RSF Elektronik

Technik, die zählt
Technology that counts

Digital Readout Systems

Improve the productivity and accuracy
of manually operated machines.

RSF Elektronik Ges.m.b.H.

RSF Elektronik was founded 1973 in St. Georgen near Salzburg, Austria.

From the beginning, the objective was to develop and produce Linear and Rotary Encoders and Digital Readouts. Our products were well accepted in the market, and after some years, the company employed more than 100 people.

Due to growth, it was then necessary for RSF Elektronik to move into larger facilities. The company moved in 1978 to our current location. Today, the largest percentage of our shipments are Incremental Linear Encoders.

To guarantee the best possible support, we have regional offices in the USA, China, Singapore, Southkorea, Switzerland and Slovenia.
We also have distributors in nearly every industrialized country in the world.

One of the main internal elements of opto-electronic measuring systems are high precision divisions on glass and/or steel carriers.
Under the trade name “SENTOP”, RSF Elektronik manufactures Precision Graduations in thin layer technology.
2002 a new production plant has been equipped to the latest international standards what the todays technique in clean room conditions fulfiles.

Our quality, performance and environment management comply with DIN EN ISO 9001 and DIN EN ISO 14001 standards.

Improve accuracy and productivity by using a RSF Digital Readout and Linear Encoders

In a competitive market, using the latest technology to improve your productivity is essential. Adding a Digital Readout and Linear Encoders is one of the best ways to make a machine tool more profitable.

The productivity and value of your machine tool will be increase when using an RSF Elektronik Digital Readout and Linear Encoders.

Regardless of the machine tool, old or new, standard or special use,
RSF Elektronik has the Digital Readout and Linear Encoders for your machine and application.

Advantages of using a Digital Readout and Linear Encoders from RSF Elektronik

- Digital Readouts from RSF Elektronik can be mounted quickly and easily to your machine tool. Installation is simple using available mounting hardware.
- The Digital Readout displays the exact tool position at all times. No longer does the machine operator need to count handwheel turns or keep track of the dial position.
- Linear Encoders from RSF Elektronik measure the machine travel directly at the machine guideway. Lead screw error and backlash have no influence on the measuring accuracy.
- If your have questions during the Digital Readout or Linear Encoder installation, do not hesitate to contact our company or nearest RSF agent.

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The Digital Readout System

A complete Digital Readout system

The system consists of one or more Linear Encoders, commonly referred to as scales, and a Digital Readout. The Linear Encoder monitors the machine travel and the Digital Readout (sometimes called a DRO) displays the distance moved or machine table position to the operator.

RSF Elektronik Linear Encoders

A Linear Encoder consists of two components:
1. the scale (extrusion/glass combination) and
2. the scanning head (reader head).

The scale unit consists of a high accuracy graduation pattern printed on glass spar. A metal extrusion holds and protects the glass. Special shaped rubber sealing lips in the extrusion keep out coolants and contamination. The scanning head has a dual guided carriage to maintain alignment with the glass scale. The design of the scanning head carriage allows for a large mounting tolerance without affecting the accuracy of the scale. The glass scale is opto-electrically scanned using LEDs, photodiodes and a reticle.

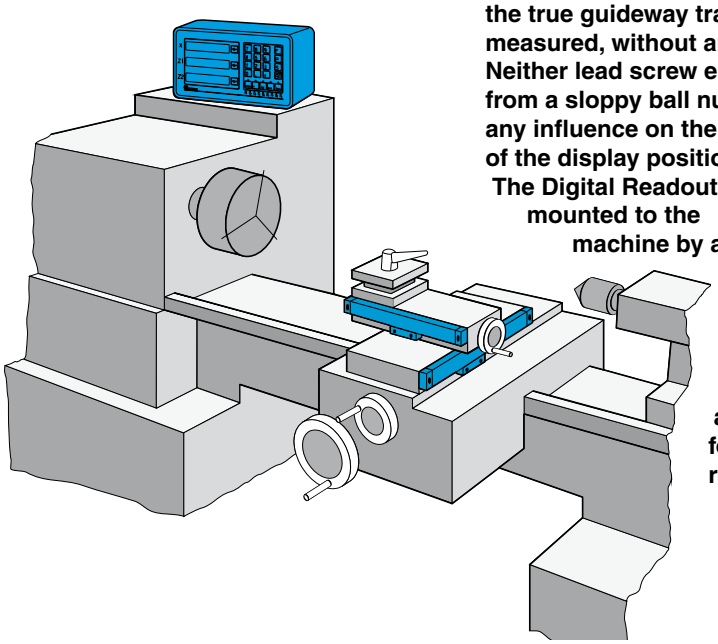
RSF Elektronik Digital Readouts

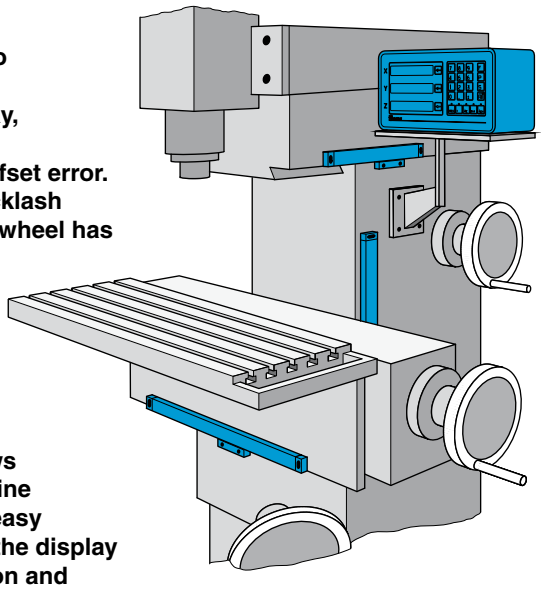
The opto-electronics in the Linear Encoder scanning head convert distance movement into quadrature square wave signals. These signals are transmitted to the Digital Readout, which in turn displays the distance moved or table position. Linear Encoders from RSF have Reference Index marks.

The Reference Index mark are a very useful feature if the Digital Readout loses power or if power is turned off. Linear Encoders from RSF Elektronik are available with distance coded reference marks (**K**): after travelling 20 mm the absolute position will be recalled on the display.

Mounting a Digital Readout system on your machine?

To get the best accuracy, a Linear Encoder should be mounted as near as possible to the machine guideway. When mounted by the guideway, the true guideway travel is measured, without an ABBE offset error. Neither lead screw error or backlash from a sloppy ball nut or hand wheel has any influence on the accuracy of the display position. The Digital Readout is mounted to the machine by a support arm/tray. This allows the machine operator easy access to the display for operation and reading the display.





The advantage of a Digital Readout System

Advantages of a Digital Readout System

- In the past, the oprator of a machine tool without a Digital Readout had to concentrate on reading and keeping track of the handwheel vernier dial. After a brief review of the Digital Readout operations manual, you will immediately work faster with better accuracy. Scrapped and rejected parts will be reduced.
- The display shows the position in clear and bright digits.
- Digital Readouts from RSF Elektronik have more features than just displaying position. Refer to the specific models for a listing of the features.
- The RSF Digital Readout has a waterproof keypad and a rugged metal housing to insure error free operation under harsh workshop conditions.

