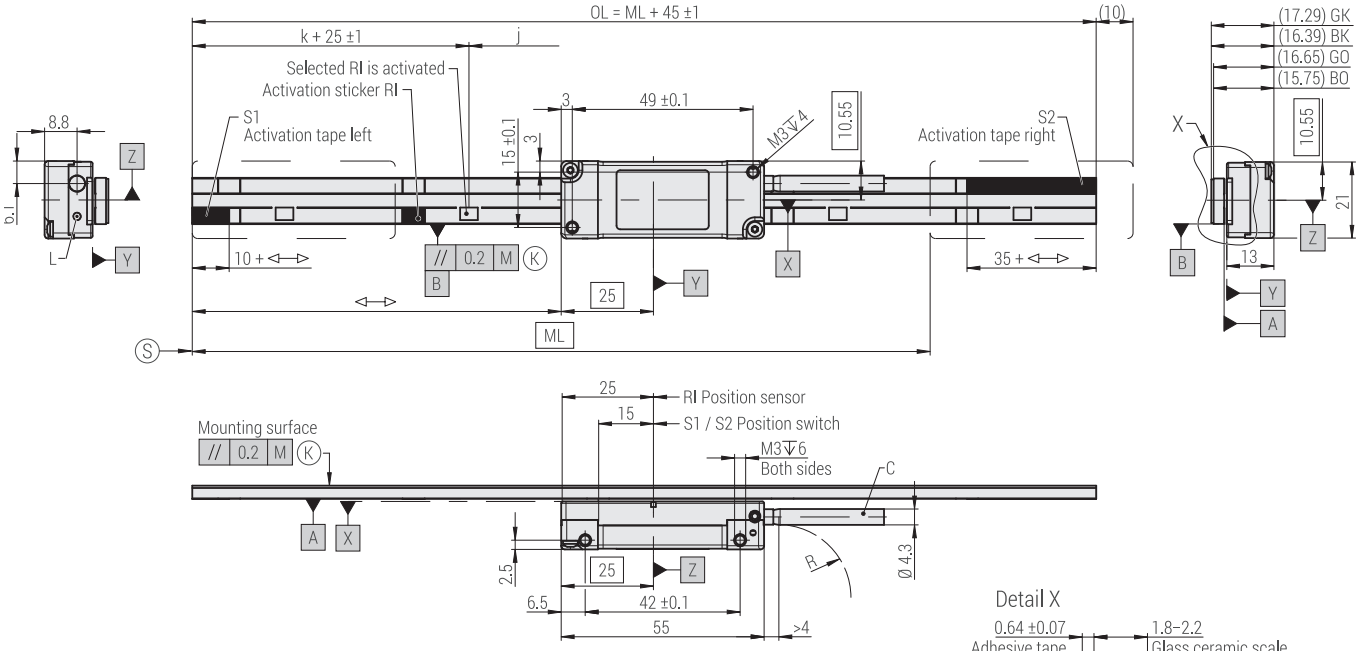
+ 30 g clamping
+ 21 g scanning head + 30 g/m cable

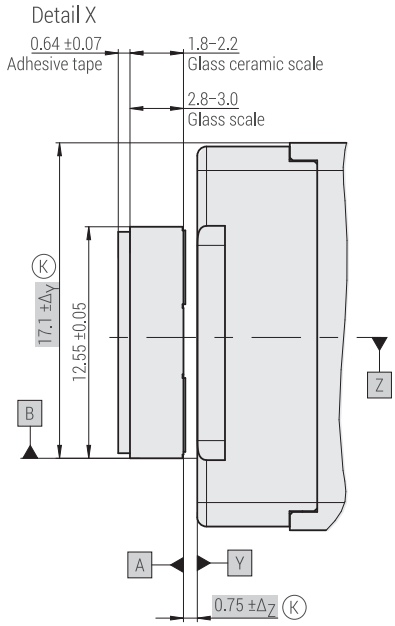
mm
Tolerancing ISO 8015
ISO 2768:1989 - m H
< 6 mm: ±0.2 mm

# MS 25 GK, BK

- Version GK: Glass scale with adhesive tape
- Version BK: Glass ceramic scale with adhesive tape


Dimensions, mounting tolerances:




M = Machine guideway
ML = Measuring length
OL = Overall length
◁—▷ = 0 ... ML
RI = Selectable reference mark(s)
k = Any position of the selected reference mark starting from the beginning of the ML
j = Additional reference marks spaced n × 50
C = Cable
Ⓚ = Required mating dimensions
L = LED function control
R = Bending radius: stat. R ≥8 mm, dyn. R ≥20 mm
Ⓢ = Beginning of the measuring length
S1, S2 = Switch signal
n = 1, 2, 3, ...

