

Belt Scales Accessories

Milltronics Test Chain

Operating Instructions · 04/2013



Milltronics

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Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Unit Repair and Excluded Liability:

- The user is responsible for all changes and repairs made to the device by the user or the user's agent.
- All new components are to be provided by Siemens Milltronics Process Instruments.
- Restrict repair to faulty components only.
- Do not reuse faulty components.

Warning: Cardboard shipping package provides limited humidity and moisture protection. This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.

Note: Always use product in accordance with specifications.

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Milltronics

Belt Scales Accessories
Milltronics Test Chain

Operating Instructions

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

 DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.

 WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.

 CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.


If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

 WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

1.1 The manual

This instruction manual is intended to provide the basic guidelines for installation, operation and maintenance of the calibration test chain and storage reel compartment. Other weighing instruction manuals are available for download from our website:

Siemens weighing (<http://www.siemens.com/weighing>)

Note**For industrial use only**

This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.

Follow these operating instructions for quick, trouble-free installation, and maximum accuracy and reliability of your weighing system.

We always welcome suggestions and comments about manual content, design, and accessibility. Please direct your comments to:

Technical publications (<mailto:techpubs.smpi@siemens.com>)

Safety notes

2.1 General safety instructions

**CAUTION**

Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance. Only qualified personnel should install or operate this instrument.

Note

Alterations to the product, including opening or improper repairs of the product, are not permitted.

If this requirement is not observed, the CE mark and the manufacturer's warranty will expire.

Safety notes

2.1 General safety instructions

Description

3.1 Test chain calibration

Test chain calibration is used extensively for testing belt scales, and to calibrate high capacity belt scales and weighfeeders that cannot be calibrated to material tests.

During the calibration, the test chain is applied to the conveyor belt and is secured at both ends so that the chain remains stationary over the weigh length. The chain rolls on the surface of the moving belt conveyor, providing dynamic scale loading of a known weight value, and thus supplying the calibration reference.

Advantages

The roller test chain simulates live material loading by causing the belt's structure to deflect in much the same manner as when material is present.

A much greater test load can be applied to high capacity belt scales and weighfeeders because most weighbridge designs can only accommodate a limited number of static weights applied to the suspension. The high capacity test load is especially important on systems using mechanical weighing elements and lever systems because they calibrate the systems with test load values close to normal operating loads.

Note

- Ensure accessibility to the top (load) side of the conveyer belt in the scale area.
 - Secure and remove the test chains each time they are used.
 - Provide routine inspection and maintenance.
 - Lubricate regularly and repair as necessary to ensure safe reliable service.
 - Weigh and measure chain annually to determine the correct and accurate load value (required to compensate for wearing and stretching of the test chain components).
-

Description

3.1 Test chain calibration

Planning/Configuring

4.1 Test chain and reel selection

A calibration range is generally targeted between 50% to 80% of the maximum design load. Use the belt scale's design information to determine chain requirements.

Example

Belt scale design information	
Belt scale's capacity:	1500 MTPH
Design load maximum:	166.67 kg/m
Idler spacing:	1.0 m
Type of belt scale:	1 weigh idler (MSI)
Belt width:	1400 mm
Belt speed:	2.5 m/sec

The next larger chain is the preferred choice to retain the desired percent of maximum loading.

In our example, the calculation is performed at 60%:

$$166.67 * .60 = 100 \text{ kg/m (67.05 lb/ft)}$$

Using the nominal kg/m value of 100, the next larger chain is selected from the chart of available test chains. The value selected is equivalent to 104 kg/m (70 lb/ft). Test Chain design size is based at 62.5% belt loading.

The length is based on the idler spacing. The test chain should extend no less than two fixed idlers beyond each end of the scale mounted idlers.

Nominal chain length = (# of scale idlers + 3) * idler spacing:

$$1 + 3 * 1 = 4m (13 \text{ ft.})$$

- Note that some chain pitches do not divide evenly into the nominal chain length. The selected chain may require to be increased by a pitch or two to accommodate construction.
- Stamped value is derived from the actual manufactured results.
- The motorized storage reel is sized for a 1400 mm belt width with a conveyor width outside to outside of stringer channels of 1820 mm, "C" dimension as given by others.