Profitting from a RSF Elektronik Digital Readout System

- **Minimize your work time at the machine**
- **Reduce the scrap rate and save material**
- **Increase the accuracy and productivity of the machine.**
- **Decrease the time to move to the next position, as much as 63%.**
- **Investment pay back within the first three to four months.**

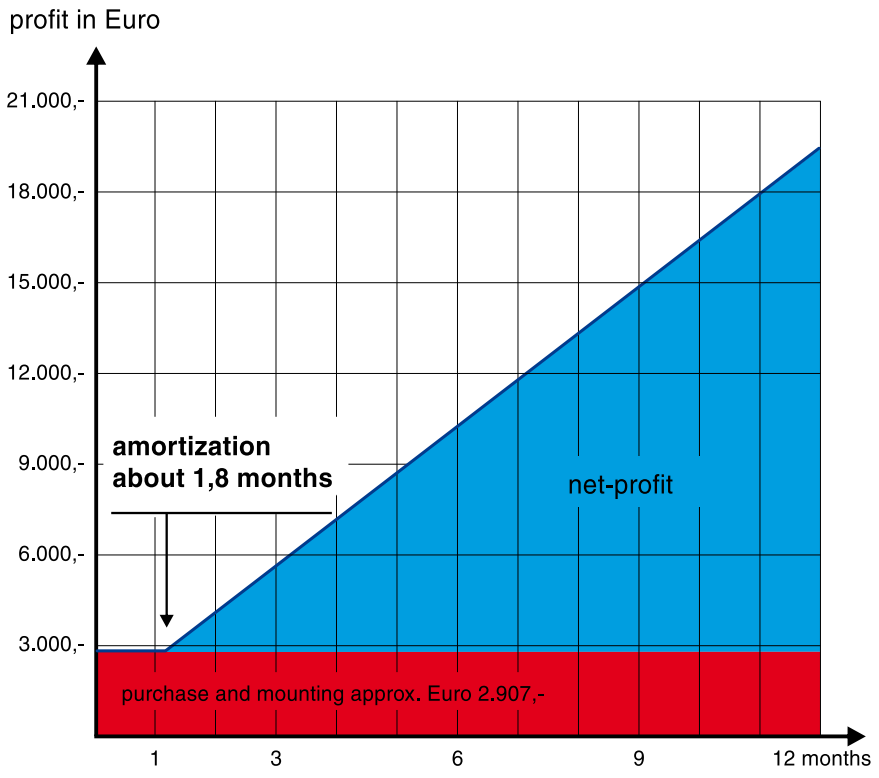
Example: A milling machine with table travel of 700 x 400 x 450 mm
The purchase and the mounting of the digital readout costs about Euro 2.907,-
Profit and production increasing min. 20%
Working time 135 h/month
Machine costs per hour Euro 60,-

Economies from machine changes:

$$\frac{20\%}{100\%} \times \frac{\text{Euro } 60,-}{\text{h}} \times \frac{135\ \text{h}}{\text{month}} = \text{Euro } 1.620,-/\text{month}$$

Amortization:

$$\frac{\text{Euro } 2.907,-}{\text{Euro } 1.620,-/\text{month}} = 1{,}8 \text{ months}$$