Permissible position deviation scanning head – scale A B
$\Delta_Y$ = Displacement, ±0.5 mm
$\Delta_Z$ = Gap tolerance, ±0.2 mm
$\varphi_Z$ = ±1.00 mrad or ±0.06° (yaw angle)
$\varphi_Y$ = ±3.60 mrad or ±0.20° (pitch angle)
$\varphi_X$ = ±5.00 mrad or ±0.29° (roll angle)

**Mass** (approx.)
- Version GK: 100 g/m
- Version BK: 70 g/m

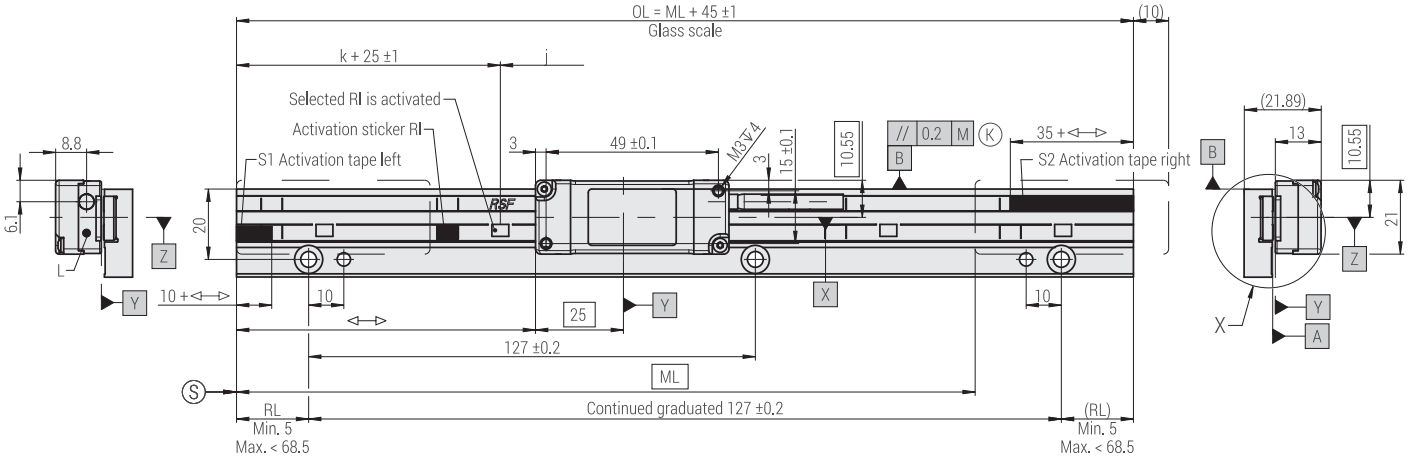
+ 21 g scanning head + 30 g/m cable

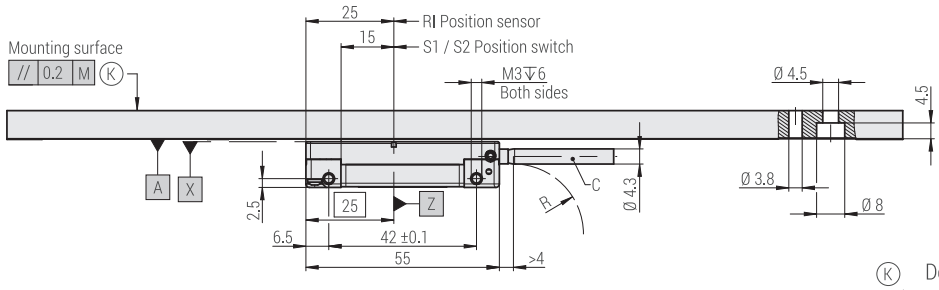
mm
Tolerancing ISO 8015
ISO 2768:1989 - m H
< 6 mm: ±0.2 mm

