Accurate Online Flow Monitoring of Bulk and Solids

ABOUT US…

In 1973 REMBE was founded by Bernhard Penno. In addition to the core business of bursting discs for the chemical and process industries we started business in the field of measurement technology in 1978. Since 1988 REMBE has continuously increased its export activities. Today we are represented globally in more than 70 countries, and have dedicated REMBE facilities in the key industrial areas. Still a family owned and privately run business REMBE is able to provide fast, efficient and reliable solutions.

FACT BOX

REMBE®
headquarters and production
in Brilon / Germany

Headquarters	Employees	Market Leadership	Market Leadership thru	Industries served	Services
59929 Brilon / Germany (Foundation in 1973) Stake in other companies: REMBE, INC., Charlotte / USA REMBE LTD, London / UK REMBE Mess- und Regeltechnik GmbH, Brunn / Austria REMBE S.R.L., Milan / Italy REMBE OY, Helsinki / Finland REMBE JLT Branch / Dubai REMBE ASIA PACIFIC PTE. LTD. / Singapore REMBE CHINA LTD, Shanghai / China Cooperations: REMBE FIBRE FORCE GMBH, Brilon / Germany KERSTING GMBH SAMPLING + GROUNDING, Brilon / Germany	150 +	in Europe	Technology, Innovation, Quality, Fast Response, Service	Renewable Energies, Geothermal Industry, Pulp & Paper, Biotech, Cosmetic, Food & Beverage, Animal Food, Aerospace, Raw Material Conveying, Chemical, Pharmaceutical, Petrochemical, Offshore, Construction, Oil & Gas, Water & Sewage, Transport, Infrastructure	Consulting for • Plant safety and process optimization • Insurance coverage • Financing • Service/maintenance

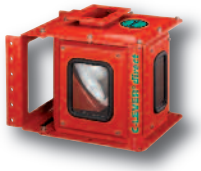
Manufacturing in Accordance with / Meeting the following Codes: ISO 9001:2008, PED 97/23/EC, ISO TS 29001:2010 ASME Sec. VIII, Div. 1, KTA 1401, GOST RTN / TR (Russia), China Manufacture Licence (CML), KOSHA (South Korea), NFPA, ATEX 94/9/EC, CSA, GL, Known Consignor (DE/KG/00912-01/0218).

Maintenance-Free and Long-Term Durability

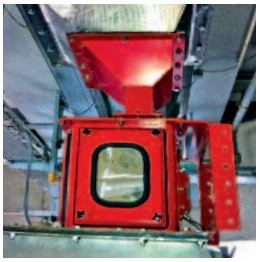
REMBE® weighing systems guarantee reliable and accurate online control of bulk and solids at any time. By using them the process control and inventory management offer improved traceability and a greater ROI. The weight scales are used in all fields of plant construction, e. g. cement, coal, building, wood, food, feed, chemical and pharmacy industries.

CUSTOMER BENEFITS

- Simple installation – no need for expensive skilled personnel
- Multiple sensor use – if your process changes, the sensors respond accordingly.
- Utmost precision – provides constant data
- Increase in efficiency – with economic cost of ownership
- Rationalisation in production – increased product efficiency



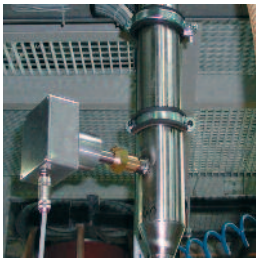
Flow Meter



C-LEVER® *direct*

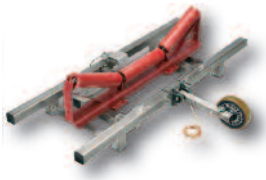
easuring accuracy up to 0.5 %
independent of bulk density 4

Detection Sensor



MicroFlow

Dust-free in-line control of pneumatic or
gravimetric conveyed bulk and solids 9



Conveyor Belt Weighing System for Self-Assembly

UNIBAND®

for output and production control,
truck loading 10

Measurement Control Systems

EVA HighEnd

Suitable for flexible output control 11

Accurate Flow Ratings with Different Bulk Densities

C-LEVER® *direct*

C-LEVER® *direct* (CLD) is the result of the permanent improvement of innovative REMBE® technologies. In close cooperation with the university of applied science in Düsseldorf, the C-LEVER® measurement procedure has been optimised to be an extremely precise and absolutely reliable measuring system for bulk and solids. The consistent pursuit of the goals that were set has led to a measurement procedure based on centrifugal force that is unique in the world.