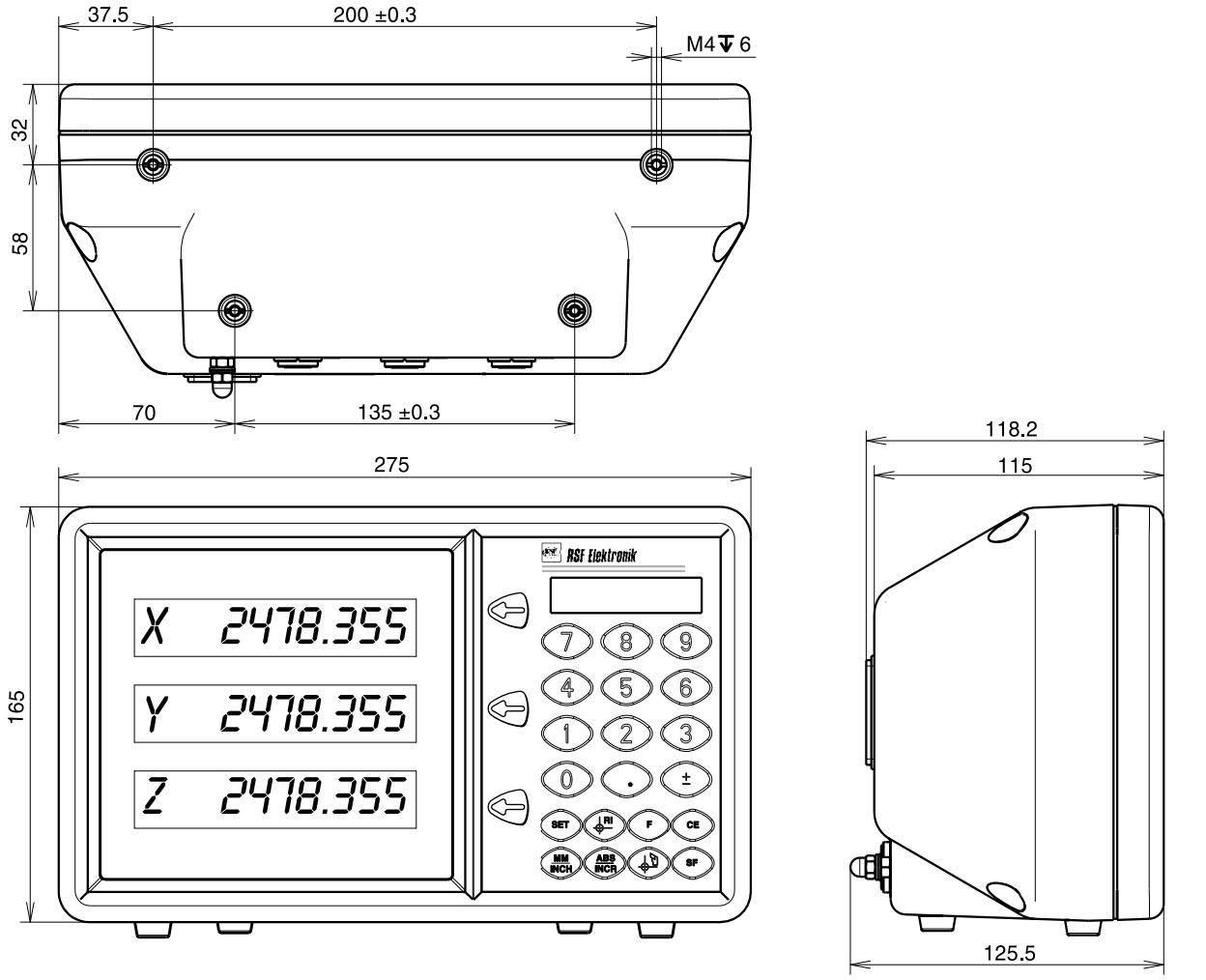


Digital Readouts

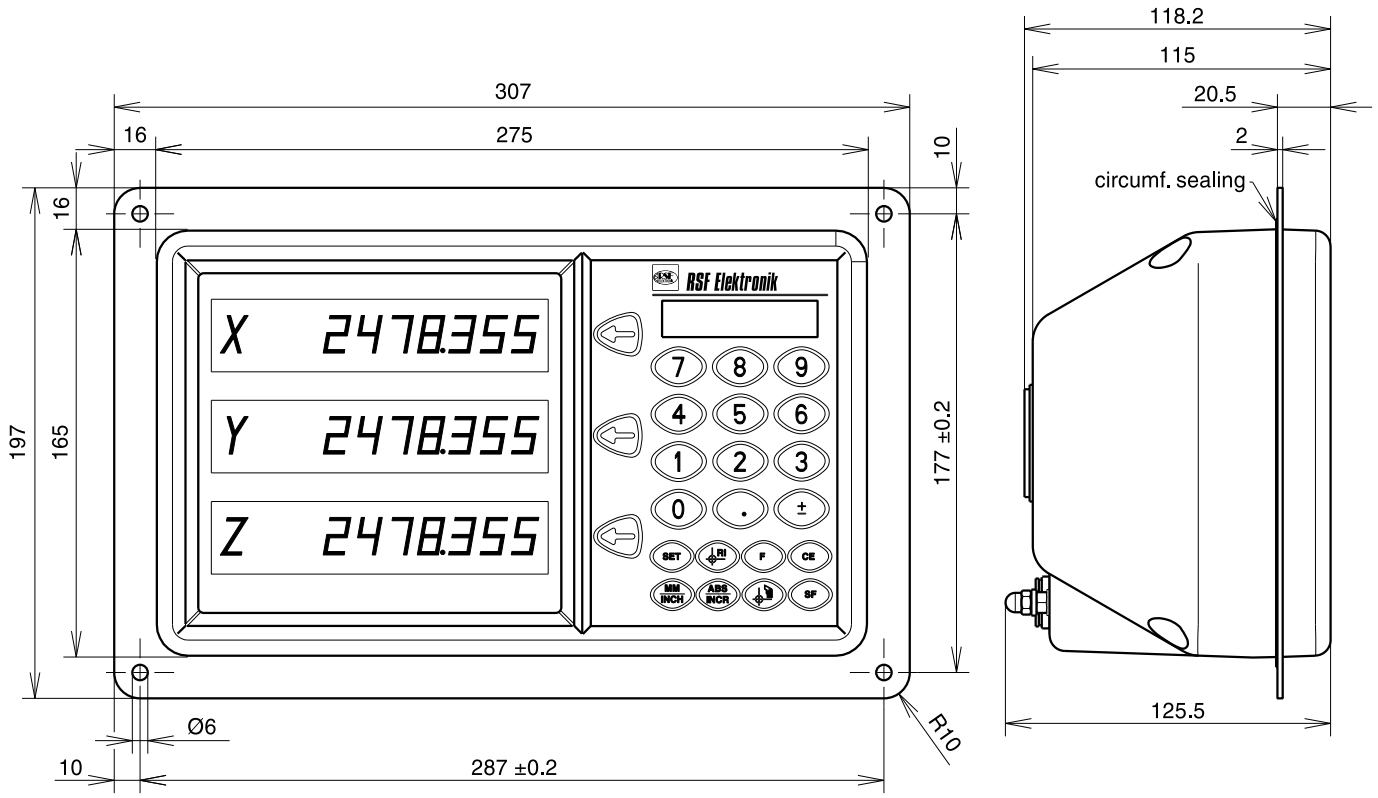
Z 710, Z 720, Z 730, Z 715, Z 725, Z 735

RSF Digital Readouts are easy to use. To speed and simplify the referencing procedure, distance coded Reference marks are available. With this feature, the absolute position will be shown on the display after travelling 20 mm. (Features and technical data Page 8 and 9).

Dimensions Z 710, Z 720, Z 730 and Z 715, Z 725, Z 735:



Dimensions 735 P in-built version:



Digital Readouts

Features:	Z 710	Z 720	Z 730	Z 715	Z 725	Z 735 Z 735E (1 Z 735S (2
number of axis	1	2	3	1	2	3
programming of system parameters		●			●	
selectable axis name		●			●	
switchable for use on a lathe or milling machine		●			●	
Software setup for fixing resolution, measuring step and counting direction		●			●	
function to delete a parameter		●			●	
Reset- and Preset input (Reset of the displays by pressing one button)		●			●	
addition/subtraction of the display value with the keyboard		●			●	
bolt hole pattern, graduated circle function, rectangular drilling pattern		●			●	
Reference mark evaluation (quasi-absolut)		●			●	
Hardware test and display test		●			●	
99 tool corrections (lathe mode)					●	
99 datum points (milling mode)					●	
store values for axis display		●			●	
absolute/incremental		●			●	
mm/inch conversion		●			●	
centering (divide by 2)		●			●	
radius/diameter		●			●	
each axis is adjustable for Rotary or Linear Encoder input. Rotary Encoder input will be displaying lines/revolution and decimal degrees.					●	
linear error correction programmable (4 point. correction)		●			●	
notlinear axes-error correction					●	(100 corr. points)
summing for two axis (Z + Z1)		●			●	
display for approximation to zero point		●			●	
feed display					●	
axes movements with displayed remaining travel way					●	

Features:	Z 710	Z 720	Z 730	Z 715	Z 725	Z 735 Z 735E Z 735S(1
inbuilt stop-watch					●	(2
taper function					●	
display of spindle speed					●	
skew compensation					●	
Bi-directional RS 232 interface to connect a printer or a personal computer (control system with extern commands) Baudrate and data format are adjustable via software					○	
8 free programmable switch off and pre-switch off points with relay output, programming to a 0,1 sec. short signal or a direction signal					○	
analog output					○	
edge probe input					○	
external Reset for each axis					○	
external input					○	
output for constant surface speed					○	
special display for spark erosion					○	
compensation for grinding wheels					○	

● = standard
○ = optional with the additional price

(1 = DRO for spark erosion machines
(2 = DRO for surface grinders

Technical data:

Power supply:
85-276 VAC (48-62 Hz)
switching power supply

Power consumption:
20 VA (3 axes)

Display: 8 digits plus sign and one digit for axis display
Monitor display:
10 digit alphanumeric display

Color of display: standard green
Height of display: 14,5 mm

Overlay: Polyester, scratchless and resistent against cooling and lubercating fluids. Audible feedback.

Resolution: selectable
(depending on the Linear Encoder)

Input: square wave signals +5 V

Permissible input frequency: 1 MHz

Permissible temperature:
0°C to +45°C (operation)
-20°C to +70°C (storage)

Environmental sealing DIN 40050:
IP 53

MSA 650 Technical data

- max. measuring length 1740 mm
- small cross-section
- mounting holes on the extrusion ends; and one center mounting hole provides a more rigid mount for longer measuring lengths
- distance coded Reference marks (**K**)

Scale model	System resolution	Accuracy grades *	Grating pitch *	Max. velocity continuous	Max. velocity momentary
• **Square wave signals with integrated Subdividing Electronics**					
MSA 650.24	10 µm	±10 µm/m	40 µm	1 m/s	2 m/s
MSA 650.23	5 µm	±5, ±10 µm/m	20 µm	1 m/s	2 m/s
MSA 650.64	2 µm	±5, ±10 µm/m	40 µm	1 m/s	2 m/s
MSA 650.63	1 µm	±5, ±10 µm/m	20 µm	1 m/s	1 m/s
MSA 650.73	0.5 µm	±5, ±10 µm/m	20 µm	1 m/s	1 m/s

* **Other accuracy grades or grating pitches (e.g. Inch) on request**

Standard measuring lengths: (mm)
170, 220, 270, 320, 370, 420, 470, 520, 620, 720, 770, 820, 920, 1040, 1140, 1240, 1340, 1440, 1540, 1640, 1740,

Measuring type: glass scale

Reference mark (RI): selectable
MSA 650.xx **K:**
Distance coded Reference marks (**K**): after travelling 20 mm the absolute position will shown on the display.