# MS 25 GA

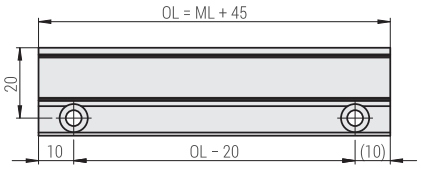
- Glass scale in aluminum carrier
- Carrier bolted

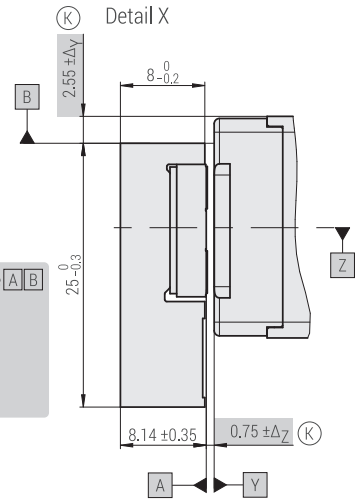

Dimensions, mounting tolerances:




Scale carrier for measuring length < 92 mm




| | | |
|---|---|---|
| M | = | Machine guideway |
| ML | = | Measuring length |
| OL | = | Overall length |
| ◁▷ | = | 0 ... ML |
| RI | = | Selectable reference mark(s) |
| k | = | Any position of the selected reference mark from the beginning of the ML |
| j | = | Additional reference marks spaced n × 50 |
| C | = | Cable |
| K | = | Required mating dimensions |
| L | = | LED function control |
| R | = | Bendingradius: stat. R ≥8 mm, dyn. R ≥20 mm |
| RL | = | Residual length |
| S | = | Beginning of the measuring length |
| S1, S2 | = | switch signal |
| n | = | 1, 2, 3, ... |

Permissible position deviation scanning head – tape scale A B

| | | |
|---|---|---|
| $\Delta_Y$ | = | Displacement, ±0.5 mm |
| $\Delta_Z$ | = | Gap tolerance, ±0.2 mm |
| $\varphi_Z$ | = | ±1.00 mrad or ±0.06° (yaw angle) |
| $\varphi_Y$ | = | ±3.60 mrad or ±0.20° (pitch angle) |
| $\varphi_X$ | = | ±5.00 mrad or ±0.29° (roll angle) |