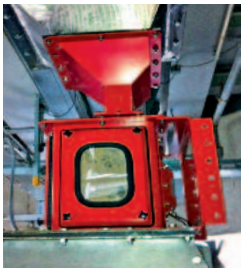
System description

The C-LEVER® *direct* (CLD) flow meter is characterized by the highest measurement accuracy. The various series are suited to the widest variety of applications – from truck pre-loading to controlling and dosing tasks in the bulk goods processing industry. The compact design and the low overallheight enable space saving applications whilst reducing time..

high precision
compact
robust
reliable
economical

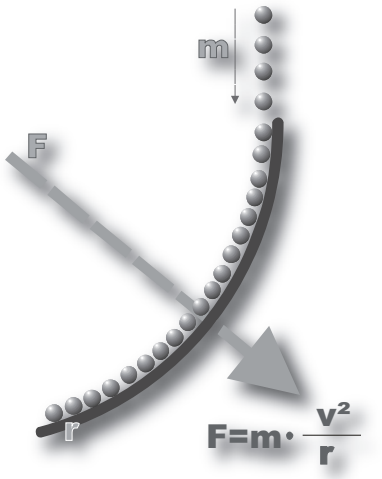
Benefits at a glance

- ✔ **transparency of stock levels and costs**
- ✔ **reliable production control**
- ✔ **optimised quality assurance**
- ✔ **less truck traffic on the factory site**
- ✔ **particle-preserving method of measuring bulk quantities**



Accuracy of up to 0.5%

C-LEVER® *direct*



Typical applications

- ✔ **Production and performance monitoring**
- ✔ **Dosage**
- ✔ **Truck pre-loading**

How it works

The C-LEVER®-principle is based on the laws of centripetal force. We have used this principle for the development of a very accurate, bulk density independent, friction compensated process.
An accuracy of up to 0.5%* can be achieved even with completely different properties of the bulk goods.

The bulk and solids that are fed via a special intake with optimum feed point are diverted over a radial shaped sensor surface. According to Newton a counter-acting centripetal force, directed towards the centre, of the same magnitude as the outward centrifugal force is created by this radial movement thus keeping the bulk product on its circular path. In the case of this optimum sensor arrangement of the C-LEVER® the counteracting force corresponds to the centripetal one, which has an absolutely linear relationship with the throughput and is measured by means of a special friction compensated force sensor (FCT).

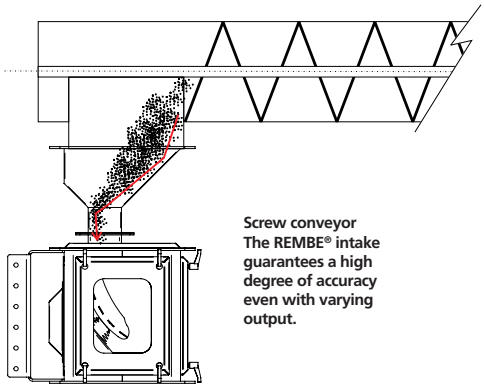
How to install

The flanges of the C-LEVER® *direct* (CLD) are adapted to any connection of your choice. Various standard connections are available. Non-standard connections, e.g. clamps are also possible on request.

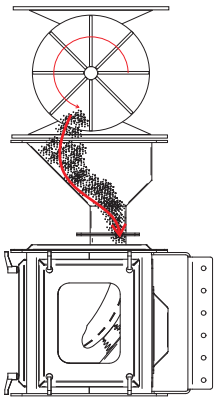
The scales themselves are simply installed in a vertical conveying section. Thanks to the low installation height of between 360 mm (14.17 in) and 700 mm (27.60 in), installation is fast and inexpensive.