4.2 Test chain assembly

Test chains can be shipped in sections based on the length ordered. These sections allow for easier handling of the chain. To connect or dis-assemble sections of the chain, remove the pins from the roll shafts. The shaft can then be removed and links of chain can be connected or removed for installation or storage.

Installing/Mounting

5.1 Installation guidelines

The Siemens Milltronics test chain storage reel requires a support steel structure for installing above the conveyor. Locate an area suitable for the storage reel for flat or inclined conveyors upstream of the belt scale's location toward the head pulley. For declined conveyors, the reel should be located to the upper side of the conveyor, approach end. Use this structure to gravity feed the test chain into place.

Once the location has been selected, ensure that the reel is centered over the center line of the belt and that it will clear the maximum material bed depth anticipated for the application. Material loads should not come in to contact with any portion of the storage reel.

Note

- Support legs, gussets, brackets, and mounting bolts are to be supplied by customer.
 - A mechanical designer should oversee the installation and verify the support structure.
 - Provision for AC power is required for wiring of gear motor. Ensure the power source is available. All wiring must be done in conjunction with approved conduit, boxes, and fittings, and done to procedure in accordance with all governing regulations.
-

A 30 foot (9.14 m) length of stainless steel wire rope is supplied with clips. One end of the cable is attached to the test chain shackle. The other end is attached to the spool piece of the reel around the shaft.

5.2 Installation procedure

Position local control station within direct viewing of the storage reel and the belt scale. Minimum requirements for the control station (supplied by customer):

- Forward / Reverse or Raise / Lower
- Three position (on, off, on) spring return configuration

Upright posts constructed of angle iron may be placed at opposite end of the test chain. These may be welded to main conveyor stringers on both sides, for securing the test chain's free end while in use.

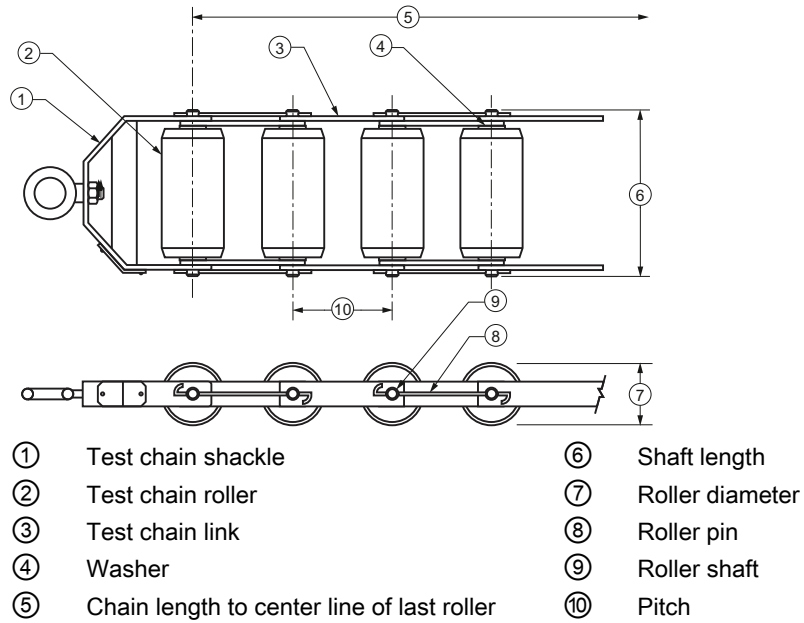
Use eye hooks attached to the posts to secure the wire rope cables from the test chain shackle. This positions the test chain, allowing it to track centrally on the belt.

Refer to installation or outline diagrams, and review all areas of the installation to ensure that the safety aspects of the mechanics have been met. All welding, hardware, fasteners, wiring and location must be sound and secure.

