DANAHER INDUSTRIAL CONTROLS

HENGSTLER

Geared Elevator Feedback

RI80-E

Hengstler GmbH
Martin Haller
Nov 12 - 2008

Geared Elevator Encoder Requirements

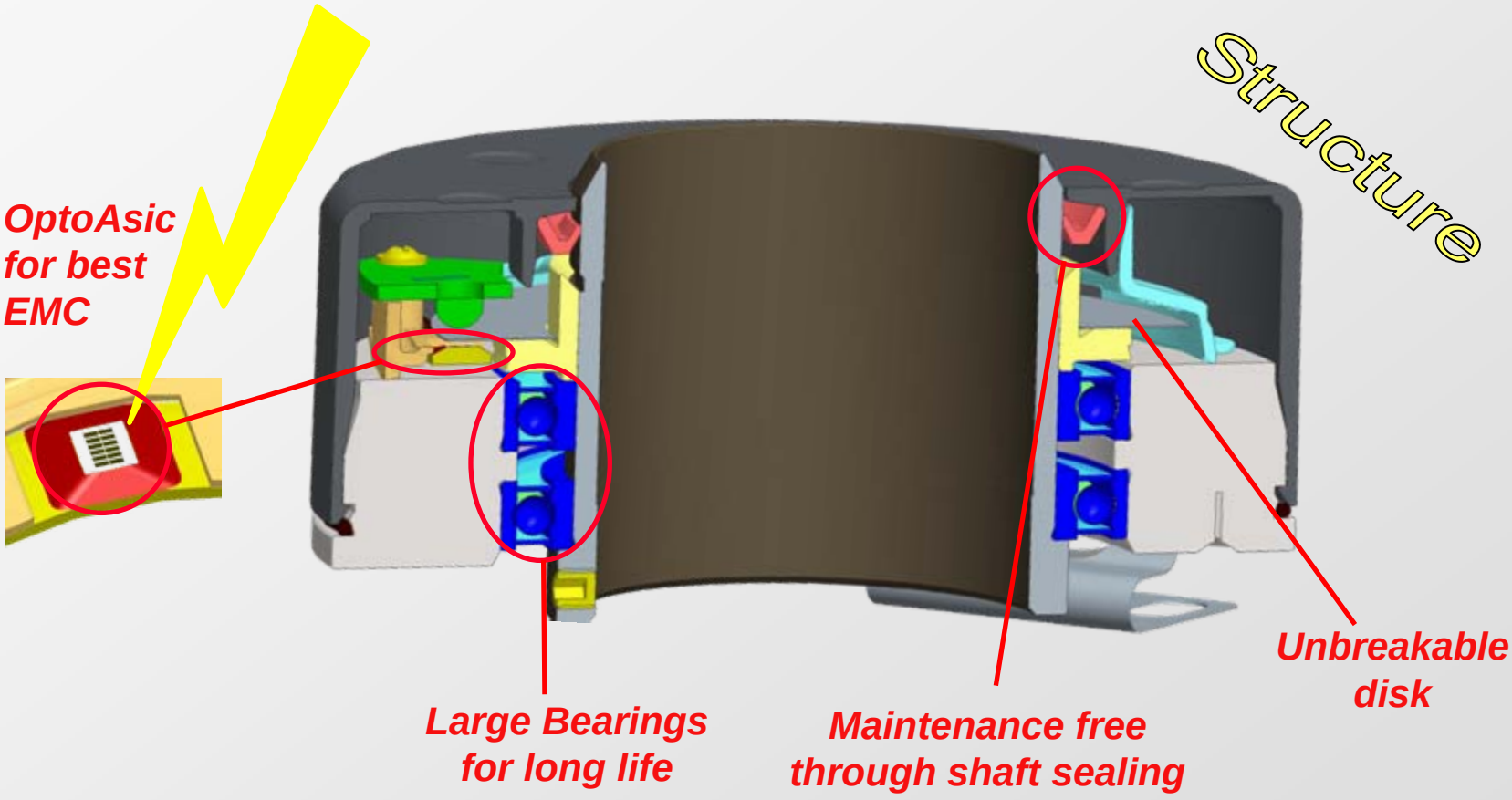
Cost effective

- ⇨ Highly integrated design
- ⇨ LCR component sourcing
- ⇨ LCR manufacturing

Longterm Reliability

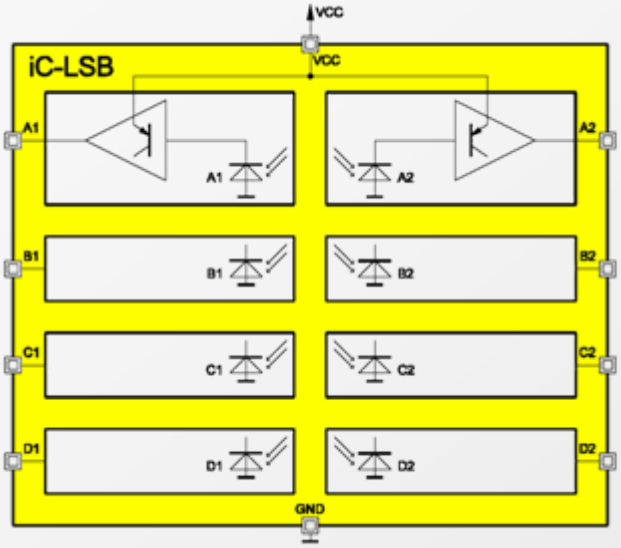
- ⇨ Robust mechanical design
- ⇨ Self monitoring electronics