The system accuracy of ± 2%* is achievable immediately. In the case of authorised product feed provided by customer or through a REMBE® intake, a maximum accuracy of 0.5 %* is achieved.

* All specified accuracies are related to the full scale reading at calibrated flow rate.



Screw conveyor
The REMBE® intake guarantees a high degree of accuracy even with varying output.



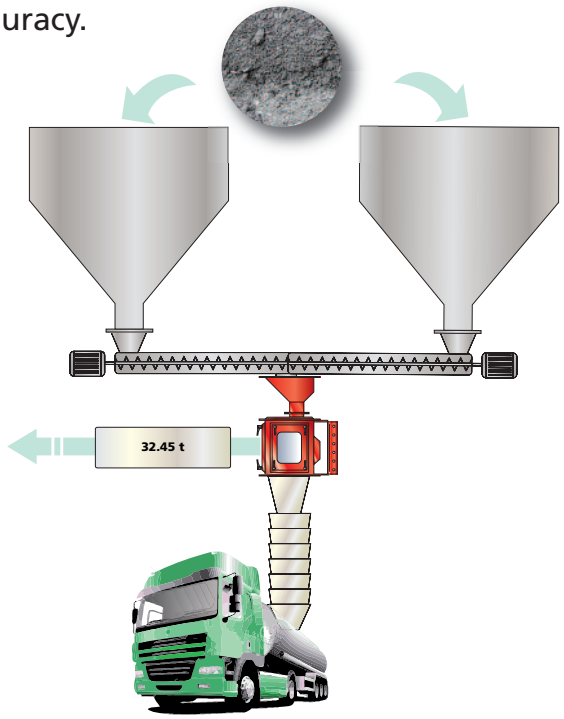
Rotary valve
C-LEVER® *direct* improves the efficiency of the product stream. Pulsating product streams are measured with high precision.

Flow Rates
from 50 m³/hr to 600 m³/hr
(1,765 ft³/hr to 21,200 ft³/hr)

C-LEVER® *direct*

especially for the measurement of bulk and solids with very high flow rates, e.g. for ship / truck pre-loading or for incoming goods inspections. Ships and trucks are loaded and/or unloaded with high accuracy.

short loading times
correct loading/unloading
less truck traffic on the factory
reliable inventory control



Technical Data	
max. flow rate	50 m³/hr to 600 m³/hr (1,765 ft³/hr to 21,200 ft³/hr)
accuracy	< ± 2%*
	± 0,5%* in case of authorised product feed
measuring sensor	precision DMS
measuring sensor error	0,017%
power supply	10 V DC
protection	IP 68
ATEX - FM load cell	optional up to zone 20
medium properties	dry, good flow capability
	non-sticky
particle size	0 to 50 mm (0 to 2 in)
density	0.01 kg/l to 3.8 kg/l
working temperature	15 °C to +70 °C optional up to 150 °C)
	(-5 °F to 158 °F, option up to 300 °F)
effective measurement range	1:20
reproducibility	0,1%
housing	steel St 52, powder-coated
	RAL 3000
	(optional: stainless steel 1.4301)
installation height	700 mm
Parts being in contact with the product are available in stainless steel, ceramic, polyurethane or other wear-resistant materials.	
*All specified accuracies are related to the volumetric range.	

C-LEVER® *direct*		without authorised product feed								with authorised product feed					
max. flow rate		outlet		intake		height		approx. weight		intake		height		approx. weight	
m³/hr	[ft³/hr]	mm	in	mm	in	mm	in	kg	lbs	mm	in	mm	in	kg	lbs
100	3,530	515 x 515	20.27 x 20.27	175 x 360	6.88 x 14.17	554	27.6	55	121	515 x 515	20.27 x 20.27	900	35.43	70	154
400	14,135	670 x 670	26.37 x 26.37	230 x 480	9.05 x 18.89	700	27.6	46	101	670 x 670	26.37 x 26.37	1210	47.6	80	176
600	21,200	670 x 800	26.37 x 31.44	396 x 146	15.59 x 5.75	700	27.6	60	132	870 x 800	26.37 x 31.49	1210	47.6	120	265
Subject to revision															