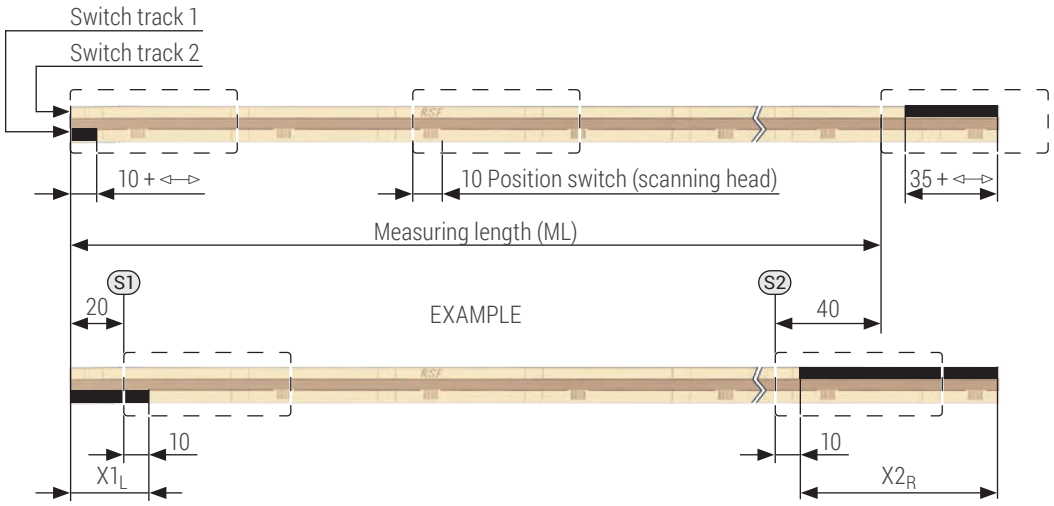
**Mass** (approx.)
- 515 g/m

+ 21 g scanning head + 30 g/m cable

mm
Tolerancing ISO 8015
ISO 2768:1989 - m H
< 6 mm: ±0.2 mm

# SWITCH TRACKS

## POSITIONING OF THE ACTIVATION TAPES

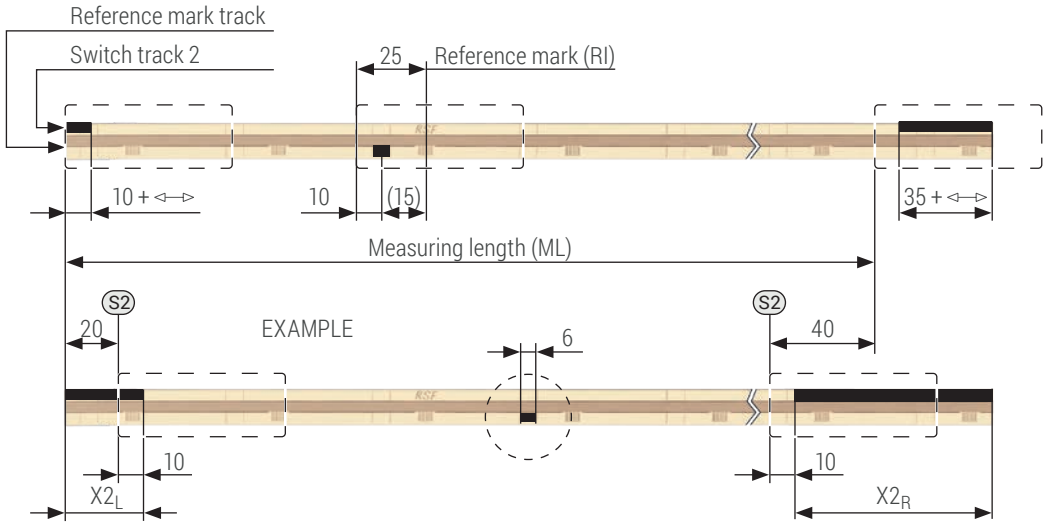



S1 = Switch point signal S1 from beginning of ML
$X1_L$ = Activation tape length
$X1_L$ = S1 + 10

S2 = Switch point signal S2 before end of ML
$X2_R$ = Activation tape length
$X2_R$ = S2 + 35

EXAMPLE
S1: 20 mm from beginning of ML → $X1_L$ = 30 mm
S2: 40 mm before end of ML → $X2_R$ = 75 mm

## REFERENCE MARK (RI)-SELECTION AND POSITIONING OF THE ACTIVATION TAPES

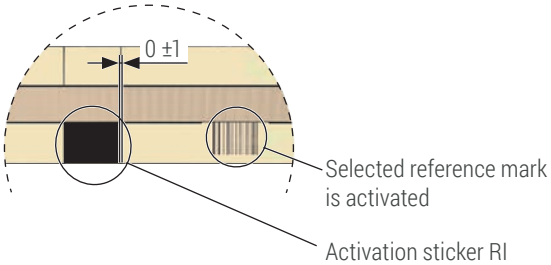



S2 = Switch point signal S1 from beginning of ML
$X2_L$ = Activation tape length
$X2_L$ = S2 + 10

S2 = Switch point signal S2 before end of ML
$X2_R$ = Activation tape length
$X2_R$ = S2 + 35

EXAMPLE
S2: 20 mm from beginning of ML → $X2_L$ = 30 mm
S2: 40 mm before end of ML → $X2_R$ = 75 mm

Within the measuring length any RI-position is possible - additional reference marks can be selected at a distance of 50 mm.



# INSPECTION OF FUNCTION

| STATUS OF LED | INFORMATION | NOTE |
|---|---|---|
| **Without external test box** | | |
| **Function-control main track** | | |
| ▪ LED displays GREEN | Counting signals very good | After successful mounting |
| ▪ LED blinks GREEN | Counting signals good | At mounting not allowed → allowed during operation |
| ▪ LED blinks RED | Counting signals out of tolerance → error | Check mounting, clean scale |
| **Function-control reference impulse RI** | | **Only by passing the reference mark** |
| ▪ LED blinks BLUE | RI within tolerance | |
| ▪ LED blinks RED | RI out of tolerance | Check mounting, clean graduation carrier |
| **With external test box** | | |
| **Function-control main track** | | |
| ▪ LED displays GREEN | Scanning head supplied with power | Evaluation of counting signals via LED not active |
| **Function-control reference impulse RI** | | **Only by passing the reference mark** |
| ▪ LED blinks BLUE | RI within tolerance | |
| ▪ LED blinks RED | RI out of tolerance | Check mounting, clean graduation carrier |

**Note!** If the scanning head passes a further reference mark within 0.5 s the information of the reference mark will not be stated by the function control. Thus the information of the incremental signals will also be displayed at high traversing speed and/or many active reference marks.