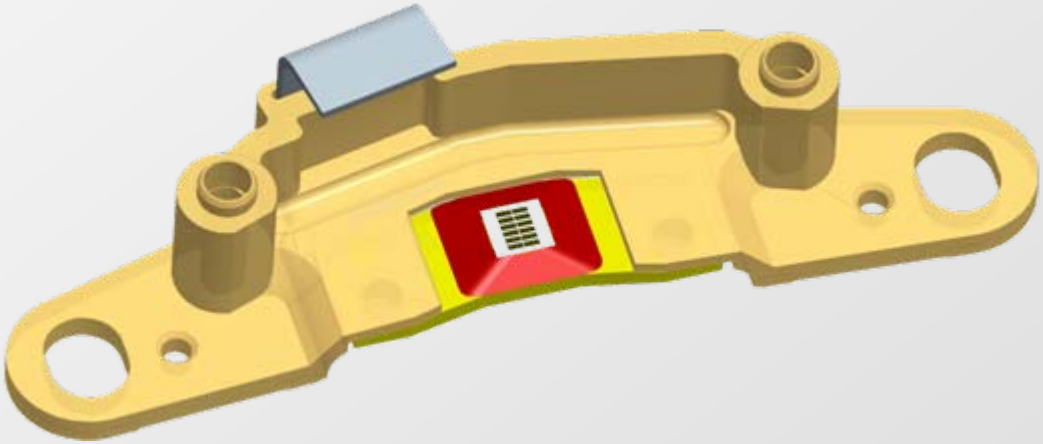
RI80-E Design Concept



The New RI80-E

RI80-E OptoAsic Technology





Highly Integrated Electronics ⇨ **Better MTBF (lower no. of components)**

⇨ **Better ESD than discrete designs**

Integrated LED current regulation ⇨ **Longer LED life**

Integrated failure monitoring ⇨ **Safe operation**

The New RI80-E

Voice of Customer

Through VOC we detected unfulfilled needs:

1. Screw- and toolless shaft cover

⇨ *Saves labor in production*

⇨ *helps in case of evacuation*

2. Self diagnostics and Remote Access

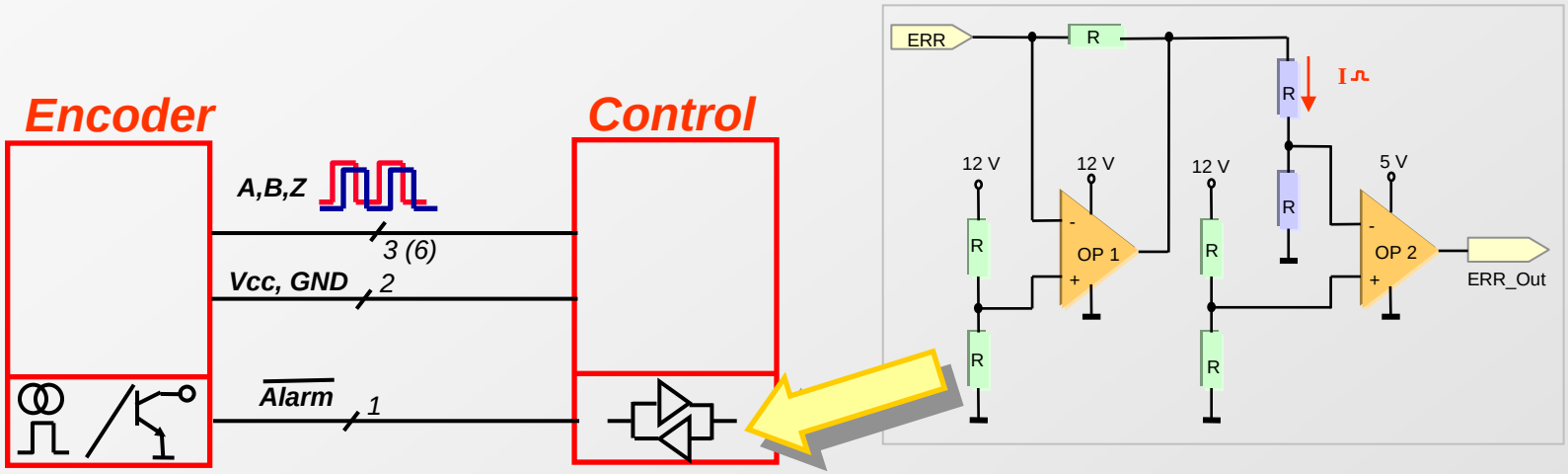
Allows access to health status through the internet