Flow Rates
from 300 kg/hr to 50 m³/hr
(661 lbs/hr to 1,765 ft³/hr)

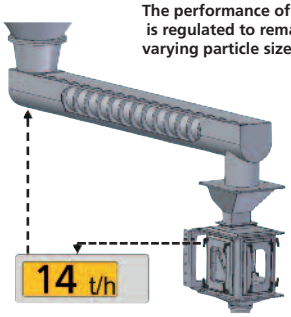
C-LEVER® *direct*

…especially for the measurement of bulk and solids in the fields of flow metering, filling, dosage/feeding and/or controlling.

constant conveying rate
low installation costs
ease of operation
reliable inventory control

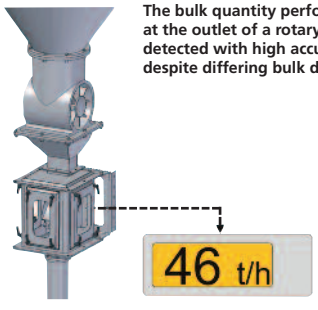
optional:
customized design

Where to use

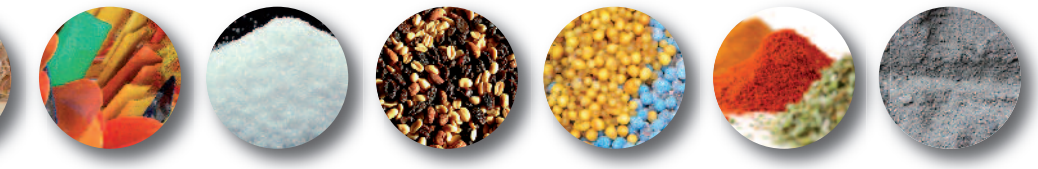


The performance of a screw conveyor is regulated to remain constant despite varying particle sizes.

Technical Data (differing from C-LEVER® *direct*, s. page 6)	
max. flow rate	12 / 24 / 50 m³/hr (423 / 847 / 1,765 ft³/hr), depending on type
accuracy	< ± 0.5%* in the case of authorised product
particle size	0 to 30 mm (0 to 1.18 in)
installation height 1	360 mm (14.17 in)
installation height 2	up to 625 mm (24.61 in) with REMBE® intake or doser
feeder/batcher (optional)	
power supply	24 V DC
control input	0-10 V, 0/4 -20 mA
protection	IP 62
other drives	pneumatic, open/close, etc. on request
Parts being in contact with the product are available in stainless steel, ceramic, polyurethane or other wear-resistant materials.	
*All specified accuracies are related to the volumetric range.	



The bulk quantity performance at the outlet of a rotary valve is detected with high accuracy despite differing bulk densities.

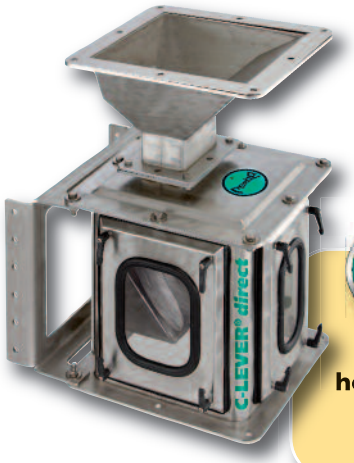


C-LEVER® *direct*		without authorised product feed								with authorised product feed					
max. flow rate		outlet		intake		height		approx. weight		intake		height		approx. weight	
m³/hr	[ft³/hr]	mm	in	mm	in	mm	in	kg	lbs	mm	in	mm	in	kg	lbs
12	424	276 x 246	10.87 x 9.69	76 x 116	2.99 x 4.57	360	14.17	14	31	278 x 250	10.95 x 9.84	625	24.60	20	44
24	847	276 x 376	10.87 x 14.80	76 x 240	2.99 x 9.45	360	14.17	21	46	278 x 375	10.95 x 17.76	625	24.60	30	66
50	1,765	276 x 676	10.87 x 26.61	76 x 542	2.99 x 21.34	360	14.17	35	77	278 x 670	10.95 x 26.38	625	24.60	50	110
Subject to revision															

