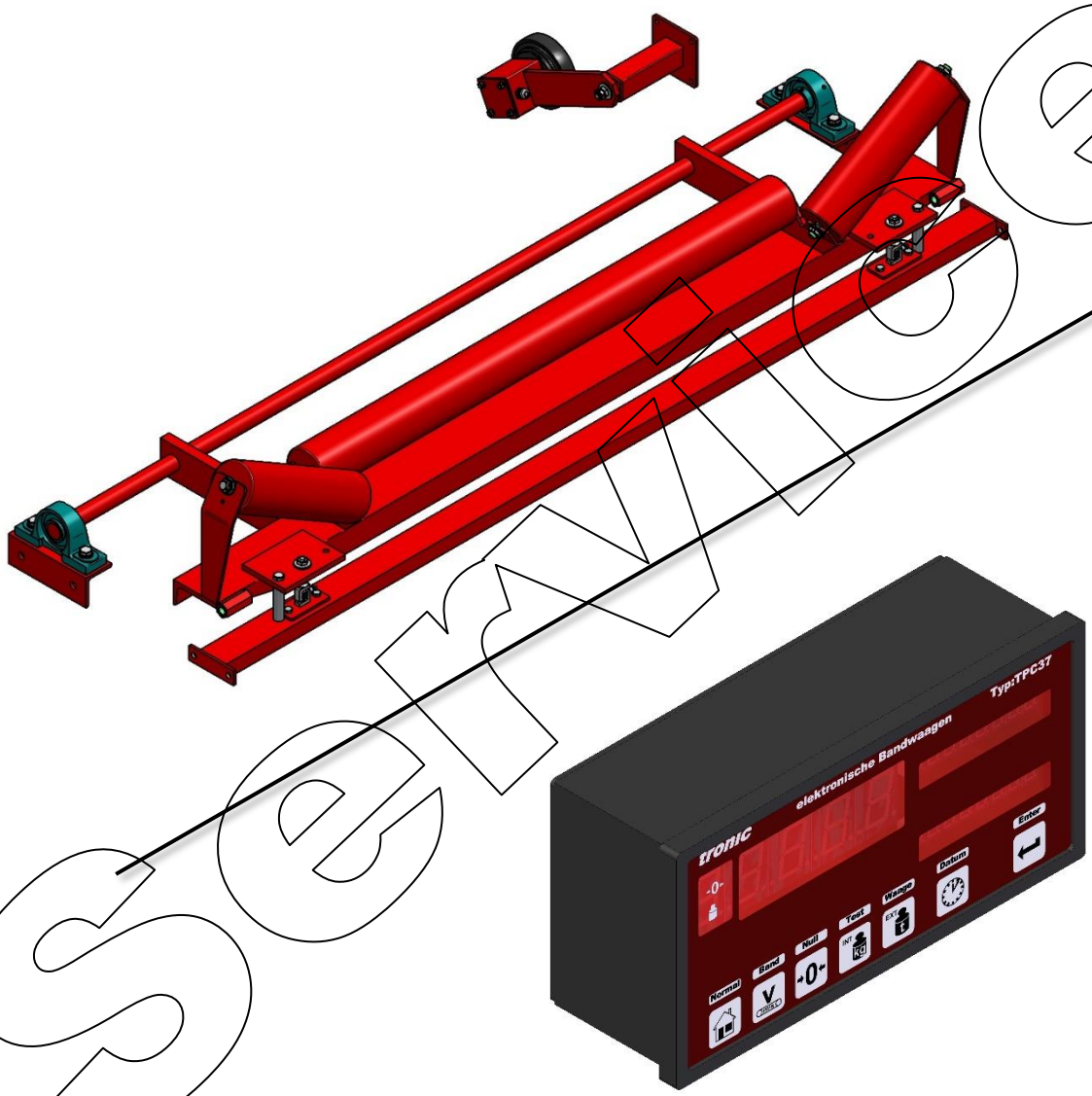
TPC 37-DFB-24



tronic
Nordstraße 6
26188 Edewecht
Tel. : 04405-281
FAX: 04405-4826981

Contents

1. Overview

- Processor controlled
- Easy to use
- Automatic tare
- Test mode with test weight integrated
- Insensitive measuring system
- High resolution and reproducibility
- Integrated clock
- Two galvanically isolated outputs for PLC
- Serial interface
- Current loop interface 0(4) - 20mA

Load Cell System

- Weighing using load cells
- Very fine resolution

2. Safety information

2.1 Risks from the conveyor belt

When working on running machines, there is a considerable risk of injury.
Before starting any work, take note to the following warnings.

WARNING

Moving parts

Risk of injury from moving and driven machine parts

- Before any work on the machine:

1. Turn of the machine.
2. Wait till the machine stands still.
3. Safe the machine against turning back on.
4. Disconnect the power supply to the machine.

2.2 Danger from bulk material

DANGER

Danger from stray bulk materials

Risk of injury with possible death from falling or “shooting” bulk material.

- Before any work on the machine:

1. Interrupt and deactivate the material supply.
2. Secure the material supply against being switched on again.

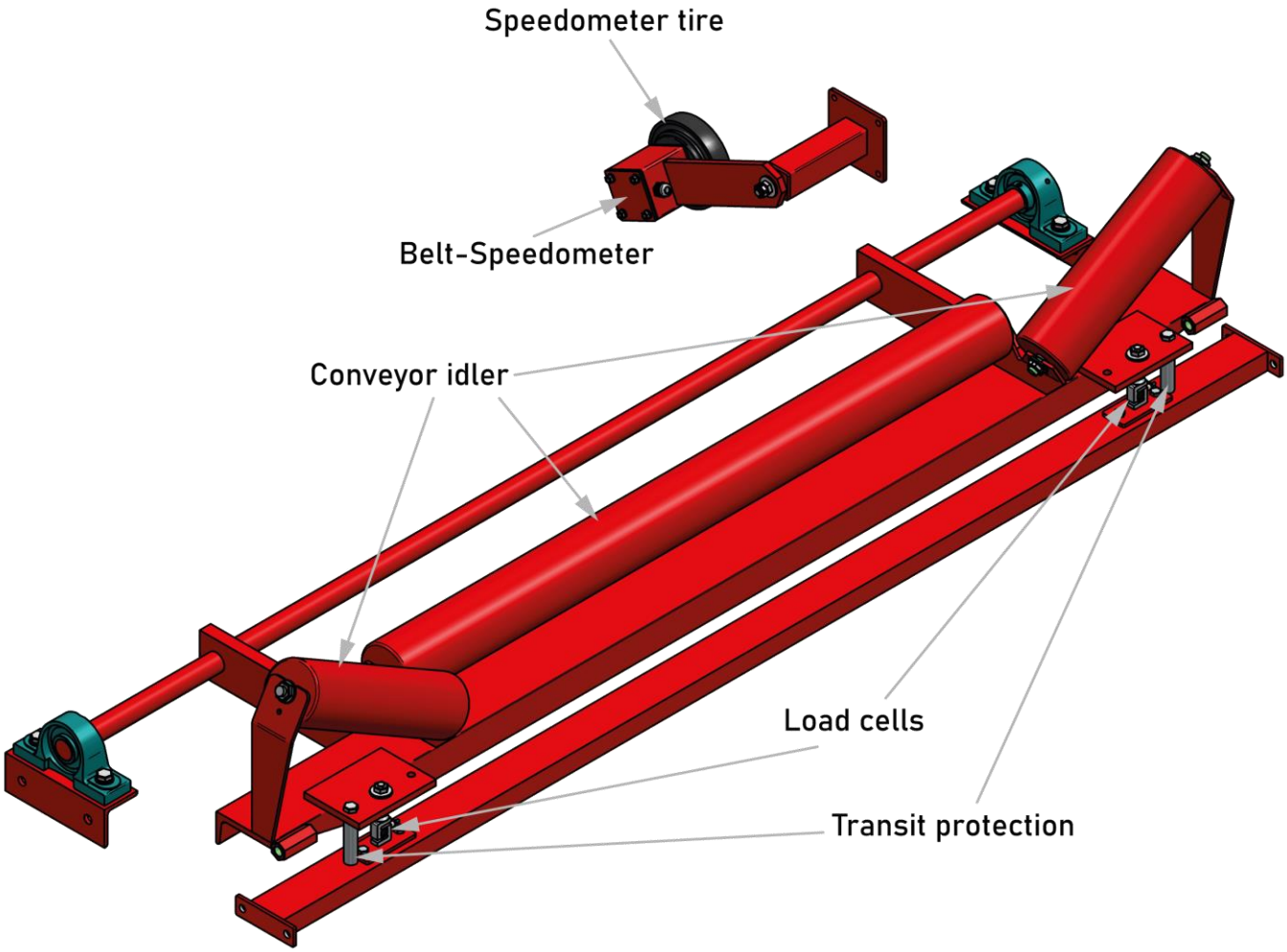
3. Technical specifications

Case:	To DIN 43700 with the following dimensions 192 X 96 X 64 (WxHxD) The DIN case (protection class IP 55) consists of fibreglass reinforced NORYL GFN2 SE1
Displays:	3 displays are installed. - 1 x 5 digit 20mm display height - 2 x 8 digit 8mm display height In normal operation of the weighbelt, the following data is displayed constantly: - Average conveying rate in t/h - Current time - Tonnes per day in 0.1t steps Furthermore, the belt speed, date, annual ton counter and special displays for calibration and zeroing can be accessed.
Keys:	7 film keys with different icons
Mechanics:	Lever arm mechanism with LVDT measuring transducer Tacho generator for belt speed
Belt width:	400-2200 mm
Electronics:	- Supply 24VDC or 100-240VAC, 50/60Hz (option) - Power consumption max. 12VA - Working temp. range -20 to +50° Celsius - Accuracy better than 1 % - Cable length up to 200m
Measuring range:	depending on the design, from 20 t/h to 3000 t/h
Means of adjustment:	- Automatic zeroing - Calibration with test weight or test weighing - Limits for max. and min. conveying rate - Limits for min. speed
Outputs:	Analogue and digital interfaces are programmable to order

3.1 Load cell

Manufacturer	**GALOCE**	
Model	**GSL312-50KG (490N)**	
Rated Output	mv/v	1.91996
Comprehensive precision	%F.S	≤±0.1
Linearity error	%F.S	0.1
Repeatability error	%F.S	0.1
Hysteresis error	%F.S	0.05
Creep	%F.S/30min	0.05
Zero balance	%F.S	±2
Input impedance	Ω	350±5
Output impedance	Ω	350±3
Temp.effect on zero	%F.S/10°C	0.05
Temp.effect on span	%F.S/10°C	0.05
Excitation voltage	VDC	5~10
Compensated temp range	°C	-10~+60
Operating temp range	°C	-20~+80
Safe overload	%F.S	150
Ultimate overload	%F.S	200
Material		Stainless steel
Cable		Φ2*3m
Defend grade		IP66

4. Descriptions



5. Technical overview

5.1 Mechanics

The mechanical part of our weighbelts is deliberately robust because experience has shown that, particularly in mobile applications, the weighing stations are subjected not only to the applied weight force of the conveyed material, but also to heavy vibrations and overloading when the conveyor belts are in motion.
In the weighing station, care was taken to ensure that all moving parts at the conveyor belt frame have adequate clearance. This measure prevents falling conveyed material from impeding the movement of the station by jamming. This experience gathered on site led us to decline cost-reducing savings in the mechanics.

5.2 Belt speedometer

The belt speedometer is held in triple bearings and has a rubber running surface which minimizes slippage between the idle wheel and the conveyor belt.

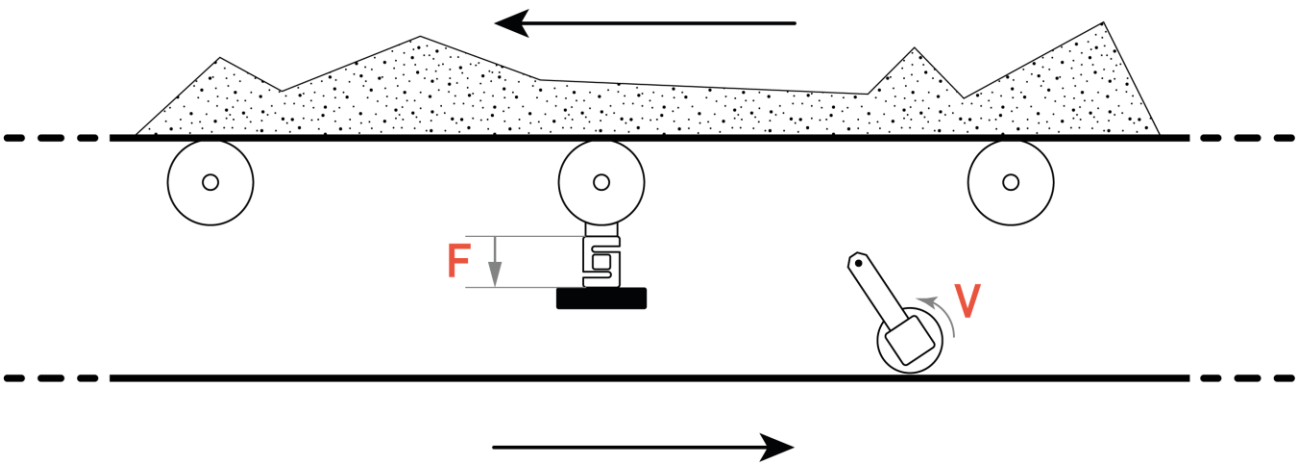
5.2 Load cells

****

5.3 Measurement acquisition electronics

The electronic system of the weighbelt consists of two parts. One part is located directly at the mechanical part of the weighbelt. The very small signal of the measuring transducer is processed here to create a signal of 4-20mA. This has two advantages: 1. the signal generated in this way is extremely insensitive to externally generated interference fields and the length of the cable can be changed without recalibration. 2. if the evaluation circuitry is replaced, it is unnecessary to calibrate the measuring transducer.
With the current loop interface, it is also possible to detect open circuits and short-circuits.
The 2nd part of the electronic system is the evaluating circuitry.