⇨ *Improves efficiency of service organization*

⇨ *Helps minimizing downtime*

The New RI80-E

Safety Concept *RI80-E*



Alarm: NPN o.C. ***-> signalizes alarm***

Control switches 7 V on Encoder Alarm output

->initiates communication

Current Loop ***->Read Error Registers***

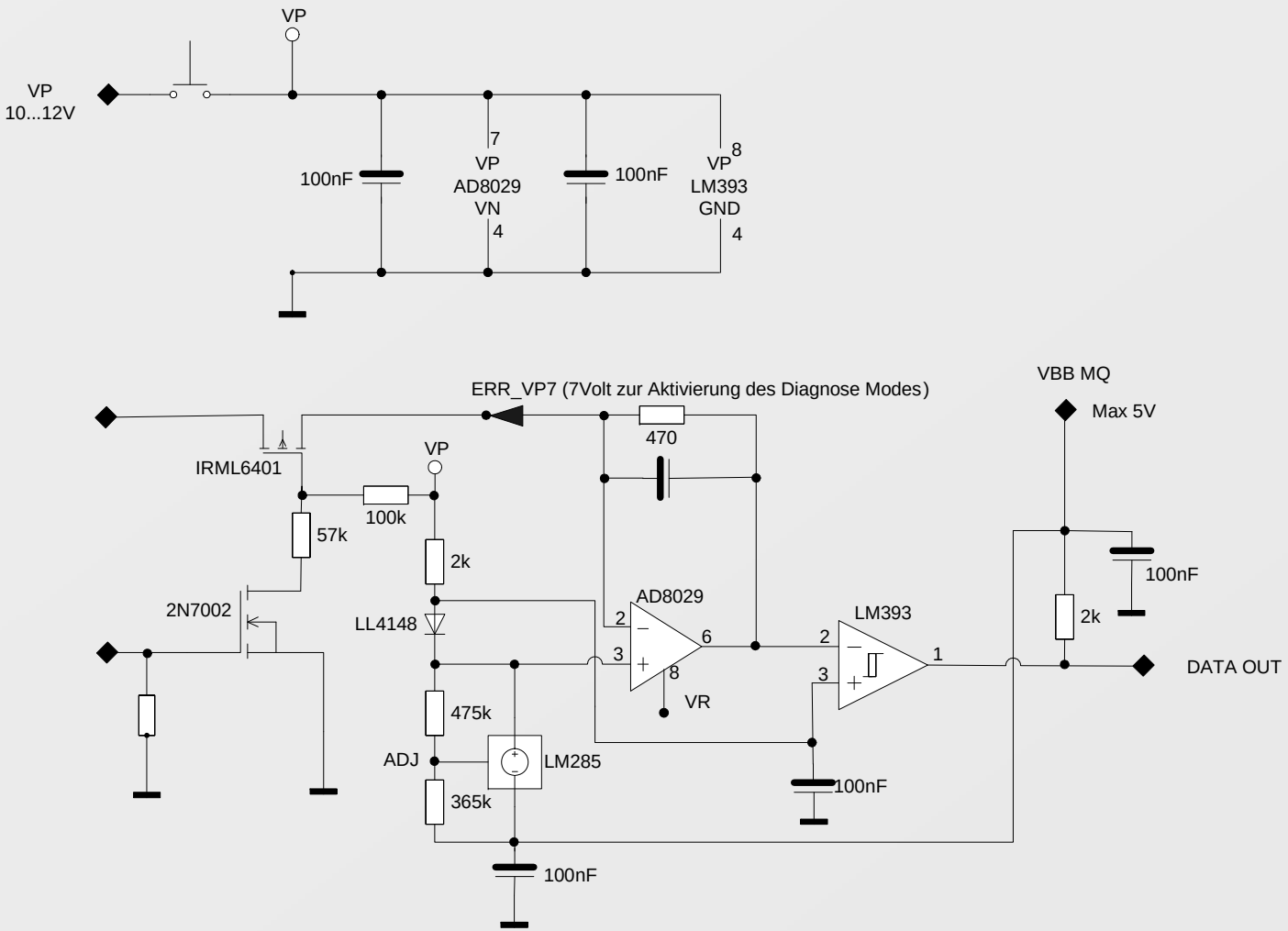
Error Registers

First recorded Error

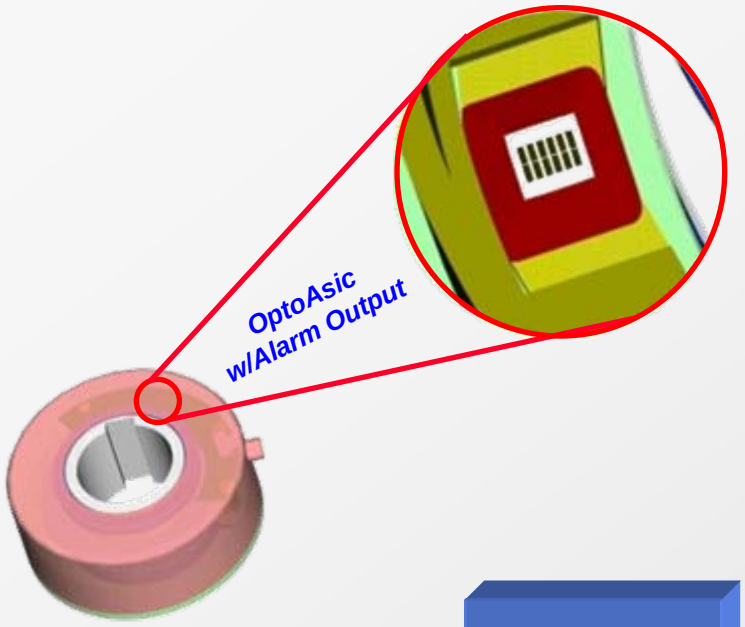
Last recorded Error

All Errors

Circuit for Diagnostic Readout



Safety Concept *RI80-E*



Alarm output

Exceeding of Limits: Alarm

Electrical Protection	***Phase Amplitude Line Count***	***Temperature-monitoring***	***LED Current Monitor***
EMC / ESD *Short Circuit* *Reverse Polarity*	*Mechanical* *Overload* *Pollution* *Condensation*	*Overtemperature* *Undertemperature*	*Ageing of LED* *Pollution* *Condensation* *Overspeed* *Disk Break*

Summary RI80-E Benefits

$

Preventive Maintenance
Maximized Uptime

- Improved Service Efficiency
- Well aligned service life with elevator
- Encoder reliability improves overall system reliability
- High Quality image turns into higher revenues