Flow Rates
from 300 kg/hr to 50 m³/hr
(661 lbs/hr to 1,765 ft³/hr)

C-LEVER® *direct* Stainless Steel

…especially developed for the measuring of solids found in the industries of food processing, chemicals and pharmaceuticals. The stainless steel housing makes cleaning quick and easy whenever changing products to be processed, whereas any product contamination is prevented right from the start.



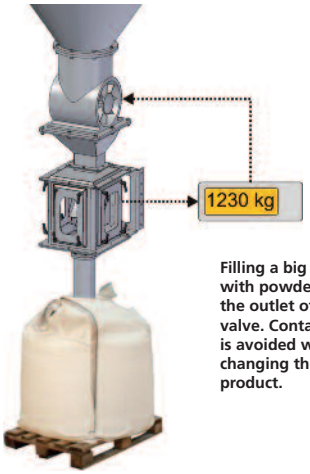
perfect cleaning

FM/ATEX approval

housing in stainless steel 1.4301 or higher

optional: electropolished surface

Technical Data (differing from C-LEVER® *direct*, s. page 7)	
accuracy	< ± 0.5%* standard
housing	stainless steel 1.4301(optional other stainless steels)
feeder/batcher (optional)	
power supply	24 V DC
control input	0-10 V, 0/4 -20 mA
protection	IP 62
other drives	pneumatic, open/close, etc. on request
Parts being in contact with the product are available in stainless steel, ceramic, polyurethane or other wear-resistant materials.	
*All specified accuracies are related to the volumetric range.	

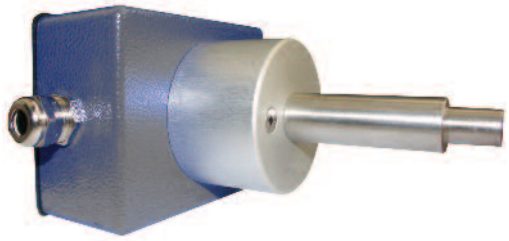


Filling a big bag with powder at the outlet of rotary valve. Contamination is avoided when changing the product.

C-LEVER® *direct*		without authorised product feed								with authorised product feed					
max. flow rate		outlet		intake		height		approx. weight		intake		height		approx. weight	
m³/hr	[ft³/hr]	mm	in	mm	in	mm	in	kg	lbs	mm	in	mm	in	kg	lbs
12	424	276 x 246	10.87 x 9.69	76 x 116	2.99 x 4.57	360	14.17	14	31	278 x 250	10.95 x 9.84	625	24.60	20	44
24	847	276 x 376	10.87 x 14.80	76 x 240	2.99 x 9.45	360	14.17	21	46	278 x 375	10.95 x 17.76	625	24.60	30	66
50	1,765	276 x 676	10.87 x 26.61	76 x 542	2.99 x 21.34	360	14.17	35	77	278 x 670	10.95 x 26.38	625	24.60	50	110
Subject to revision															

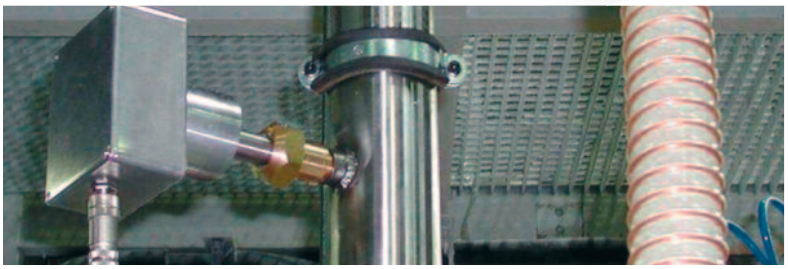
Detection of Pneumatic or Gravimetric Conveyed Bulk and Solids

MicroFlow



Typical applications

- ✔ Measuring and Controlling secondary fuels (e. g. coal-powder, sawmill)
- ✔ Master/slave control of different product streams
- ✔ Flow-/No Flow control
- ✔ Threshold monitoring and Signalling



System description

The Micro-Flow sensor reliable detects pneumatic- or gravimetric conveyed bulk and solids in horizontal and vertical metallic pipes. The sensor does not tower inside the pipe, thus mechanical wear and tear is avoided. The sensor works as a "stand-alone"-system with a programmable 20 mA output for flow rate control. It is suitable for self-assembly and can be easily calibrated.