5.4 Working principle

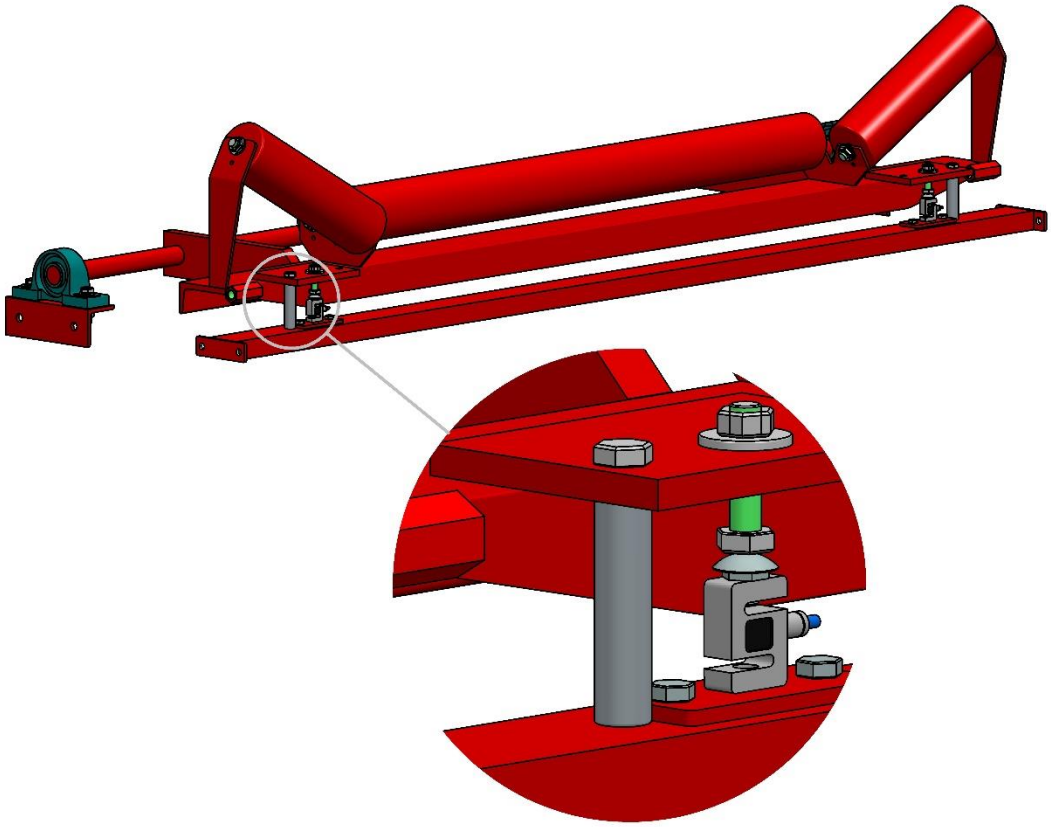


With the Load Cell System the weight (F) is measured continuously by two load cells.

The belt-speed (V) is measured by the belt-speedometer.

6. Transit protection

The transit protections are used to protect the load cells, as these are usually defect after an overload.



Always use the transit protection if:

- The conveyor is moved
- Workings take place on the conveyor
- The conveyor scale is exposed to an impermissible load

7. Maintenance

The system is low maintenance. There are only a few things to look at:

7.1 Idler roller

- Keep the roller clean.
- Make sure the rollers run smoothly.

7.2 Belt speedometer

- Make sure the speedometer tire runs smoothly.
- Check the tire for rough wear.

Make sure that the speedometer can move easily up and down.

Service-manual

TPC 37

8. Service manual

8.1 Outputs

Analog Interface 0(4)-20mA

The active current interface is sending a proportional current signal of the actual conveyor capacity. The scaling of current and capacity can be adjusted. You can use this signal with an PLC Analog Input.

Pulse output 100kg

This is an opto isolated output for an PLC Input. Every 100kg this output sends a signal for a definable time.
A PLC can count this pulse on a normal input and sum it for visualizing of the quantity of conveyed material.

Pulse output 1kg

This is an opto isolated output for an PLC Input. Every 1kg this output sends an impulse.
A PLC can count this pulse on a special count input and sum it for visualizing of the quantity of conveyed material.

RS232

This is the serial port for Printers.
The communication parameters are: 9600Bd,n,8,1

Profinet

****

Profibus

****

8.2 Parameters which can be calibrated

Values in brackets are default values.

P0: **Range of value 0-255 (0)**
This parameter will adjust 0 or 4 mA currency interface.
It indicates current for conveying capacity of 0 t/h.
Value of 0 corresponds to 0 mA.
Value of 47 corresponds to 4 mA.
Output of actual current will be passed to the interface during calibration.

P1: **Range of value 0-255 (245)**
This parameter is a reference value for maximal current of 20 mA.
Value of 246 corresponds to 20 mA

P2: **Range of value 0-255 (10)**
This parameter gives pulse duration for pulse outputs.
0 = 20ms
1 = 20ms
2 = 40ms
3 = 60ms ------> 20 = 400ms

P3: **Range of value 0-23 (13)**
For configuration of current output 0 (4)-20 mA it is necessary to introduce conveying capacity for current of 20 mA.

0 = 50 t/h	1 = 60 t/h	2 = 70 t/h	3 = 80 t/h	4 = 90 t/h
5 = 100 t/h	6 = 150 t/h	7 = 200 t/h	8 = 250 t/h	9 = 300 t/h
10 = 350 t/h	11 = 400 t/h	12 = 450 t/h	13 = 500 t/h	14= 550 t/h
15 = 600 t/h	16 = 650 t/h	17 = 700 t/h	18 = 750 t/h	19= 800 t/h
20 = 850 t/h	21 = 900 t/h	22 = 950 t/h	23 = 1000 t/h	

P4: **Printer Textnumber**
P5: **Printer Mode**

P6: **bit0** 0= Eine Tachofahne 1= 4 Tachofahnen
Bit1 0 = Normal Modus 1= wenig Modus

P7: **min speed** 35 = 0,6m/s
70 = 0,3m/s
140 = 0,15m/s

P9: **Limit value for automatic shutdown**
P10: **Time value for automatic shutdown**

P12: **Range of value 0 – 255**
Profibus address

8.3 Error codes

Error 20: **Current from tachogenerator to high.**
Short circuit in Cable or Printed Circuit board

Error 21: **Current consumption of Tachogenator is low.**
Broken wiring.

Error 30: **Current of LVDT Signal is to high.**
Defect LVDT electronic. Improper adjustment of LVDT Sensor.

Error 31: **Current of LVDT Signal ist to low.**
Improper adjustment of LVDT Sensor.
Broken wiring.

8.4 Profibus

In the Profibus option is a 9 pin SUB-D connector.
In the Profinet version is a Network Connector

All Datawords are Low Byte / High Byte

Structure of PROFIBUS/NET data:

Inputs in the sight of PLC

INPUT:	**2 Byte (1 word)**		**Pressure value (kg)**
INPUT:	**2 Byte (1 word)**		**t/h**
INPUT:	**2 Byte (1 word)**		**Speed in cm/s**
INPUT:	**2 Byte (1 word)**		**LVDT Value**
INPUT:	**4 Byte (2 word)**		**Counter 1 in steps of 100kg**
INPUT:	**4 Byte (2 word)**		**Counter 2 in steps of 100kg**
INPUT:	**2 Byte (1 word)**		**Calibration value**
INPUT:	**2 Byte (1 word)**		**Zeropoint value**
INPUT:	**1 Byte**		**Temperature (option)**
INPUT:	**1 Byte**		**Control Word**
		BIT 0	Zeroing is running
		BIT 1	Testmode running
		BIT 2	Test weighing is running
		BIT 3	
		BIT 4	
		BIT 5	Value is negative (Minus in display)
		BIT 6	State of first impulse output
		BIT 7	State of second impulse output
INPUT:	**1 Byte**		**Error Number**