OptoAsic Technology

LED current regulation
Highest EMC Immunity
Signal monitoring and regulation

Self Diagnostics

Warnings and Alarms
Temperature, Pollution,
Ageing, Speed, Voltage

Agency approvals

CE, C-UL,
TÜV-HALT - tested

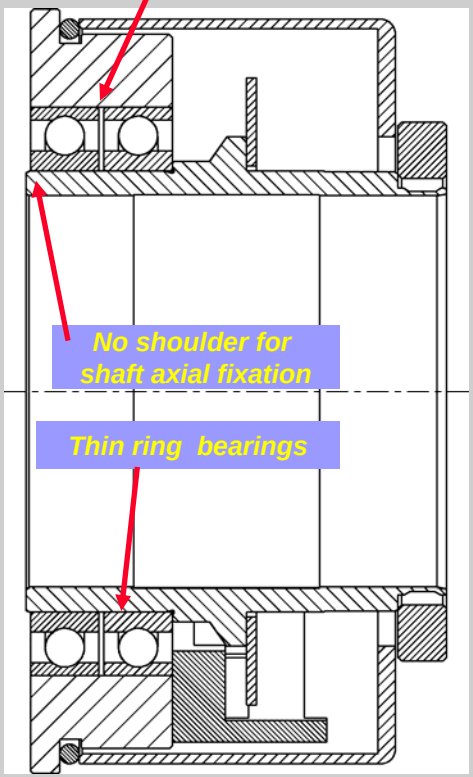
Solid Mechanical Design

Oversized Bearings
Integrated Shoulders
Large airgap

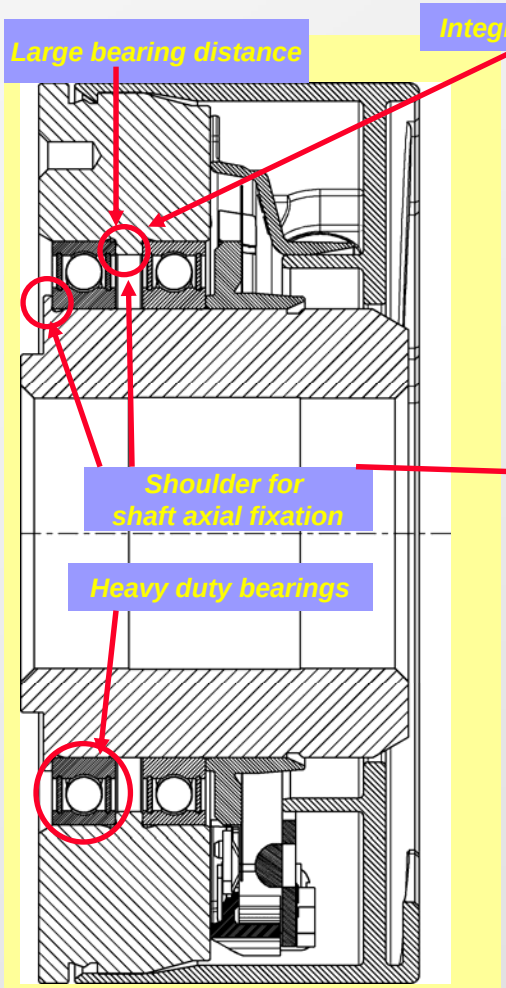
The New RI80-E

RI76 vs RI80E and RF53

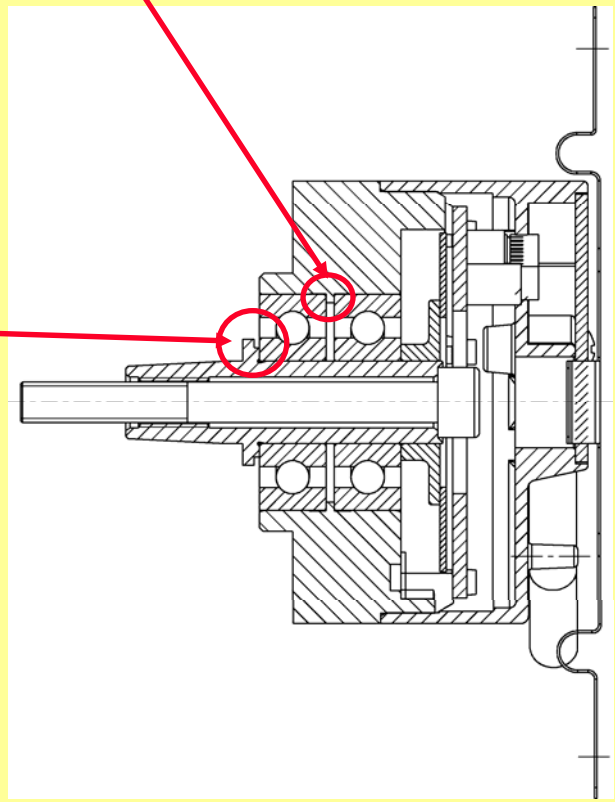
RI76 – old



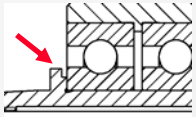
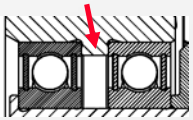
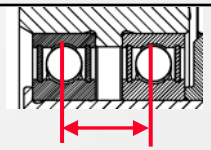
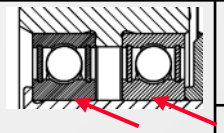
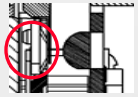
RI80E new



RF53 new



Design improvements

Design Element	Sketch	Feature	RI76	RF53	RI80	Improvement Impact
Shaft		Shoulder in front of bearing	**no**	**yes**	**yes**	Prevents disk from touching the sensor or lense Highly overloadable
Base (flange)		Shoulder between bearings	**no**	**yes**	**yes**	
Bearing distance			**7.5mm**	**9mm**	**10mm**	Improves the applicable shaft load and bearing life
Bearing mounting process		Bearing on shaft	**Heat-shrink**	**Floating**	**Floating**	Perfekt bearing alignment No point loads Constant airgap Longer bearing life
		Runout / Play	10-30µm	1-5µm	1-5µm	
Airgap Mask-Disk			35µm - 100µm	300µm	100µm	Minimized risk of disk scratching
Interpolation			**no**	**yes**	**yes**	More tolerant sensor and bigger airgap possible
Market Introduction			1996	2005	2005	9 years of learning curve

Hengstler - your preferred source for traction machine feedback

Thank You!

The New RI80-E