MSA 650.xx:
Up to measuring length 920 mm one Reference mark in the middle of the measuring length or 35 mm from both ends of measuring length, measuring length 1040 mm and longer, 45 mm from both ends of measuring length.

Option:
One Reference mark at any location, or two or more RI's separated by distances of n x 50 mm

Required moving force:
with standard sealing lips < 3 N
with low drag sealing lips < 0.2 N

Environmental sealing DIN 40050:
IP 53 (with standard sealing lips)

Permissible temperature:
-20°C to +70°C (storage), 0°C to +50°C (operation)

Weight (approx.)
0.8 kg/m (scale spar) + 0.3 kg (scanning head with 3 m cable)

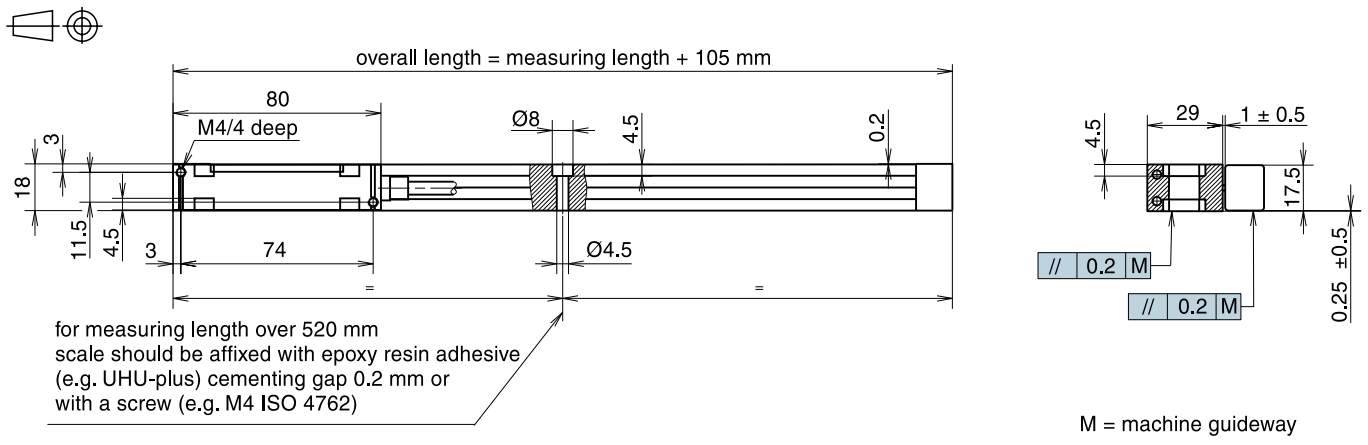
Signal-outputs(optional)

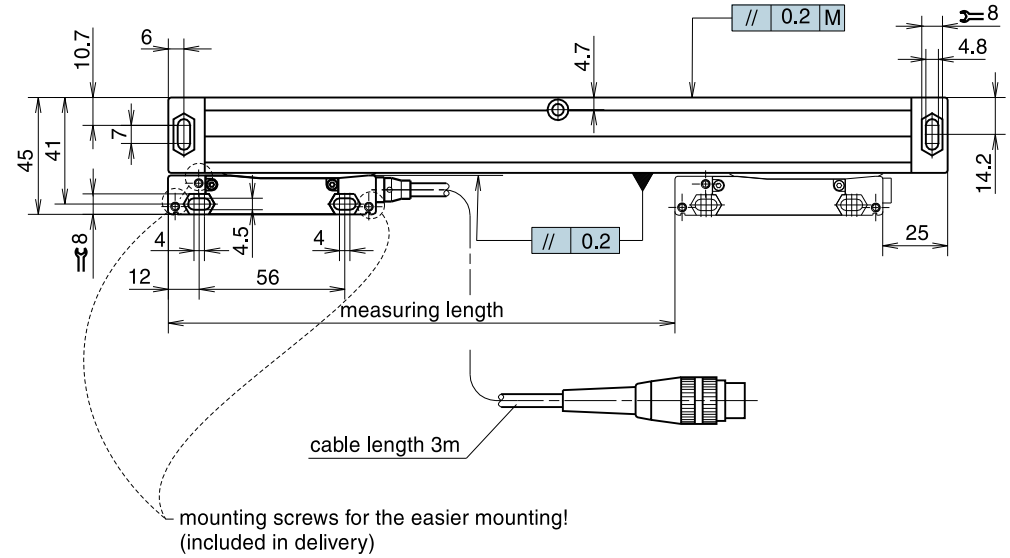
- **square wave signals** (single ended)
  with integrated Subdividing Electronics

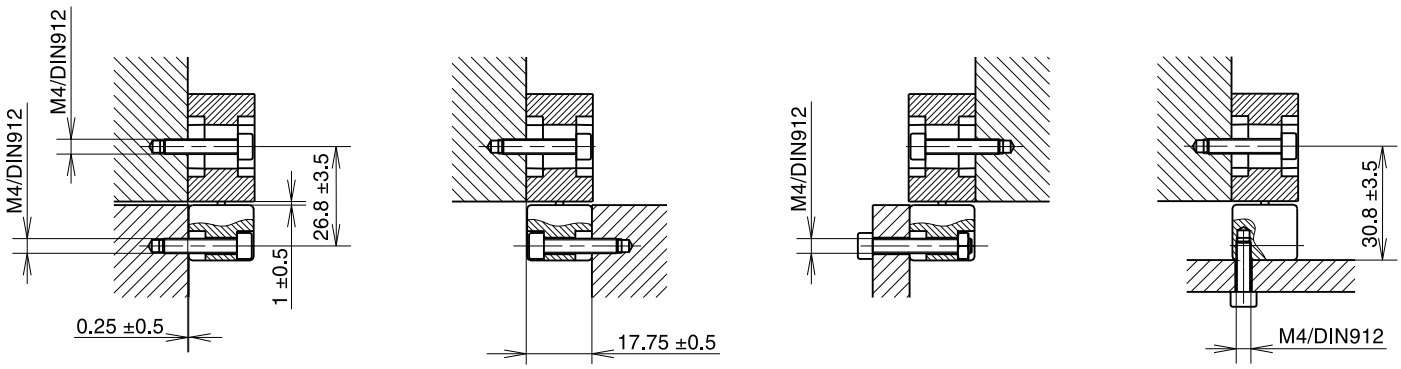
- **square wave signals** (differential)
  via Line Driver RS 422 standard
  with integrated Sudividing Electronics
  MSA 650.23 = times1
  MSA 650.24 = times1
  MSA 650.63 = times5
  MSA 650.64 = times5
  MSA 650.73 = times10

Power supply:
+5 V ±5%, < 150 mA (without interpolation, unloaded)
< 200 mA (with interpolation, unloaded)

MSA 650 Dimensions - Mounting tolerances - Mounting possibilities:







MSA 651 Technical data

- max. measuring length 2240 mm
- small cross-section
- mounting holes on top of the extrusion improves vibration rating
- distance coded Reference marks (**K**)

Scale model	System resolution	Accuracy grades *	Grating pitch *	Max. velocity continuous	Max. velocity momentary
• **Square wave signals with integrated Subdividing Electronics**					
MSA 651.24	10 µm	±10 µm/m	40 µm	1 m/s	2 m/s
MSA 651.23	5 µm	±5, ±10 µm/m	20 µm	1 m/s	2 m/
MSA 651.64	2 µm	±5, ±10 µm/m	40 µm	1 m/s	2 m/s
MSA 651.63	1 µm	±5, ±10 µm/m	20 µm	1 m/s	1 m/s
MSA 651.73	0.5 µm	±5, ±10 µm/m	20 µm	1 m/s	1 m/s

* **Other accuracy grades or grating pitches (e.g. Inch) on request**

Standard measuring lengths: (mm)
170, 220, 270, 320, 370, 420, 470, 520, 620, 720, 770, 820, 920, 1040, 1140, 1240, 1340, 1440, 1540, 1640, 1740, 1840, 2040, 2240

Measuring type: glass scale

Reference mark (RI): selectable
MSA 651.xx **K:**
Distance coded Reference marks (**K**): after travelling 20 mm the absolute position will shown on the display.