Outputs in the sight of PLC

OUTPUT:	**1 Byte**		**Controlword 1**
			(Action starts on change from 0 to 1)
		BIT 0	Start zeroing
		BIT 1	Start testmode
		BIT 2	Start test weighing
		BIT 3	Kontrollverwiegung einstellen
		BIT 4	
		BIT 5	
		BIT 6	Clear counter 1
		BIT 7	Clear counter 2
OUTPUT:	**1 Byte**		**Controlword 2 (trigger)**
		BIT 0	
		BIT 1	
		BIT 2	
		BIT 3	
		BIT 4	
		BIT 5	Accept reference value
		BIT 6	Accept zero value
		BIT 7	Accept calibration value
OUTPUT:	**2 Byte (1 word)**		**Calibration value**
OUTPUT:	**2 Byte (1 word)**		**Zeropoint value**
OUTPUT:	**2 Byte (1 word)**		**Reference value**

8.5 Input of parameters

Input parameters by following steps:

1. Press “**BAND**” and additionally “**TEST**” button during 1 second and release buttons.

2. Press “**ZERO**”. On display 1 appears P 0
Numbers of parameters can be modified by “DATE” or “SCALE” buttons.

3. After selection of the required parameter press “**ENTER**” button. Display 1 will change from P to C.

Now you can modify the value of the parameter using “DATE” and “SCALE” buttons.
The new value will be assumed pressing “ENTER” button.

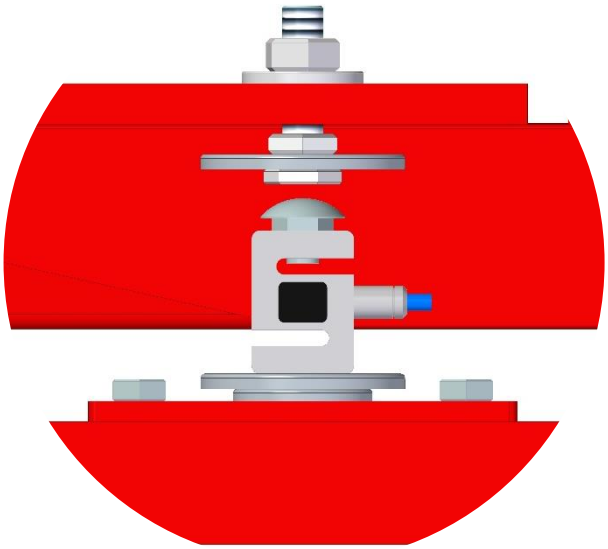
If you don't want to assume the value you can press “NORMAL” button.

You will quit the adjustment menu by repeated pressing of “NORMAL” button.

8.6 Calibration of the load cells

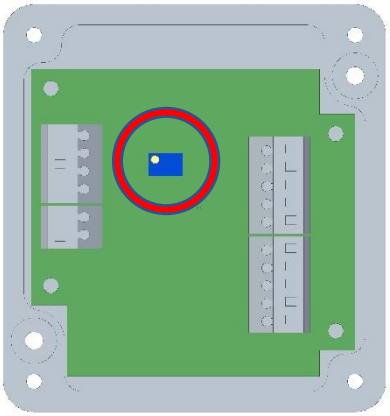
1. Press “**BAND**” and additionally “**TEST**”. Hold the buttons at least one second.

2. Turn the screw of the left sensor so that there is no load on the load cell. (The complete load is on the right load cell)



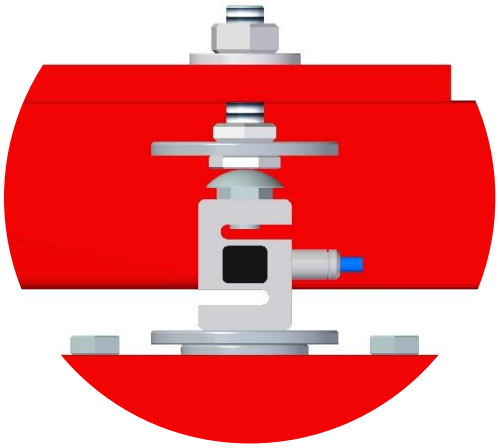
3. Only connect the **right** sensor.

   Adjust the potentiometer (red circle) that the mainscreen of the TPC37 shows 180.



4. Now turn the screw of the left sensor back down so the load cell is loaded again. Adjust the screw that the mainscreen of the TPC37 shows 90.

   Remember to counter the screw again with the upper nut



5. Now connect the left sensor aswell.

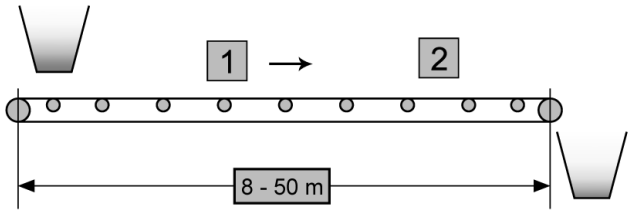
   If you followed the steps correctly the TPC37 should show around 180 on the mainscreen.

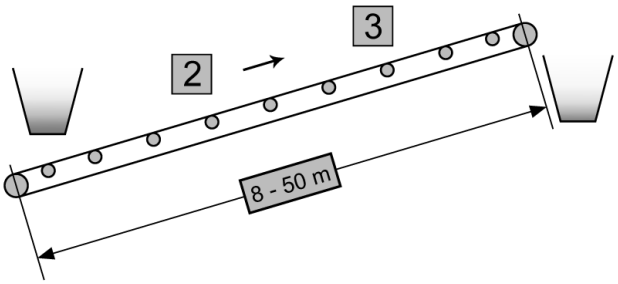
9. Installation instructions for the conveyor belt scale

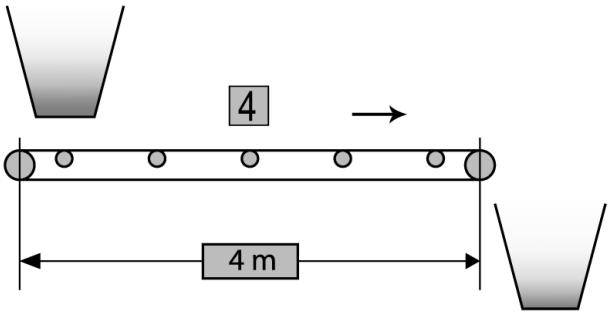
The assembly of the conveyor scale takes place in a straight piece of conveyor.

The following figures show Conveyors with typical installation locations of conveyor scales.

The numbers in the squares represent the accuracy of the installation location (1 = very good, 6 = disadvantageous).

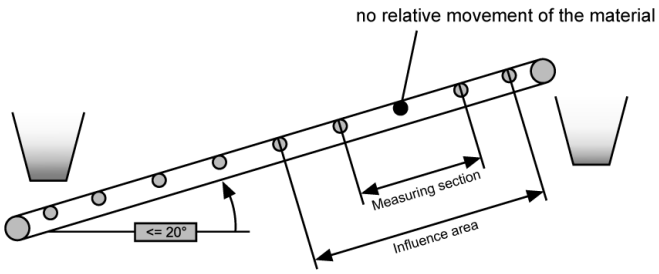






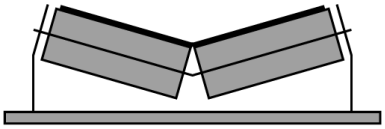
The angle of inclination of the conveyor belt must be chosen that no rollback of the material occurs.