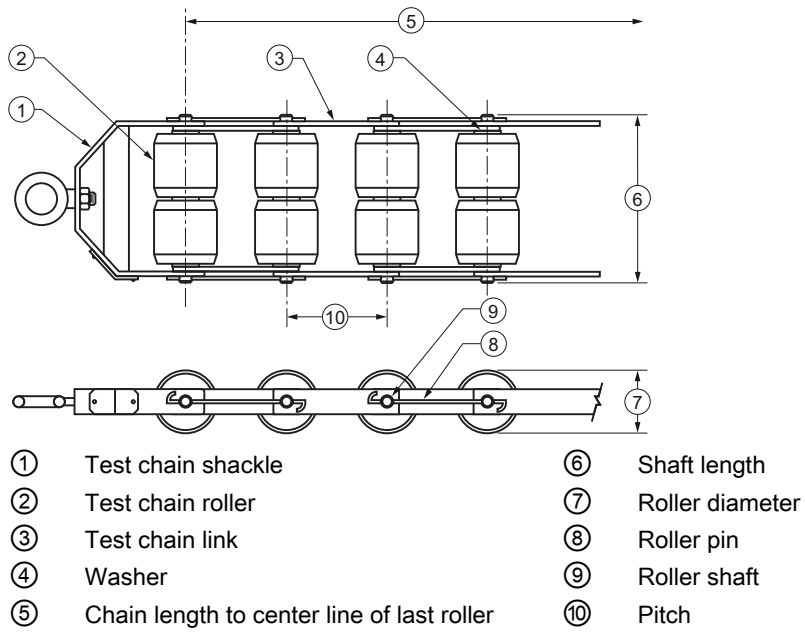
5.3 Test chain design

Roller diagrams

Single roller bushed test chain



Double roller bushed test chain



5.4 Chain reel

Location

On incline conveyors, the chain reel must be carefully installed upstream of the scale weighbridge so the chain rolls out with the movement of the belt. "Upstream" is when you look from the conveyor tail or infeed end towards the head or discharge end of conveyor.

On a level conveyor, locate the reel prior to the scale position.

Facilitate chain rollout over the scale by jogging the belt until the chain is in position.

Mount the reel to the conveyor about 4 to 4.5 idler spaces from the scale center line. This places the support legs of the reel about 1.5 spaces from the end of the test chain for easy attachment to the restraining device.

Once the chain has been secured at both ends, the cable from the reel can be detached and the belt restarted for the calibration process.

Reel size and compartment diameters

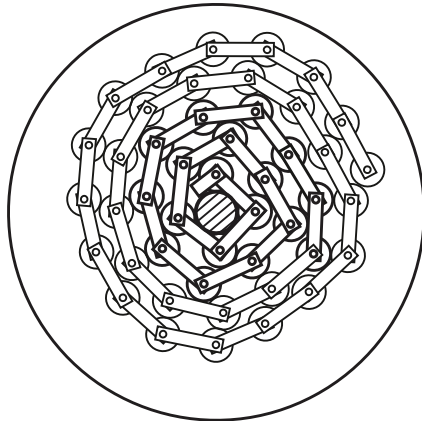
The size of the reel is determined by the requirements of the specific conveyor application and the selected chain loading. The width of the conveyor (18" [46 cm] through 96" [244 cm] belt conveyor), its incline, and its general construction determine the reel cross member length and section sizing for that member.

Compartment disc diameter is determined by the following:

- Chain length, pitch, and roll diameter
- Wire rope and chain wrap around the reel drum
- Chain wrap around the successive wraps of chain
- The number of rolls in a given wrap increase with each revolution of the reel
- The number of wraps the reel disc holds depends on the given chain parameters (as few as one to two wraps, to as many as nine wraps)
- Overall wrap diameter varies from about 12" (30.5 cm) for the shortest chain to about 60" (152 cm) for the longest chain.