MSA 651.xx:
Up to measuring length 920 mm one Reference mark in the middle of the measuring length or 35 mm from both ends of measuring length, measuring length 1040 mm and longer, 45 mm from both ends of measuring length.

Option:
One Reference mark at any location, or two or more RI's separated by distances of n x 50 mm

Required moving force:
with standard sealing lips < 3 N
with low drag sealing lips < 0.2 N

Environmental sealing DIN 40050:
IP 53 (with standard sealing lips)

Permissible temperature:
-20°C to +70°C (storage), 0°C to +50°C (operation)

Weight (approx.)
0.8 kg/m (scale spar) + 0.3 kg (scanning head with 3 m cable)

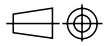
Signal-outputs(optional)

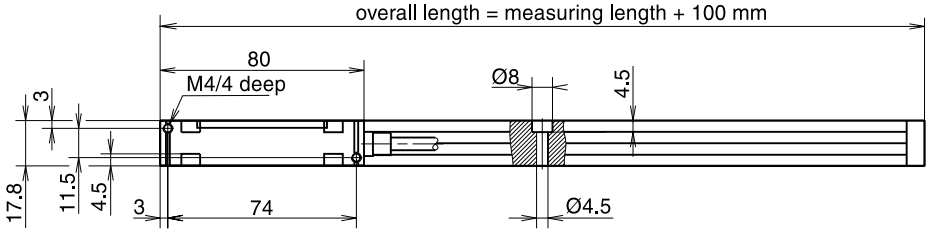
- **square wave signals** (single ended)
  with integrated Subdividing Electronics

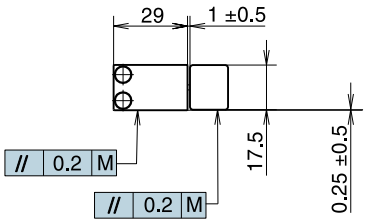
- **square wave signals** (differential)
  via Line Driver RS 422 standard
  with integrated Sudividing Electronics
  MSA 651.23 = times1
  MSA 651.24 = times1
  MSA 651.63 = times5
  MSA 651.64 = times5
  MSA 651.73 = times10

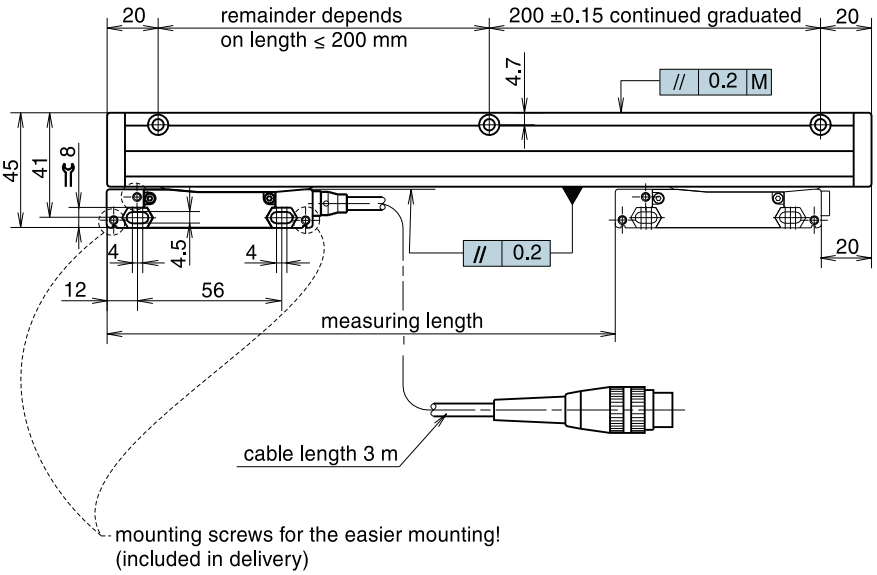
Power supply:
+5 V ±5%, < 150 mA (without interpolation, unloaded)
< 200 mA (with interpolation, unloaded)

MSA 651 Dimensions - Mounting tolerances - Mounting possibilities:

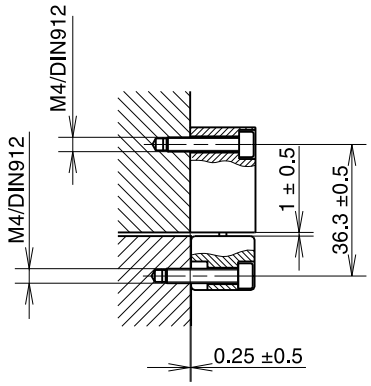


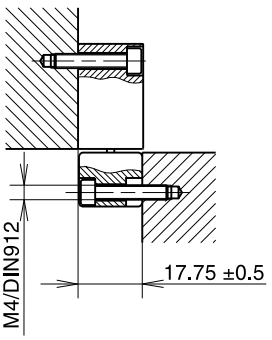


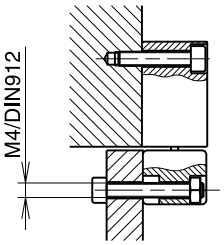


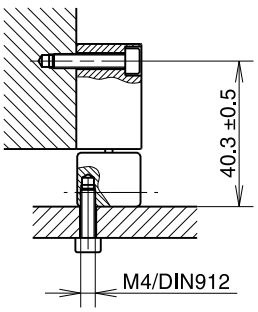


M = machine guideway









MSA 350 Technical data

- max. measuring length 3040 mm
- rigid mounting
- large cross-section
- mounting holes on the extrusion ends and with mounting supports
- distance coded Reference marks (**K**)

Scale model	System resolution	Accuracy grades *	Grating pitch *	Max. velocity continuous	Max. velocity momentary
• **Square wave signals with integrated Subdividing Electronics**					
MSA 350.24	10 µm	±10 µm/m	40 µm	1 m/s	2 m/s
MSA 350.23	5 µm	±5, ±10 µm/m	20 µm	1 m/s	2 m/s
MSA 350.64	2 µm	±5, ±10 µm/m	40 µm	1 m/s	2 m/s
MSA 350.63	1 µm	±5, ±10 µm/m	20 µm	1 m/s	1 m/s
MSA 350.73	0.5 µm	±5, ±10 µm/m	20 µm	1 m/s	1 m/s

* **Other accuracy grades or grating pitches (e.g. Inch) on request**

Standard measuring lengths: (mm)
170, 220, 270, 320, 370, 420, 470, 520, 620, 720, 770, 820, 920, 1040, 1140, 1240, 1340, 1440, 1540, 1640, 1740, 1840, 2040, 2240 2440, 2640, 2840, 3040

Measuring type: glass scale

Reference mark (RI): selectable
MSA 350.xx **K:**
Distance coded Reference marks (**K**): after travelling 20 mm
the absolute position will shown on the display.