The distance of the conveyor scale to the feeding device must be chosen that the material flow is calm and no relative movement occurs.



The trough affects the accuracy.

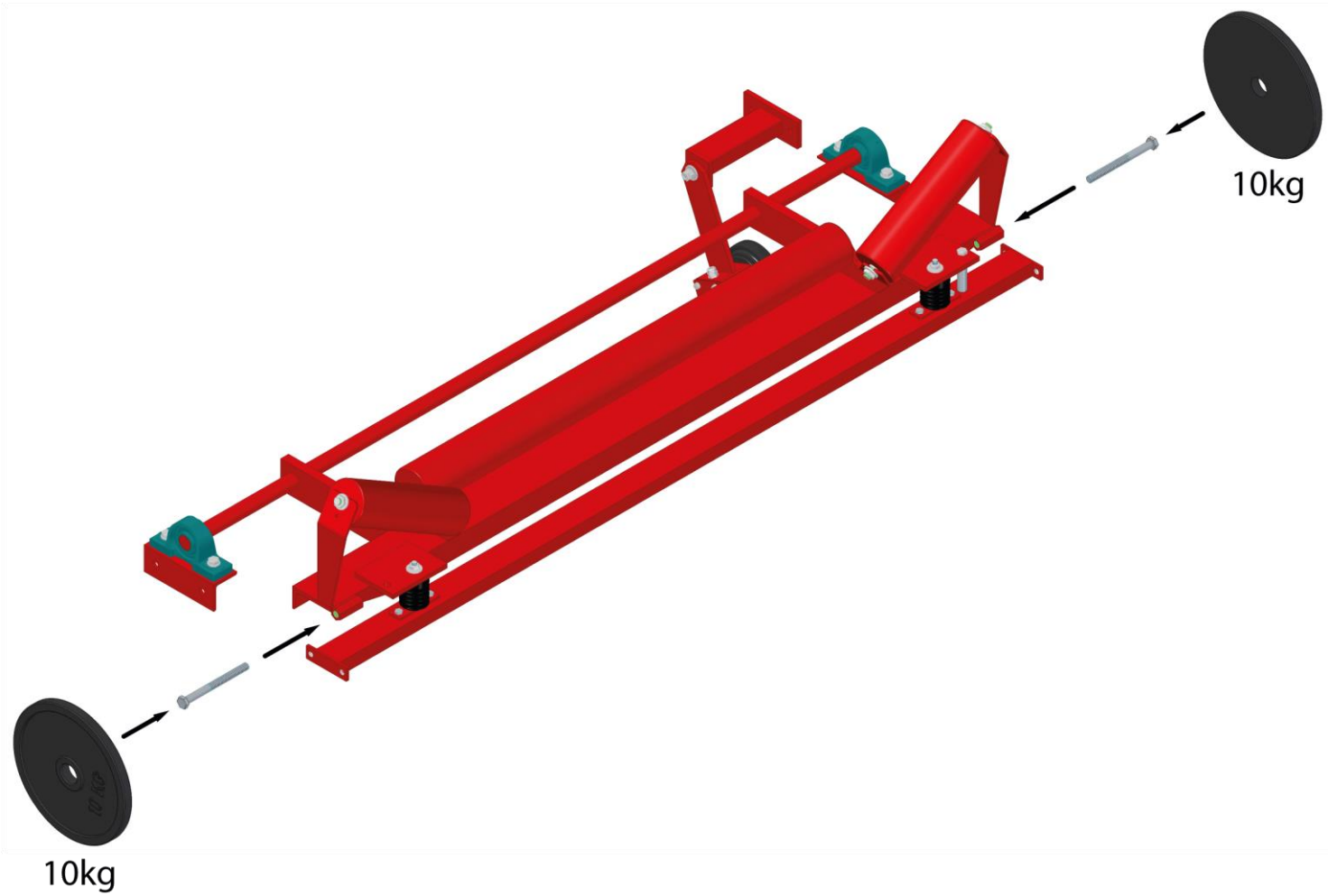
In the area of influence of the scale (2 rollers before and after the measuring station) must be the full troughing of the belt.



suitable for measuring accuracies of 2%

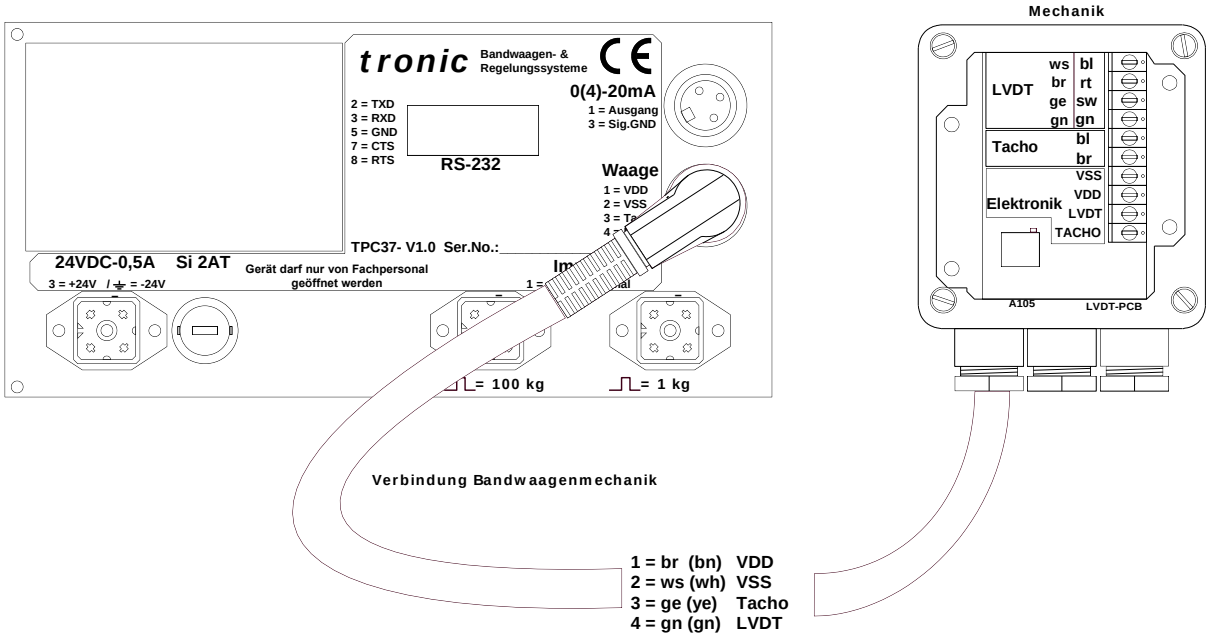
till 20° good
till 30° satisfactory
till 45° suitable for measuring accuracies of 2%