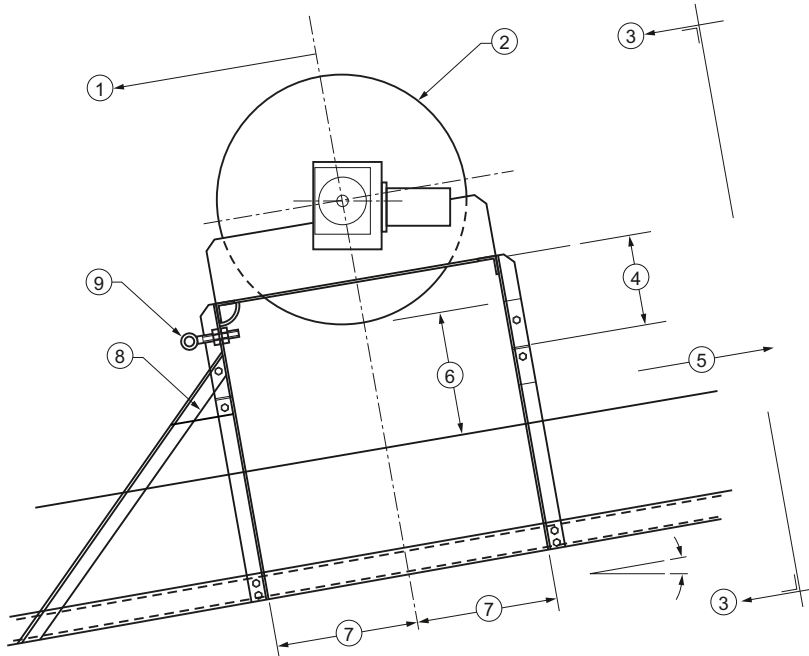
Specifications

- 6" (15 cm) pitch test chain, 20 ft (609 cm) long
- 42 rollers long, 41 pitches long
- roll diameter: 3.75" (9.5 cm)
- disc diameter: 36" (91.5 cm)



5.5 Standard motorized test chain storage reel

View "A-A"

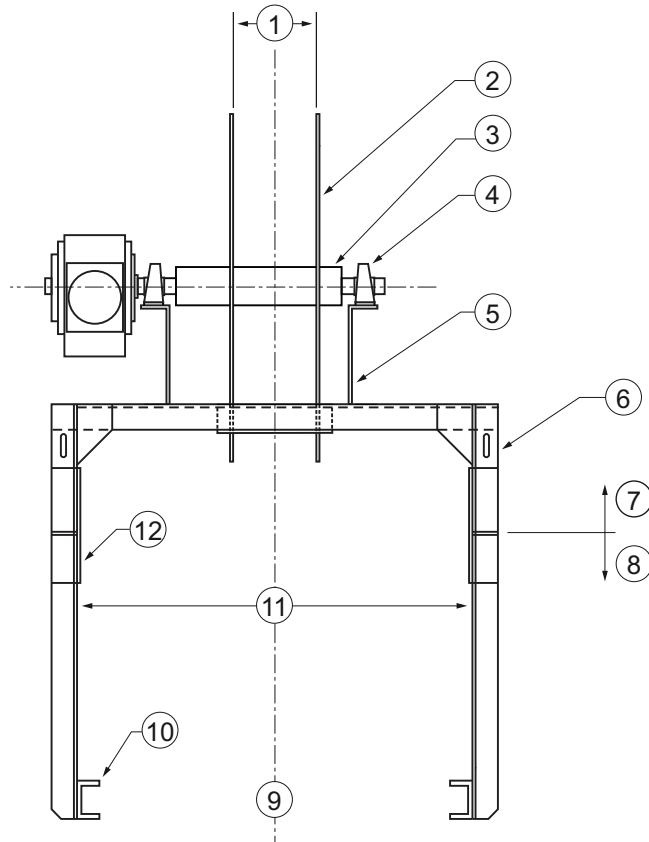


- | | |
|--|-------------------------------|
| ① "D" dimension to center line of belt scale | ⑥ To suit |
| ② reel Ø | ⑦ "B" |
| ③ View "A" | ⑧ Gusset (by customer) |
| ④ "E" | ⑨ Eyebolt for chain restraint |
| ⑤ Belt travel direction | |

reel Ø	"B"	"E"
36" (91.5 cm)	20.5" (52 cm)	13.25" (34 cm)
42" (107 cm)	23.5" (60 cm)	13.25" (34 cm)
48" (122 cm)	26.5" (67 cm)	13.25" (34 cm)
60" (152 cm)	32.5" (83 cm)	17.75" (45 cm)

Reels may have from one to two chain compartments (widths vary according to the width of the specific test chain).

View "A"