MSA 350.xx:
Up to measuring length 920 mm one Reference mark in the middle of the measuring length or 35 mm from both ends of measuring length,
measuring length 1040 mm and longer,
45 mm from both ends of measuring length.

Option:
One Reference mark at any location, or two or more RI's separated by distances of n x 50 mm

Required moving force:
with standard sealing lips < 3 N
with low drag sealing lips < 0.2 N

Environmental sealing DIN 40050:
IP 53 (with standard sealing lips)
IP 64 with DA300

Permissible temperature:
-20°C to +70°C (storage), 0°C to +50°C (operation)

Weight (approx.)
3 kg/m (scale spar) + 0.4 kg (scanning head with 3 m cable)

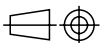
Signal-outputs(optional)

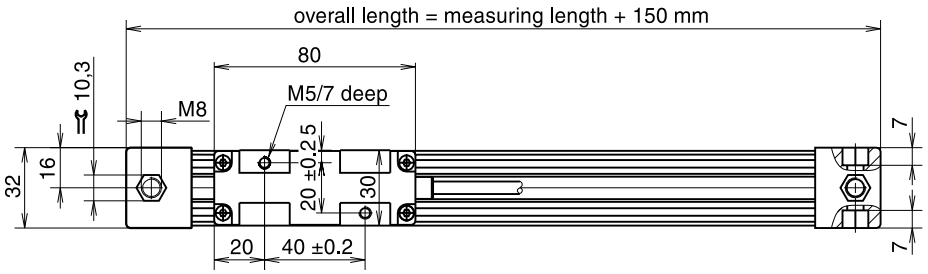
- **square wave signals** (single ended)
  with integrated Subdividing Electronics

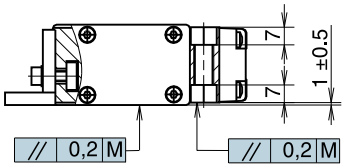
- **square wave signals** (differential)
  via Line Driver RS 422 standard
  with integrated Sudividing Electronics
  MSA 350.23 = times1
  MSA 350.24 = times1
  MSA 350.63 = times5
  MSA 350.64 = times5
  MSA 350.73 = times10

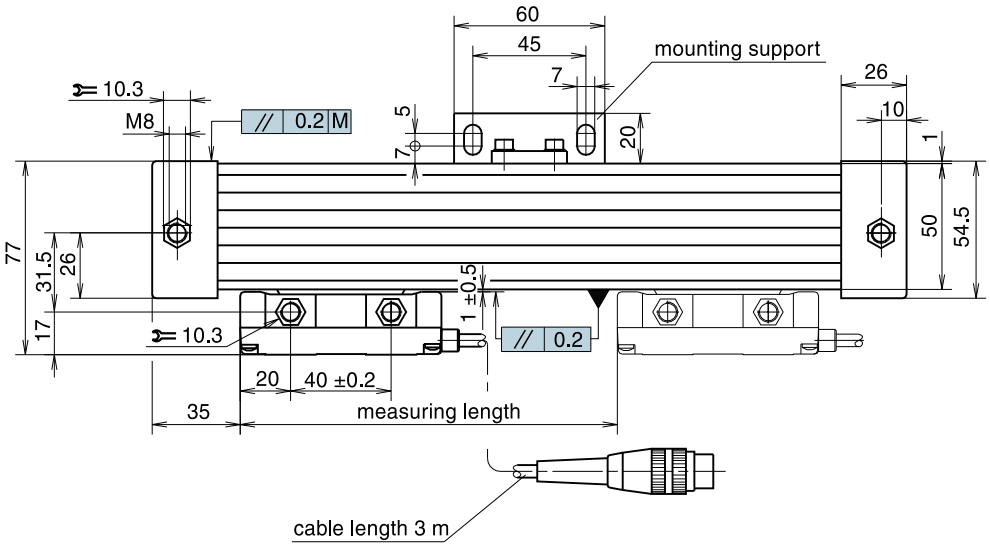
Power supply:
+5 V ±5%, < 150 mA (without interpolation, unloaded)
< 200 mA (with interpolation, unloaded)

MSA 350 Dimensions - Mounting tolerances - Mounting possibilities:



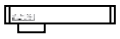




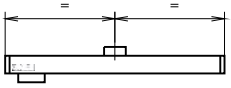


M = machine guideway

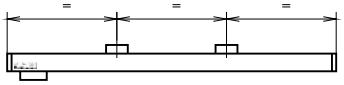
quantity and position
of the mounting support
per measuring length



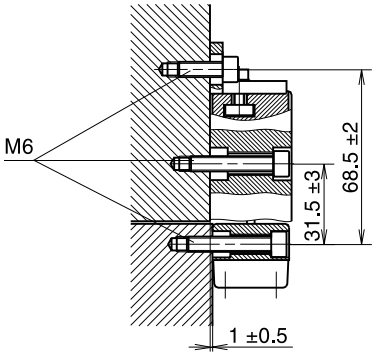
170 - 520 mm

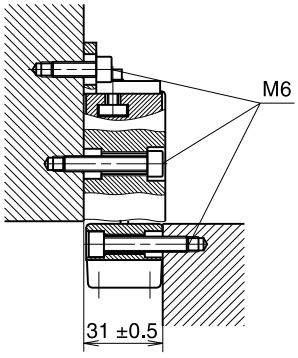


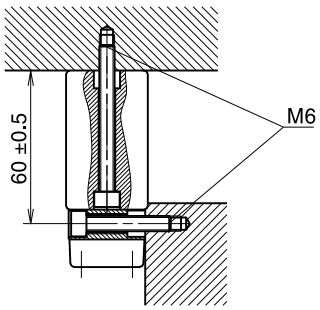
620 - 1020 mm 1x

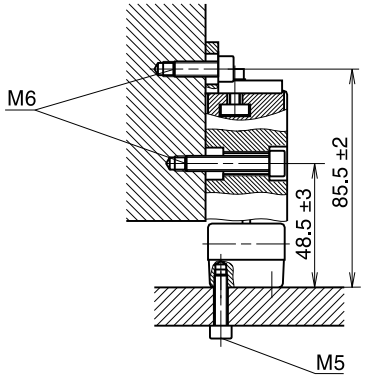


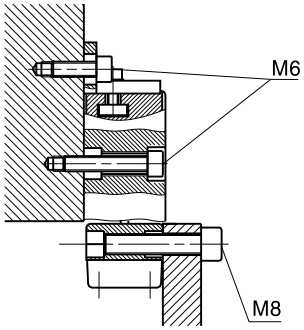
1140 - 2040 mm 2x
2240 - 3040 mm 3x











MSA 352 Technical data

- max. measuring length 3040 mm
- rigid mounting
- large cross-section
- mounting holes on the extrusion ends and with mounting supports
- distance coded Reference marks **(K)**
- two sets of sealing lips

Optional: the MSA 352 is available with air inlets on extrusion ends.
In addition to the two sets of sealing lips, low pressure air helps to keep out coolants and contamination. The RSF air pressure unit **(Model DA300)** is designed to clean and regulate the encoder air.