10. How to apply the test weight

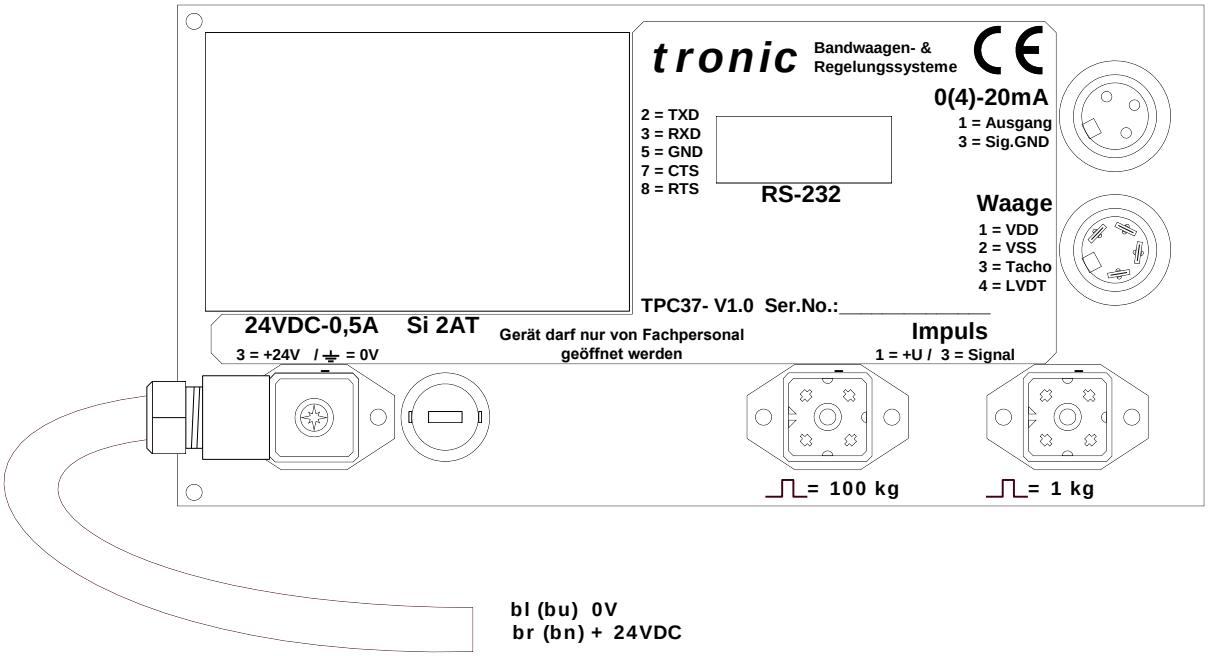


11. Cable connections

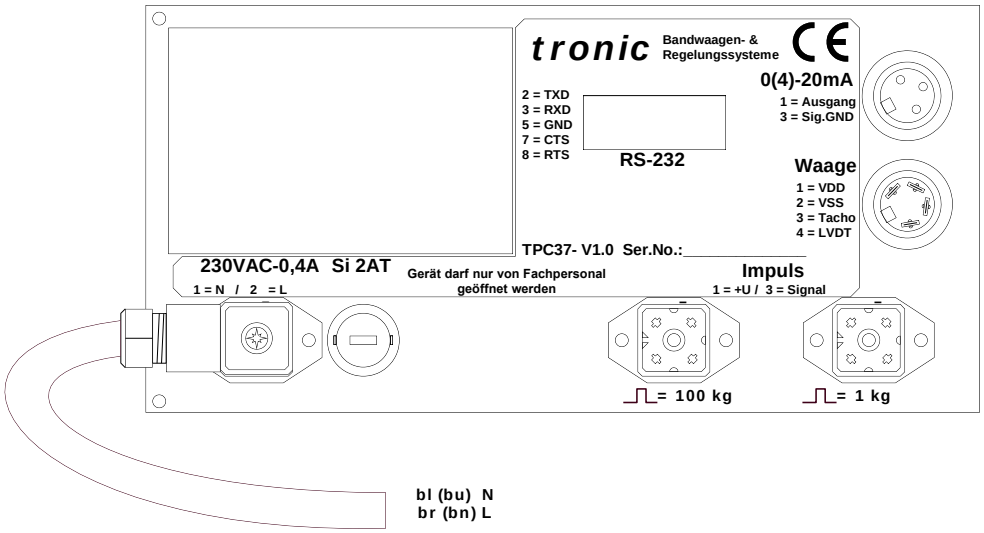
Connecting electronics and mechanics



Power supply 24V



Power supply 230V



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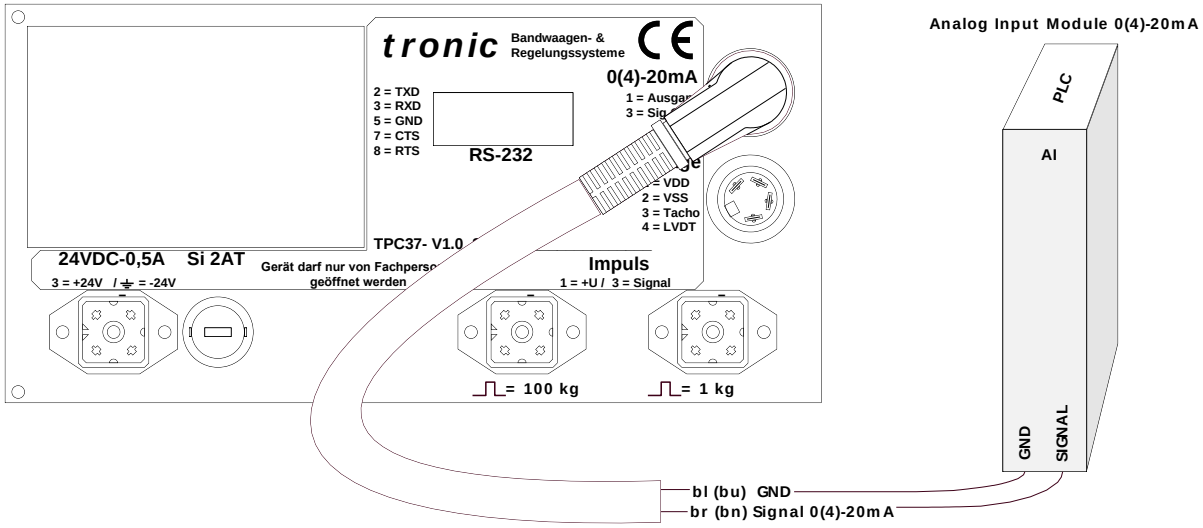