How it works

The sensor uses a micro wave at 24.125 GHz with less than 5 mW transmitting power. It is flush mounted via a 1/2" screw thread at the pipe wall. At its front side it transmits a measurable frequency. From the reflected signal the mass flow rate is directly detected and is read out as an analogue signal proportional to the mass flow rate.

Optionally an external controller interface can be used. It provides the evaluation and data log, data transfer via interface, e. g. Profibus.

The Micro Flow is unaffected by temperature and pressure. It provides accuracy from 2 % to 5 % independent of installation position and flow profile of particles.

In order to achieve a better accuracy - especially in case of larger pipe diameters - the interconnection of two sensors in combination with one controller can be utilized.

The controller provides easy calibration as well as displaying mass flow (kg/h, t/h) and absolute quantity (kg, t), graphic display, logical switching sequences, data logger via customary USB stick, line graph and remote maintenance.

Technical Data	
Transducer	
supply	24 DC from controller
power reception	0.5 A (incl. heater)
frequency	K-belt (24.125 Ghz)
output signal	0/4-20 mA (not standardized)
housing	stainless steel/cast aluminium
enviroment protection	IP 54
working temperature	-35 °C to +65 °C (-31 °F to 150 °F)

Controller	
supply	230V / 115V
	50/60 Hz or 24V DC
input	constant from transducer
output	transducer supply 24 V
optional	0/4 – 20 mA, RS 422 interface
	counter contact relay
display	2-lines LCD (backlighted)
	1st line kg/hr or t/h / 2nd line kg or t absolute
environment protection	IP 54
housing	plastics IP 55

Benefits at a glance

- ✔ **easy self-assembly and calibration**
- ✔ **dust-free in-line control**
- ✔ **record of no-load and downtimes**
- ✔ **reliable, durable, maintenance-free**

Conveyor Belt Weighing System for Self-Assembly: Extremly Robust, Maintenance-Free, Economic

UNIBAND®

Typical applications

- ✓ **Output- and production control**
- ✓ **Control and truck loading**

System description

Belt scales are often used under extremely harsh surrounding conditions. When designing UNIBAND® great emphasis was placed on achieving the highest possible measurement precision by using robust and maintenance-free components. The weighing construction is made from square-section stainless steel. It is suitable for widths from 350 mm (14 in) to 2,400 mm (95 in) and for outputs from 4 t/hr (3.9 long tons/hr) to 5,000 t/hr (4,920 long tons/hr).

The single idler belt scale UNIBAND® with its stainless-steel weighing frame has a fully encapsulated, laser-welded strain gauge transducer.

The unique design has proven itself even under harsh environmental conditions. It guarantees utmost accuracy and reliability.

The customer effectively controls the processes and inventory by using the belt scale UNIBAND®. He can always rely on precise traceability and utilisation forecast. Loss of material is reduced in production. At the same time production and delivery are optimised.

How it works

The belt scale records the material flow by means of the weighing frame resp. the incorporated load cell on a defined belt section. The weighing station converts the vertical pressure into a horizontal tensile force via two maintenance-free pivot bearings.

The tensile force is transmitted to the load cell sensor and is converted by this into an electrical voltage signal. The weighing unit connected to the sensor evaluates the weight signal in relation to the belt speed tachometer. It displays the idler transport rate in „t/h" (tons per hour) and the selected count in „t" (e.g. tons per day, tons per month or tons per year).

