RELM20 high accuracy incremental linear scale

RELM20 ZeroMet™ scale is manufactured from near zero thermal expansion material, ensuring the high level of accuracy is maintained across the full temperature range.

It can be mounted direct to your machine, either mechanically or by the use of a self-adhesive backing tape. RELM20 scale also features the IN-TRAC™ optical reference mark allowing fast auto-phasing.

RELM20 is a 20 µm pitch scale and is compatible with Renishaw’s VIONIC™ and TONIC™ range of encoders, offering levels of performance previously only available from delicate fine pitch systems.

- High accuracy, certified to ±1 µm up to 1 m, calibrated against International Standards
- Robust ZeroMet offers 0.75 ±0.35 µm/m/°C@20 °C thermal expansion plus ease of handling and installation
- Scale mounting with self-adhesive or clips and clamps
- IN-TRAC bi-directional auto-phase optical reference mark
- Dual limits provide on-scale end of travel indication
### RELM20 scale specifications

<table>
<thead>
<tr>
<th><strong>Form (H x W)</strong></th>
<th>1.6 mm x 14.9 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scale lengths (L)</strong></td>
<td>20 mm to 1.5 m (available in increments of 10 mm)</td>
</tr>
<tr>
<td><strong>Pitch</strong></td>
<td>20 µm</td>
</tr>
</tbody>
</table>
| **Accuracy** | Certified to ±1 µm for lengths up to 1 m, ±1 µm/m for lengths >1 m to 1.5 m  
Calibrated traceable to International Standards |
| **Material** | ZeroMet. High stability, low-expansion nickel-iron alloy |
| **Coefficient of thermal expansion (at 20 °C)** | 0.75 ±0.35 µm/m/°C |
| **Mounting** | Epoxy datum point and adhesive tape or datum clamp and mounting clips  
Adhesive backing tape is included with all scale (nominal thickness 0.2 mm) |
| **Mass** | 184 g/m |

### Reference mark

<table>
<thead>
<tr>
<th><strong>Type</strong></th>
<th>IN-TRAC optical reference mark</th>
</tr>
</thead>
</table>
| **Position** | RELM20 – midpoint of scale length  
RELE20 – 20 mm from end of scale |
| **Phasing** | Auto-phased by readhead calibration routines |
| **Repeatability** | Repeatable to unit of resolution throughout specified temperature and speed range |

**NOTE:** When using a VIONiC or TONiC system the readhead should be ordered so all reference marks are output; no actuator magnet is required.

### Limit switches

<table>
<thead>
<tr>
<th><strong>Type</strong></th>
<th>Magnetic actuators; with dimple triggers Q limit, without dimple triggers P limit (see image below)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trigger point</strong></td>
<td>The limit output is nominally asserted when the readhead limit switch sensor passes the limit magnet leading edge, but can trigger up to 3 mm before that edge</td>
</tr>
<tr>
<td><strong>Mounting</strong></td>
<td>Customer placed at desired locations</td>
</tr>
<tr>
<td><strong>Repeatability</strong></td>
<td>&lt;0.1 mm</td>
</tr>
</tbody>
</table>

![P limit (10 mm, A-9653-0138) and Q limit (10 mm, A-9653-0139)](image)

Limit magnets are available in 10 mm, 20 mm and 50 mm lengths and supplied on a back plate with self-adhesive tape.

**NOTE:** Use of limits will affect the available measuring length (see page 6).
Compatible readheads

<table>
<thead>
<tr>
<th></th>
<th>VIONIC</th>
<th>TONiC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs</td>
<td>Digital resolutions from 5 µm to 2.5 nm direct from the readhead</td>
<td>Analogue 1 Vpp only. RS422 digital resolutions from 5 µm to 1 nm available when connected to a Ti, TD or DOP interface</td>
</tr>
<tr>
<td>SDE (typical)</td>
<td>&lt;±15 nm</td>
<td>±30 nm</td>
</tr>
<tr>
<td>Jitter (RMS)</td>
<td>down to 1.6 nm</td>
<td>down to 0.5 nm</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>12 m/s</td>
<td>10 m/s</td>
</tr>
</tbody>
</table>

Readhead features

- Filtering optics and Auto Gain Control for high reliability and solid Lissajous signals.
- High signal-to-noise ratio provides ultra-low jitter for optimum positional stability.
- Auto-phasing of IN-TRAC reference mark.
- Clocked outputs ensure optimised speed performance for all resolutions, for a wide variety of industry-standard controllers.
- DOP Dual output interfaces available to provide simultaneous analogue and digital outputs (TONiC systems only).
RELM20 scale installation drawing (adhesive mounting method shown)

For further details please refer to relevant system installation guides

Dimensions and tolerances in mm

**NOTE:** Adhesive mounted scale should not be reused after installation.
RELM20 (centre reference mark)

RELE20 (End reference mark)

Mounting clip

(A-9584-2049)

Special M3 low-profile screw
with 1.5 mm hex socket
(A-9584-2047 pack of 25)

1.8 (clip height)

Counterbore all mounting
holes 3.2 mm diameter x
1 mm to 1.5 mm deep.
6 mm minimum depth
full thread.