Pulse output 100kg

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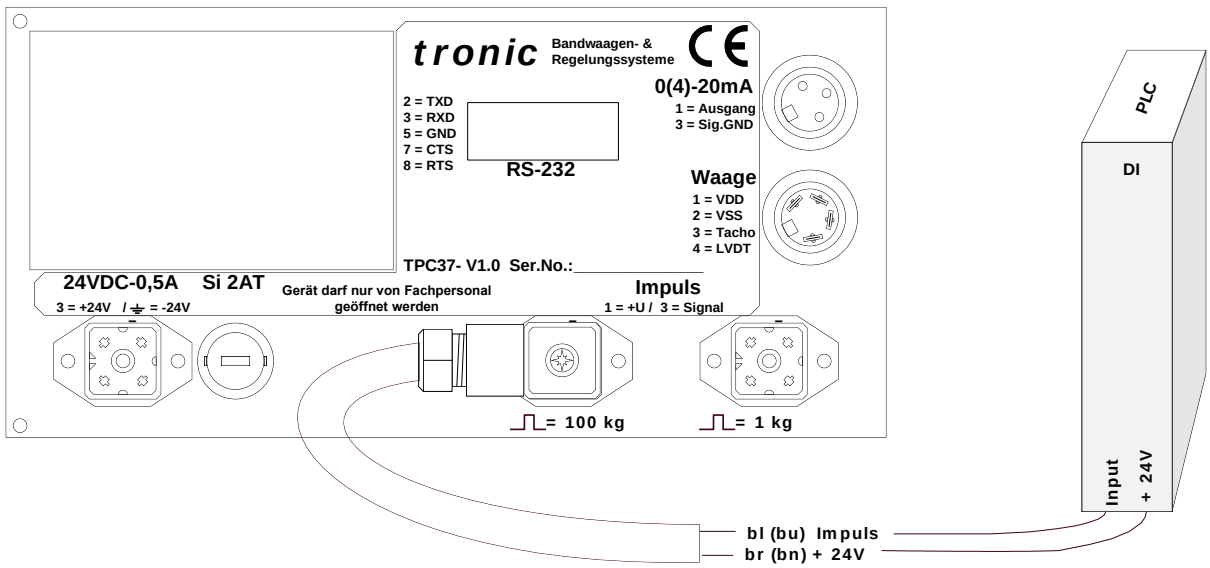
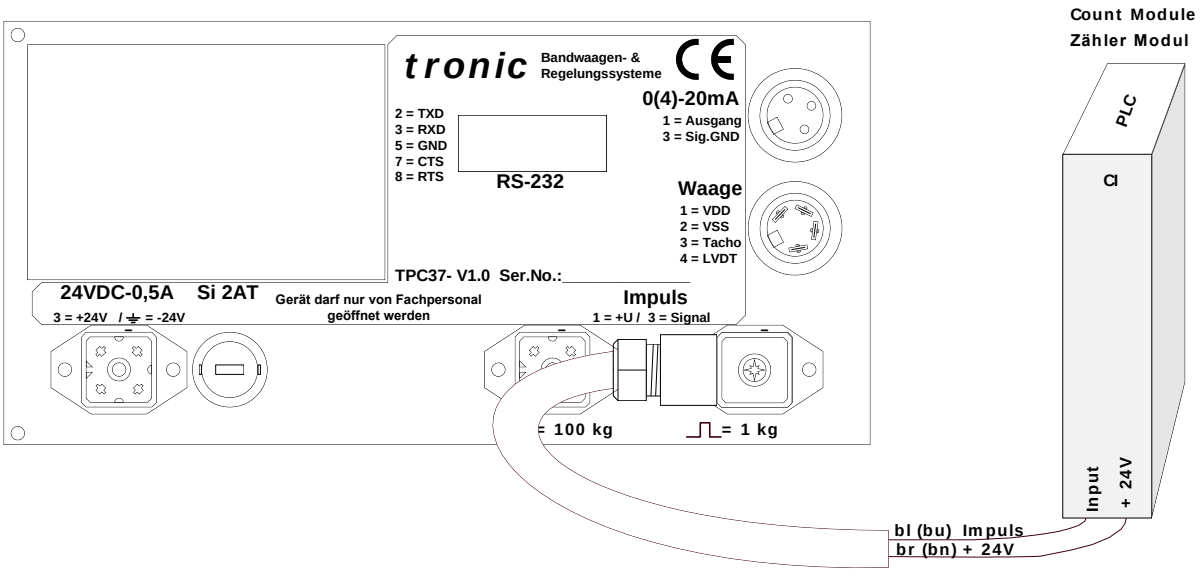
A PLC can count this pulse on a normal input and sum it for visualizing of the quantity of conveyed material.

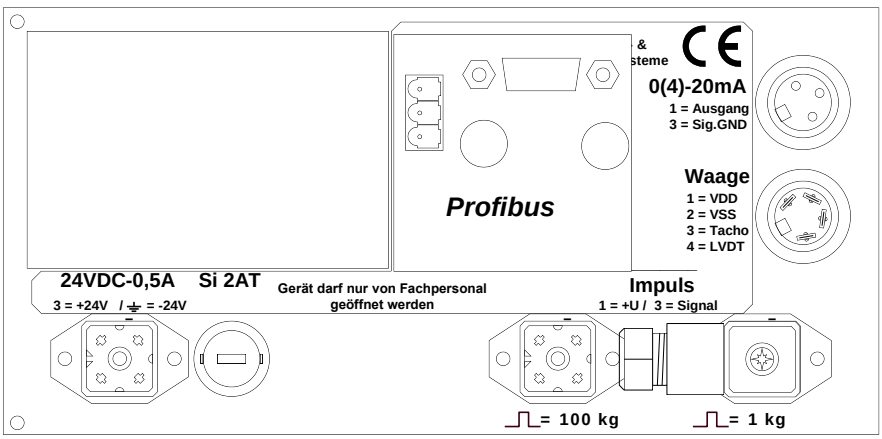


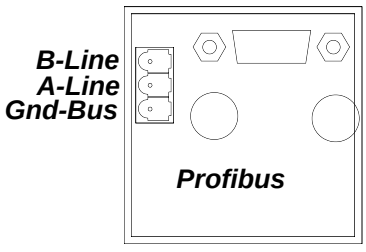
Pulse output 1kg

This is an opto isolated output for an PLC Input. Every 1kg this output sends an impulse.
A PLC can count this pulse on a special count input and sum it for visualizing of the quantity of conveyed material.