Features

- continuous measurement in stationary and conveying equipment
- stainless Steel weighing frame
- low installation height
- fully encapsulated, laser-welded strain gauge transducer with mechanical overload protection
- weighing unit with touch panel
- easy adjustment due to comparable weighing
- optional accessories: data logger with USB stick, WLAN data transfer or remote maintenance via GPRS

Benefits at a glance

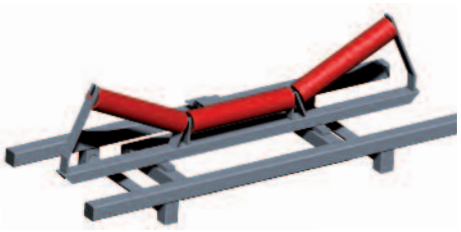
- ✓ **easy and quick assembly and installation**
- ✓ **robust (anti-corrosion) stainless steel weighing frame**
- ✓ **process-safe and accurate**
- ✓ **maintenance-free**
- ✓ **economic**

Multifunctional Controller

EVA HighEnd

Technical Data	
Specifications	
Wiring	full Wheatstone bridge with passive connections (6-wire system)
Sense system	passive sense system
Minimum bridge resistance	43.75 Ohm @ 5V exc.
Number of load cells	1 channel 1 - 8 Load cells 5 0 O h m 3 @ 5V exc. or 1 - 16 Load cells 1100 Ohm @ 5V exc.
Sensitivity	0.1 - 0.5 µV minimum voltage for verification scale
A/D Conversion Speed	1600 measurements per second
Internal Resolution	24 Bits (16,777,216 parts)
A/D Converter type	sigma-delta, radiometric isolated
Display Resolution	100,000 divisions max.
Display Step	x1, x2, x5, x10, x50
Decimal Comma	selectable between any digits of the display value
Full Scale Range	-25 mV to +25 mV
Excitation voltage	5 VDC (+2.5V and -2.5V with respect to the internal ground)
Linearity	< 0.001 % of full scale
Offset Drift	< +/- 2 ppm/°C
Span Drift	< +/- 2 ppm/°C
Digital filters	high performance digital filter 1- 10 Hz
Overall filter	0 to -50 dB
Memory Allocation	calibration data flash, dynamic data in SRAM with battery backup
Real-Time Clock	standard with NiMh b battery backup

EVA HighEnd Controller



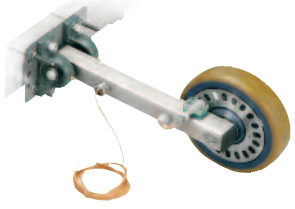
Stainless Steel Weighing Frame

Optional I/O	
Analog Output	1 Analog output 4-20 mA, 0-20 mA or 4-24 mA
Electrics	
Power Supply	100 - 240 VAC 50/60 Hz, 15 W max.
Environmental Conditions	
Operating Temperature	-10 °C to +40 °C [14 °F to 104 °F]
Storage Temperature	-20 °C to +70 °C [-4 °F to 158 °F]
Relative Humidity	40 to 90 % non-condensing

Stainless Steel Weighing Frame „Tandem"

Optional Communication Ports	
PROFIBUS DP	Profibus GSD file
Communication Software	
Profibus	GSD file for Profibus, with Sub D
Two-phase protocol	
Printer protocol	

Belt speed tachometer in robust design controlling the current belt speed	
material	stainless steel, 1.4301
speed control	inductive proximity switch
connection	3-wire with connector
Accuracy of the belt scale system	
± 1 - 2 % of the volumetric range in dependence of installation position and belt conveyor	



Belt Speed Tachometer

You are interested in learning more?

Our Booklet of Bulk Flow Control (BOB) provides guidance for accurate flow ratings with different bulk densities. It gives examples of typical applications reflecting the flexibility of the C-LEVER® *direct* flow meter.

Please download at www.rembe.com or call for: T +49 (0) 2961 / 7405-0

REMBE® GMBH
SAFETY+CONTROL

Gallbergweg 21
59929 Brilon / Germany
T + 49 (0) 29 61 - 74 05 - 0
F + 49 (0) 29 61 - 5 07 14
sales@rembe.de
www.rembe.de