Datum clamp

(A-9584-2050)

Special M3 low-profile screw
with 1.5 mm hex socket
(A-9584-2047 pack of 25)

1.9 (clamp height)

Counterbore all mounting
holes 3.2 mm diameter x
1 mm to 1.5 mm deep.
6 mm minimum depth
full thread.

NOTES:

Datum clamp usually coincident with selected
IN-TRAC reference mark. However, the position is
user selectable depending upon application.

For lengths 80 ≤ L ≤ 190 ensure scale is clamped
or clipped in the middle as well as at both ends.

For optimum performance the readhead should be
installed close to nominal geometry.

Care should be taken to ensure sufficient
clearance between the readhead/mounting bracket
and clips/datum clamp.

Only special low-profile screws should be used.
Screws are provided with all clips/datum clamps
and spares can be supplied if required.

Dimensions and tolerances in mm

For further details please refer to relevant system installation guides.
RELM20 scale measuring lengths
For further details please refer to relevant system installation guides

Dimensions and tolerances in mm

Limit sensor position
Optical centreline (incremental and reference mark)
ML = (L−10) without limits
ML = (L−25) with 10 mm limits

1.6 ±0.1 (Clip/clamp mounting)
1.8 ±0.1 (Adhesive mounting)

Ra 3.2
1.6 ±0.1
1.8 ±0.1 (Clip/clamp mounting)
2.1 ±0.15
2.05 ±0.1 (Adhesive mounting)
Scale part numbers

RELM20

20 µm pitch ZeroMet spar scale with single IN-TRAC reference mark at mid-point of scale length.

<table>
<thead>
<tr>
<th>Part number</th>
<th>Available lengths</th>
<th>Available in increments of</th>
<th>Ordering instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-9660-xxxx</td>
<td>20 mm to 1500 mm</td>
<td>10 mm</td>
<td>xxx is the length in mm. Ordering A-9660-0450 for example will result in a length of 450 mm.</td>
</tr>
</tbody>
</table>

RELE20

20 µm pitch ZeroMet spar scale with single IN-TRAC reference mark 20 mm from scale end.

<table>
<thead>
<tr>
<th>Part number</th>
<th>Available lengths</th>
<th>Available in increments of</th>
<th>Ordering instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-9661-xxxx</td>
<td>30 mm to 1500 mm</td>
<td>10 mm</td>
<td>xxx is the length in mm. Ordering A-9661-0450 for example will result in a length of 450 mm.</td>
</tr>
</tbody>
</table>

Accessory part numbers

Limit switch magnets*

<table>
<thead>
<tr>
<th>Part description</th>
<th>Part number</th>
<th>Product image</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 mm Q limit switch actuator magnet</td>
<td>A-9653-0139</td>
<td></td>
</tr>
<tr>
<td>Adhesive mounted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 mm P limit switch actuator magnet</td>
<td>A-9653-0138</td>
<td></td>
</tr>
<tr>
<td>Adhesive mounted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnet applicator device</td>
<td>A-9653-0201</td>
<td></td>
</tr>
<tr>
<td>(Aids positioning)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Longer limit magnets are available. Contact your local subsidiary for more information.

Clip/clamp mounting accessories†

<table>
<thead>
<tr>
<th>Part description</th>
<th>Part number</th>
<th>Product image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting clips</td>
<td>A-9584-2049</td>
<td></td>
</tr>
<tr>
<td>Datum clamp kit</td>
<td>A-9584-2050</td>
<td></td>
</tr>
<tr>
<td>Replacement M3 screws (pack of 25)</td>
<td>A-9584-2047</td>
<td></td>
</tr>
<tr>
<td>Spare clip setting shim</td>
<td>M-9584-0928</td>
<td></td>
</tr>
</tbody>
</table>

† UHV and extra wide clip/clamp accessories are available. Contact your local subsidiary for more information.
Compatible products

REL M20
REL E20
T O N I C
V I O N I C

For worldwide contact details, visit www.renishaw.com/contact