# EXTERNAL TESTING DEVICE PWT 101

Even though the MS 25 linear encoders allow large mechanical mounting tolerances, it is recommended to control the function of counting signals and reference impulse.

The signals can be controlled directly via the integrated LED function control or connected to an oscilloscope and checked for conformity with signal specifications. The last mentioned method requires some effort.

The PWT 101 is a testing device for checking the function and adjustment of RSF Elektronik encoders. At encoders with pin assignment according to RSF standard (compare page 05) the pinout adapter PA2 must be used additionally. At alternative pin assignments other pinout adapters could be necessary.

Thanks to its compact dimensions and robust design, the PWT 101 is ideal for mobile use. A 4.3-inch touchscreen provides for display and operation.

## Available functions

The performance range of the PWT 101 can be expanded by firmware update. Appropriate firmware files that can be imported to the PWT 101 through a memory card (not included in delivery) will be made available at www.heidenhain.de.

# FURTHER PRODUCTS

## MCR 15 | MCS 15

***Absolute modular angle encoders with small dimensions***

- Diverse serial interfaces
- Status display directly at the scanning head via LED function
- Easy mounting as a result of large mounting tolerances
- High insensitivity against contaminations
- Possible drum diameter (TTR): 50.00 mm to 350.23 mm (outside)
- Possible scanning diameter (MBR): 59.93 mm to 350.23 mm (outside)
- Possible scanning diameter (MCS): from Ø 75 mm

## MSR 15 | MSS 15

***Incremental modular angle encoders with small dimensions***

- Quality of the scanning signals is directly visible at the scanning head via a tricolored LED function
- Easy mounting as a result of large mounting tolerances
- High insensitivity against contaminations
- Possible drum diameter (TTR): 50.00 mm to 350.23 mm (outside)
- Possible scanning diameter (MBR): 59.93 mm to 350.23 mm (outside)
- Possible scanning diameter (MSS): from Ø 75 mm

## MSR 45

***Modular angle encoders with steel tape scale - various versions***

- Full-circle or segment version
- Grating period: 200 µm
- Accuracy of the grating (stretched): ±30 µm/m
- High permissible rotational speed resp. circumferential speed
- Integrated subdividing: up to times 100
- Possible diameter: Full-circle from Ø 146.99 mm Segment from Ø 150 mm

## MC 15

***Absolute linear encoders with status display***

- Divers serial interfaces
- Status display directly at the scanning head via LED function
- Easy mounting as a result of large mounting tolerances
- High insensitivity against contaminations
- Max. measuring length Steel tape scale: 10 000 mm

## MS 15

***Exposed linear encoder with integrated mounting control***

- Easy mounting; no test box or oscilloscope needed
- Quality of the scanning signals is directly visible at the scanning head via a tricolored LED function
- Two independent switch tracks for individual special functions
- Position of reference mark selectable by customer
- High insensitivity against contamination
- High traversing speed
- Integrated subdividing: up to times 100
- Max. measuring length: steel tape scale: 20 000 mm

## MS 45

***Exposed scanning linear encoders with integrated mounting control***

- Easy mounting; no test box or oscilloscope needed
- Quality of the scanning signals is directly visible at the scanning head via a tricolored LED function
- Flat dimensions
- Easy mounting due to large mounting tolerances
- High insensitivity against contamination
- High permissible traversing speed
- Integrated subdividing: up to times 100
- Max. measuring length: Steel tape scale: 30 000 mm