Scale model	System resolution	Accuracy grades *	Grating pitch *	Max. velocity continuous	Max. velocity momentary
• **Square wave signals with integrated Subdividing Electronics**					
MSA 352.24	10 µm	±10 µm/m	40 µm	1 m/s	2 m/s
MSA 352.23	5 µm	±5, ±10 µm/m	20 µm	1 m/s	2 m/s
MSA 352.64	2 µm	±5, ±10 µm/m	40 µm	1 m/s	2 m/s
MSA 352.63	1 µm	±5, ±10 µm/m	20 µm	1 m/s	1 m/s
MSA 352.73	0.5 µm	±5, ±10 µm/m	20 µm	1 m/s	1 m/s

* **Other accuracy grades or grating pitches (e.g. Inch) on request**

Standard measuring lengths: (mm)
170, 220, 270, 320, 370, 420, 470, 520, 620, 720, 770, 820, 920, 1040, 1140, 1240, 1340, 1440, 1540, 1640, 1740, 1840, 2040, 2240 2440, 2640, 2840, 3040

Measuring type: glass scale

Reference mark (RI): selectable
MSA 352.xx **K:**
Distance coded Reference marks (**K**): after travelling 20 mm the absolute position will shown on the display.

MSA 352.xx:
Up to measuring length 920 mm one Reference mark in the middle of the measuring length or 35 mm from both ends of measuring length, measuring length 1040 mm and longer, 45 mm from both ends of measuring length.

Option:
One Reference mark at any location, or two or more RI's separated by distances of n x 50 mm

Required moving force:
< 6 N (two set of sealing lips)

Environmental sealing DIN 40050:
IP 54 (two set of sealing lips)
IP 64 with DA300

Permissible temperature:
-20°C to +70°C (storage), 0°C to +50°C (operation)

Weight (approx.)
3 kg/m (scale spar) + 0.4 kg (scanning head with 3 m cable)

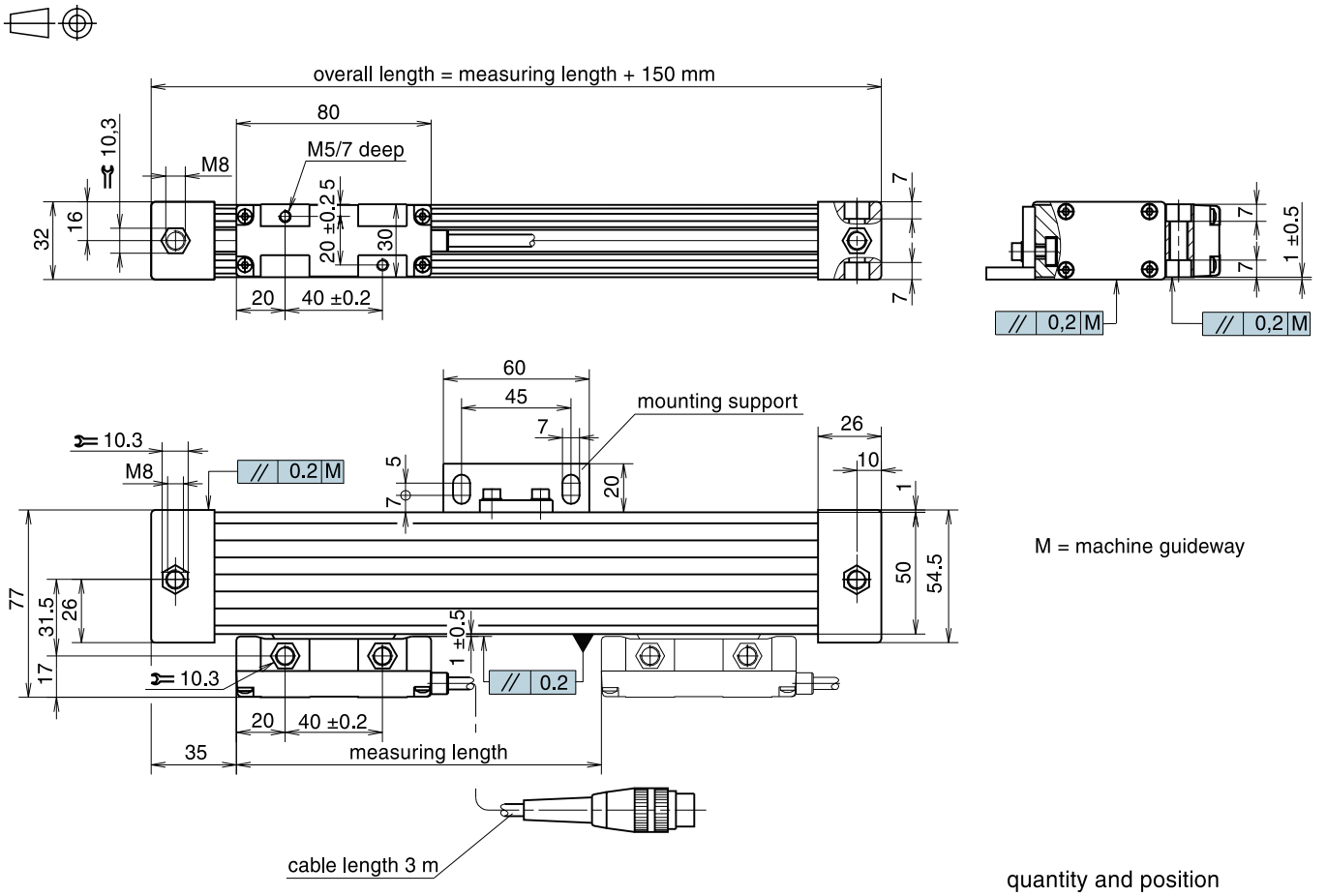
Signal-outputs(optional)

- **square wave signals** (single ended)
  with integrated Subdividing Electronics

- **square wave signals** (differential)
  via Line Driver RS 422 standard
  with integrated Sudividing Electronics
  MSA 352.23 = times1
  MSA 352.24 = times1
  MSA 352.33 = times2
  MSA 352.63 = times5
  MSA 352.64 = times5
  MSA 352.73 = times10

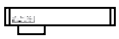
Power supply:
+5 V ±5%, < 150 mA (without interpolation, unloaded)
< 200 mA (with interpolation, unloaded)

MSA 352 Dimensions - Mounting tolerances - Mounting possibilities:

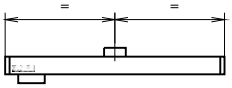


M = machine guideway

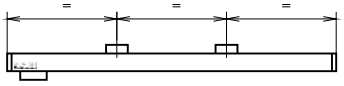
quantity and position
of the mounting support
per measuring length