Profibus-Interface

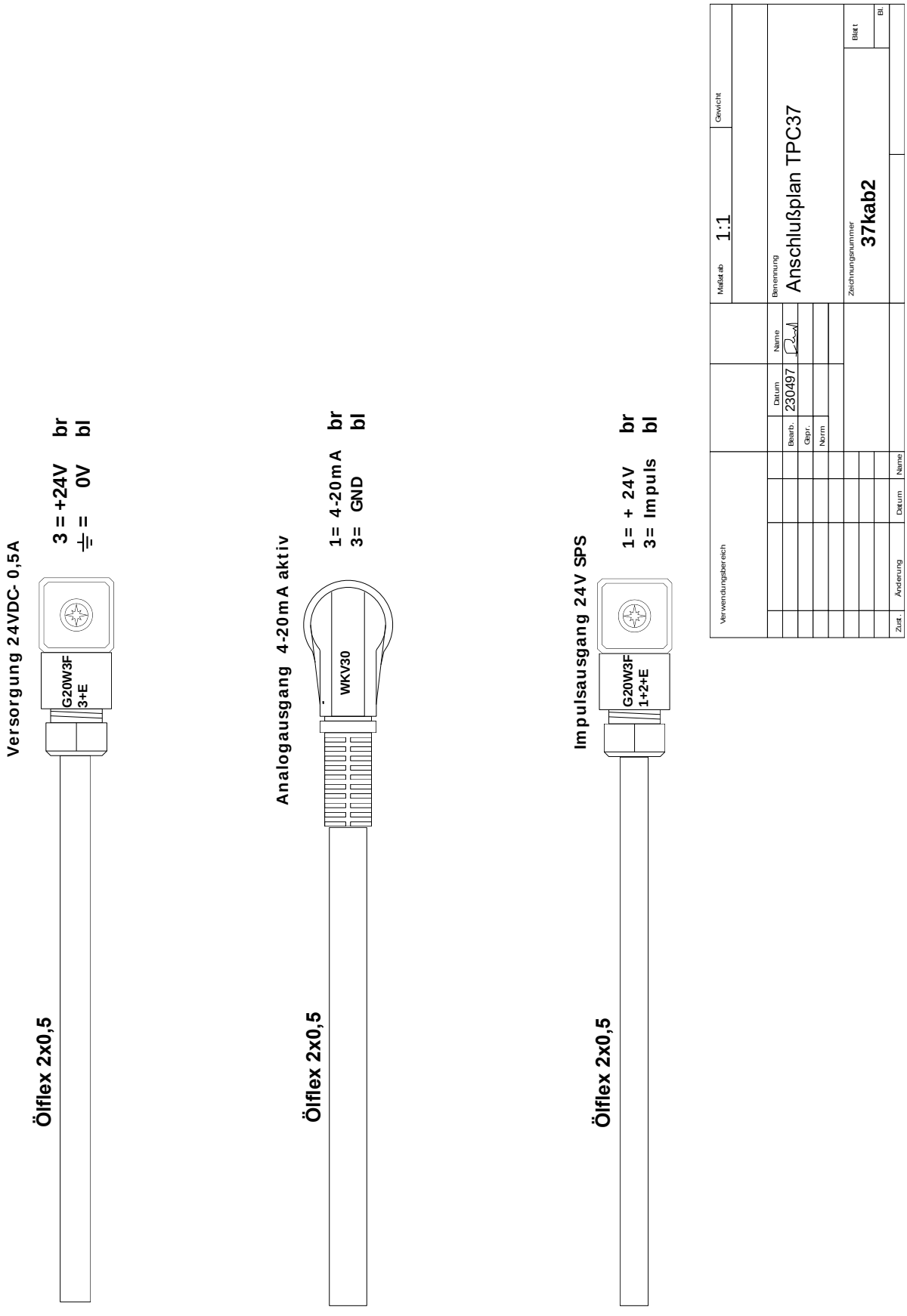


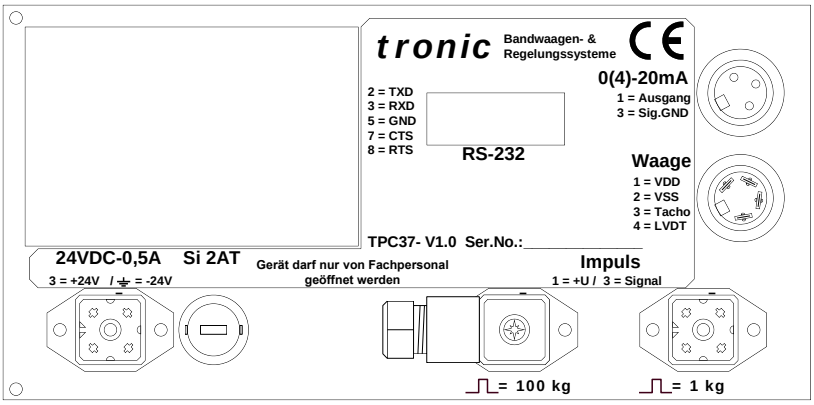


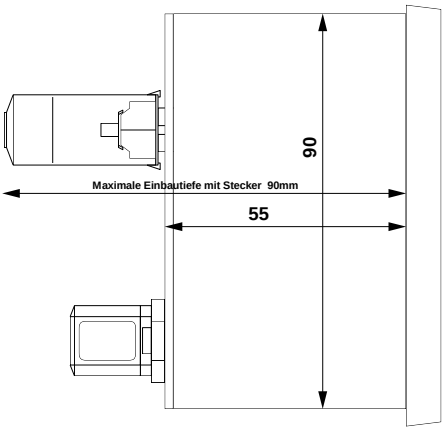
9pol Sub-D Buchse

3 = B-Line
8 = A-Line
5 = Gnd-Bus

12. Cable list







Panel cutout

186 x 92

Verwendungsbereich								Maßstab 1:1	Gewicht
						Datum	Name	Benennung	
					Bearb.	230497		Bandwaage TPC37	
					Gepr.				
					Norm				
								Zeichnungsnummer	Blatt
								37rueck.tdr	Bl.
Zust.	Änderung		Datum	Name					

13. Parts list

1	2	3	4	5	6
Pos.	Menge	Ein-heit	Benennung	Sachnummer	Bemerkung
	1	Stück	Traverse	3700-1	Bandrahmenbreite angeben
	1	Stück	Meßschwinge	3700-2	dito
	2	Stück	Lagerbefestigung	3700-3	abhängig von Band-körper Ausführung
	2	Stück	Pendelkugellager YAR 206-2F mit Gehäuse SY506M	3700-4	
	4	Stück	Bügel-Lagerbefestigung	3700-5	
	3	Stück	Förderbandrollen 89mm	Rolle 200 / Rolle 250 / Rolle 320 Rolle 400	Entsprechende Größe angeben
	2	Stück	Meßfeder	3700-7	
	4	Stück	Federaufnahme	3700-8	
	1	Stück	Bremse	3700-9	nicht für stationären Einbau
	1	Stück	Testgewicht	3700-0	
	1	Stück	Schraube für Testgewicht	3700-6	benötigte Länge angeben
	1	Stück	Meßaufnehmer LVDT	LVDT-10	
	1	Stück	Stift für Meßaufnehmer LVDT	STIFT-10	
	1	Stück	Tachogenerator mit Stromausgang	TG137	
	1	Stück	Elektronik für Tachogenerator TG137	TG137-PCB	
	1	Stück	Elektronik für Meßaufnehmer LVDT-10 mit 4-20mA Ausgang	LVDT-PCB	
	1	Stück	Gehäuse für Meßaufnehmer-Elektronik	A105	Bopla 01105000
	2	Stück	HTS Stifteinsatz 10 polig	HTS 43121040	nicht für stationären Einbau
	1	Stück	HTS Anbaugehäuse mit Kabeleinführung	HTS 42631006	nicht für stationären Einbau
	2	Stück	HTS Steckergehäuse	HTS 42421005	nicht für stationären Einbau
	2	Stück	HTS Buchseneinsatz 10 polig	HTS 43221040	nicht für stationären Einbau
	40	Meter	Bandwaagenkabel	Ölflex-100 SY 4 x 0,5	Bei Bestellung Länge angeben

1	2	3	4	5	6
Pos.	Menge	Ein-heit	Benennung	Sachnummer	Bemerkung
	1	Stück	Auswerte-Elektronik TPC37 komplett	3711	
	1	Stück	Display für TPC37	3707	
	1	Stück	CPU-Karte TPC37	3709	
	1	Stück	Netzteil TPC37 bei 220V-Version	3704	
	1	Stück	Stecker 0(4)-20mA 3 polig	WKV30	
	1	Stück	Stecker LVDT 4 polig	WSV40	
	1	Stück	Buchse 24V Versorgungsspannung	G20W3F 3+E	
	1	Stück	Buchse 230V Versorgungsspannung	G20W3F 1+2	
	1	Stück	Buchse Impulsausgang	G20W3F 1+2+E	
	2	Stück	Befestigungsspannge Form B	Spange	
	1	Stück	Sicherung - Fein 2AT	träge 2,0A	

					Maßstab	
				Datum	Name	Stückliste TPC37
			Bearb.	10.12.97	Rink	
			Gepr.			
			Norm			
						Blatt 2von2
			tronic Bandwaagen			Bl.
Zust.	Änderung	Datum	Name			37Stückdoc