# DISTRIBUTION CONTACTS

| | | | | |
|---|---|---|---|---|
| AUSTRIA<br>*Corporate Head Quarters* | **RSF Elektronik Ges.m.b.H.** | A-5121 Tarsdorf 93 | ☎ +43 62 78 81 92-0<br>FAX +43 62 78 81 92-79 | e-mail: info@rsf.at<br>internet: www.rsf.at |
| BELGIUM | **HEIDENHAIN NV/SA** | Pamelse Klei 47<br>1760 Roosdaal | ☎ +32 (54) 34 3158<br>FAX +32 (54) 34 3173 | e-mail: sales@heidenhain.be<br>internet: www.heidenhain.be |
| FRANCE | **HEIDENHAIN FRANCE sarl** | 2 Avenue de la Christallerie<br>92310 Sèvres | ☎ +33 1 41 14 30 00<br>FAX +33 1 41 14 30 30 | e-mail: info@heidenhain.fr<br>internet: www.heidenhain.fr |
| GREAT BRITAIN | **HEIDENHAIN (GB) Ltd.** | 200 London Road<br>Burgess Hill<br>West Sussex RH15 9RD | ☎ +44 1444 247711<br>FAX +44 1444 870024 | e-mail: sales@heidenhain.co.uk<br>internet: www.heidenhain.co.uk |
| ITALY | **HEIDENHAIN ITALIANA S.r.l.** | Via Asiago, 14<br>20128 Milan | ☎ +39 02 27075-1<br>FAX +39 02 27075-210 | e-mail: info@heidenhain.it<br>internet: www.heidenhain.it |
| NETHERLANDS | **HEIDENHAIN NEDERLAND B.V.** | Copernicuslaan 34<br>6716 BM EDE | ☎ +31 318-581800<br>FAX +31 318-581870 | e-mail: verkoop@heidenhain.nl<br>internet: www.heidenhain.nl |
| SPAIN | **FARRESA ELECTRONICA S.A** | Les Corts 36-38<br>08028 Barcelona | ☎ +34 93 4 092 491<br>FAX + 34 93 3 395 117 | e-mail: farresa@farresa.es<br>internet: www.farresa.es |
| SWEDEN | **HEIDENHAIN Scandinavia AB** | Storsätragränd 5<br>SE-12739 Skärholmen | ☎ +46 8 531 933 50<br>FAX +46 8 531 933 77 | e-mail: sales@heidenhain.se<br>internet: www.heidenhain.se |
| SWITZERLAND | **HEIDENHAIN (SCHWEIZ) AG** | Vieristrasse 14<br>8603 Schwerzenbach | ☎ +41 44 806 27 27<br>FAX +41 44 806 27 28 | e-mail: verkauf@heidenhain.ch<br>internet: www.heidenhain.ch |
| CHINA | **DR. JOHANNES HEIDENHAIN (CHINA) Co., Ltd** | Tian Wei San Jie, Area A,<br>Beijing Tianzhu Airport Industrial Zone<br>Shunyi District, Beijing 101312 | ☎ +86 10 80 42-0000 | e-mail: sales@heidenhain.com.cn<br>internet: www.heidenhain.com.cn |
| ISRAEL | **MEDITAL Hi-Tech** | 36 Shacham St., P.O.Box 7772<br>4951729 Petach Tikva | ☎ +972 0 3 923 33 23<br>FAX +972 0 3 923 16 66 | e-mail: avi@medital.co.il<br>internet: www.medital.co.il |
| JAPAN | **HEIDENHAIN K.K.** | Hulic Kojimachi Bldg.,<br>9F 3-2 Kojimachi, Chiyoda-ku<br>Tokyo, 102-0083 | ☎ +81 3 3234 7781<br>FAX +81 3 3262 2539 | e-mail: sales@heidenhain.co.jp<br>internet: www.heidenhain.co.jp |
| KOREA | **HEIDENHAIN LTD.** | 75, Jeonpa-ro 24beon-gil,<br>Manan-gu, Anyang-si<br>14087 Gyeonggi-do | ☎ +82 31 380 5200<br>FAX +82 31 380 5250 | e-mail: info@heidenhain.co.kr<br>internet: www.rsf.co.kr |
| SINGAPORE | **HEIDENHAIN PACIFIC PTE LTD.** | 51, Ubi Crescent<br>408593 Singapore | ☎ +65 67 49 32 38<br>FAX +65 67 49 39 22 | e-mail: info@heidenhain.com.sg<br>internet: www.heidenhain.com.sg |
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| USA | **HEIDENHAIN CORPORATION** | 333 East State Parkway<br>Schaumburg, IL 60173-5337 | ☎ +1 847 490 11 91 | e-mail: info@heidenhain.com<br>internet: www.heidenhain.com |

Date 06/2024 ■ Art.Nr.1076479-04 ■ Dok.Nr. D1076479-05-B-01 ■ Technical adjustments in reserve!