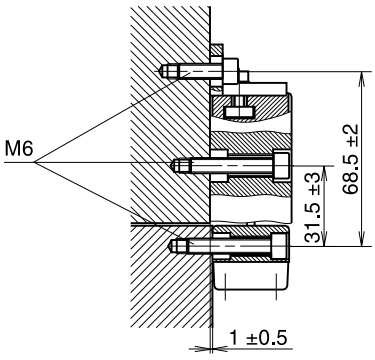
170 - 520 mm

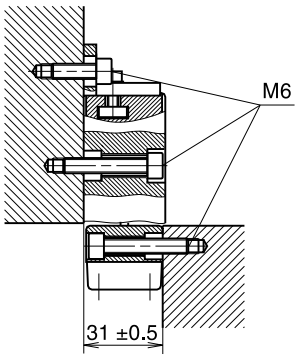


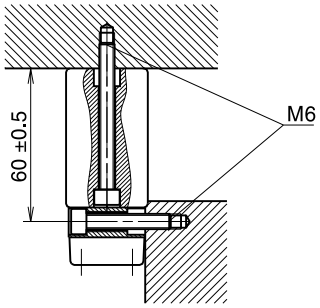
620 - 1020 mm 1x

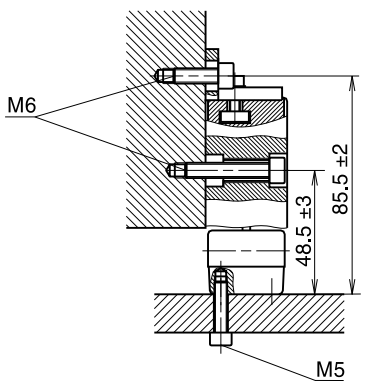


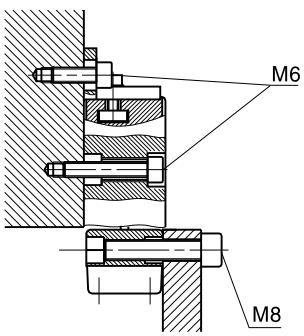
1140 - 2040 mm 2x
2240 - 3040 mm 3x



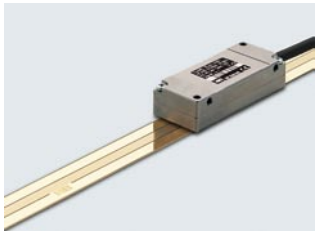








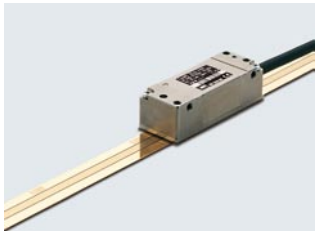
Other RSF Products



MS 20

Open Linear Encoder with singlefield reflective scanning

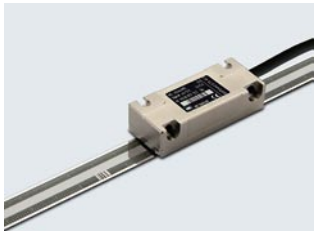
- easy mounting as a result of large mounting tolerances
- high traversing speed
- high insensitivity to contamination
- „true“ reference mark
- integrated subdividing up to times 100 interpolation
- max. measuring length 9440 mm



MS 30

Open Linear Encoder with singlefield reflective scanning

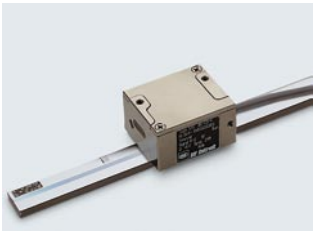
- two independent switch signals for individual functions
- easy mounting as a result of large mounting tolerances
- high traversing speed
- high insensitivity to contamination
- integrated subdividing up to times 100 interpolation
- max. measuring length 9440 mm



MS 40

Open Linear Encoder with singlefield reflective scanning at low price and high qualitiy

- easy mounting as a result of large mounting tolerances
- high traversing speed
- high insensitivity to contamination
- integrated subdividing up to times 100 interpolation
- max. measuring length 30040 mm



MS 8x

Open Linear Encoder

- two switch tracks for individual special functions
- non-contact reflective scanning
- interferential scanning principle
- for high displacement velocities
- small version
- scale version: glass scale or ROBAX glassceramic with phase grating
- max. measuring length to 3140 mm

DG 118, DG 120

Standard Rotary Encoder

- Rotary Encoder for universal application
- standard line/rev. graduated from 100 to 5.400

DIT 10, DIT 30, DIT 48

Precision measuring Probes

- for universal applications
- stroke length 10, 30, 48 mm
- mounting on shaft sleeve
- mounting with two tapped holes on body (DIT 30, DIT 48)
- with cable lifter
- integrated pneumatic lifter optional
- sealing bellows optional (DIT 30, DIT 48)

MSA 170

Enclosed Linear Encoder

- distance coded RI marks (K)
- extremely small cross section
- guided by ball bearings
- mounting holes on the extrusion ends
- max. measuring length 520 mm

MSA 670

Enclosed Linear Encoder

- distance coded RI marks (K)
- small cross-section
- enclosed version
- mounting holes on the extrusion ends
- max. measuring length 2240 mm

MSA 370

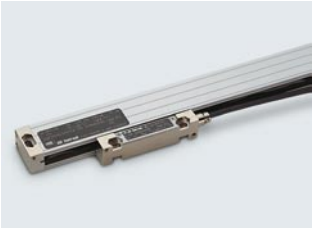
Enclosed Linear Encoder

- distance coded RI marks (K)
- rigid mounting
- large cross-section
- enclosed version
- mounting holes on the extrusion ends and with mounting supports
- max. measuring length 3040 mm

MSA 374

Enclosed Linear Encoder

- for application on presses bending machines and hydraulic cylinders
- roller bearing dual guided scanning carriage
- free positionable switching magnets for special functions
- distance coded Reference marks (K)
- mounting holes on the extrusion ends
- max. measuring length 620 mm



MSA 690, MSA 691

Enclosed Linear Encoder

- with switch tracks for special functions
- small cross-section
- enclosed version
- mounting holes on the extrusion ends (MSA 690)
- mounting holes on the top of the extrusion improves vibration rating (MSA 691)
- max. measuring length 2240 mm

MSA 390, MSA 391

Enclosed Linear Encoder

- individual choosing of the reference mark
- with switch tracks for special functions
- rigid mounting
- large cross-section
- enclosed version
- mounting holes on the extrusion ends and with mounting supports (MSA 390)
- mounting holes on the top of the extrusion improves vibration rating (MSA 391)
- max. measuring length 3040 mm

RSF Offices

Austria
RSF Elektronik Ges.m.b.H.
A-5121 Tarsdorf
☏ +43 (0) 6278 / 8192-0
FAX +43 (0) 6278 / 8192-79
e-mail: info@rsf.at
internet: www.rsf.at

USA
RSF Electronics Inc.
2880 Gold Tailings Court
Rancho Cordova, CA 95 670
☏ +1 916 852 - 6660
FAX +1 916 852 - 6664
e-mail: support@rsf.net
internet: www.rsf.net

Switzerland
RSF Elektronik (Schweiz) AG
Mülistrasse 18
CH-8320 Fehraltorf
☏ +41 (0) 44 955 10 50
FAX +41 (0) 44 955 10 51
e-mail: info@rsf.ch
internet: www.rsf.ch

China
RSF Elektronik GmbH
Tian Wei San Jie,
Area A, Beijing Tianzhu Airport Industrial Zone
Shunyi District
101312 Beijing
P.R. China
☏ +86-10-8042-0288
FAX +86-10-8042-0290
e-mail: cao.shizhi@rsf.cn
internet: www.rsf.cn

Slovenia
RSF Elektronik prodaja, d.o.o.
Jozeta Jame 14
SI-1210 Ljubljana
☏ +386 1 519 88 80
FAX +386 1 519 88 80
e-mail: mail@rsf-elektronik.si

Korea
RSF Electronics Ltd.
202 Namsung Plaza, 9th Ace Techno Tower,
345-30, Gasan-Dong, Geumcheon-Gu,
Seoul, Korea 153-782
☏ +82-2-2028-7455
FAX +82-2-2028-7456
e-mail: rsf@rsf.co.kr
internet: www.rsf.co.kr

Singapore
RSF Elektronik GmbH
51, Ubi Crescent
Singapore, 408593
☏ +65 67499 370
FAX +65 67499 357
e-mail: davidng@rsf.sg
internet: www.rsf.sg

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