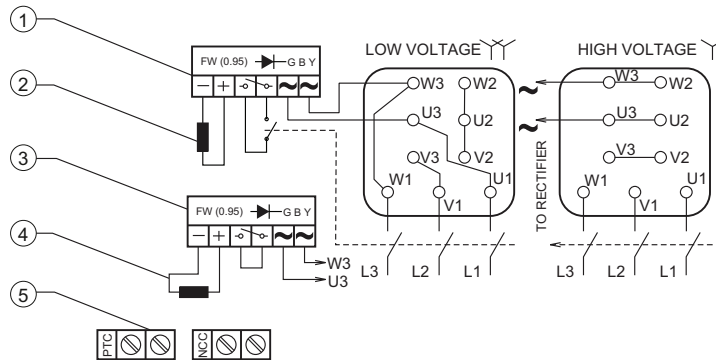
- | | | | |
|---|--|---|--------------------------------|
| ① | Center line of conveyer | ⑦ | By Siemens Milltronics |
| ② | 36, 42, 48, or 60" (91.5, 106.5, 122 or 152 cm) reel | ⑧ | By customer |
| ③ | 4" (10.15 cm) shed 40 pipe | ⑨ | View "A" |
| ④ | Pillow block bearings | ⑩ | Conveyer stringer |
| ⑤ | 10" (25.4 cm) X 20Lb/ft (or kg/m equiv.) support channel | ⑪ | "C" width per order |
| ⑥ | Structural angle frame | ⑫ | Connecting bracket by customer |

Note

- Motor starters, push button stations, and support legs from the reel to the conveyer frame are not supplied with the storage reel.
- Vertical support legs from the reel frame to the conveyer are to be supplied by others. Provision is made for direct attachment to the customer-furnished supports by short vertical leg sections from the reel support cross members.

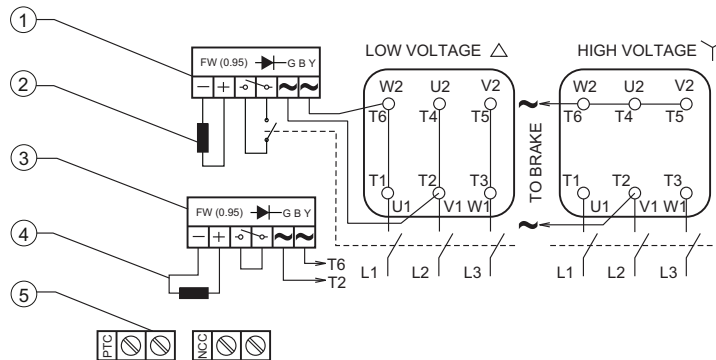
5.6 Connection of motor

Single speed dual voltage with pre-connected D.C. brake - 230/460 V AC



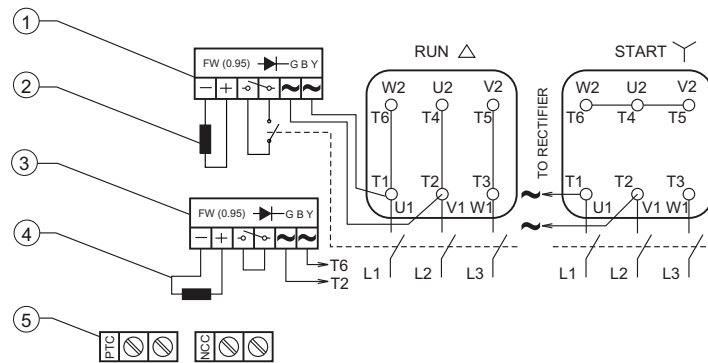
- ① Fast stopping option
- ② Brake coil 105 V DC
- ③ Standard stopping
- ④ Brake coil 105 V DC
- ⑤ Thermal sensors (if installed)

Single speed dual voltage with pre-connected D.C. brake - 190/380 V AC



- ① Fast stopping option
- ② Brake coil 103 V DC
- ③ Standard stopping
- ④ Brake coil 103 V DC
- ⑤ Thermal sensors (if installed)

Single speed with pre-connected D.C. brake - 575 V AC



- ① Fast stopping option
- ② Brake coil 250 V DC
- ③ Standard stopping
- ④ Brake coil 250 V DC
- ⑤ Thermal sensors (if installed)

5.7 Positioning the chain

Chain position is critical to accurate scale calibration. To ensure proper position, please account for the following:

- The pitch should be evenly divisible into the conveyer idler spacing.
- Rollers should straddle the idlers.
- Chain placement must be repeatable. Make sure that the chain extends a minimum two rollers before and after the weighing mechanism.

The use of appropriate chain restraints will help control longitudinal stability and is critical to ensure proper and safe usage. Restraints should do the following:

- Be attached to the chain at one end and fixed to posts mounted to each side of the conveyer at about one belt width from the end of the chain.
- Form a "V" shape when viewed from above.
- Cross over and clear the belt edges by approximately one to two inches (2.5 to 5.0 cm).

Tension in the restraints should:

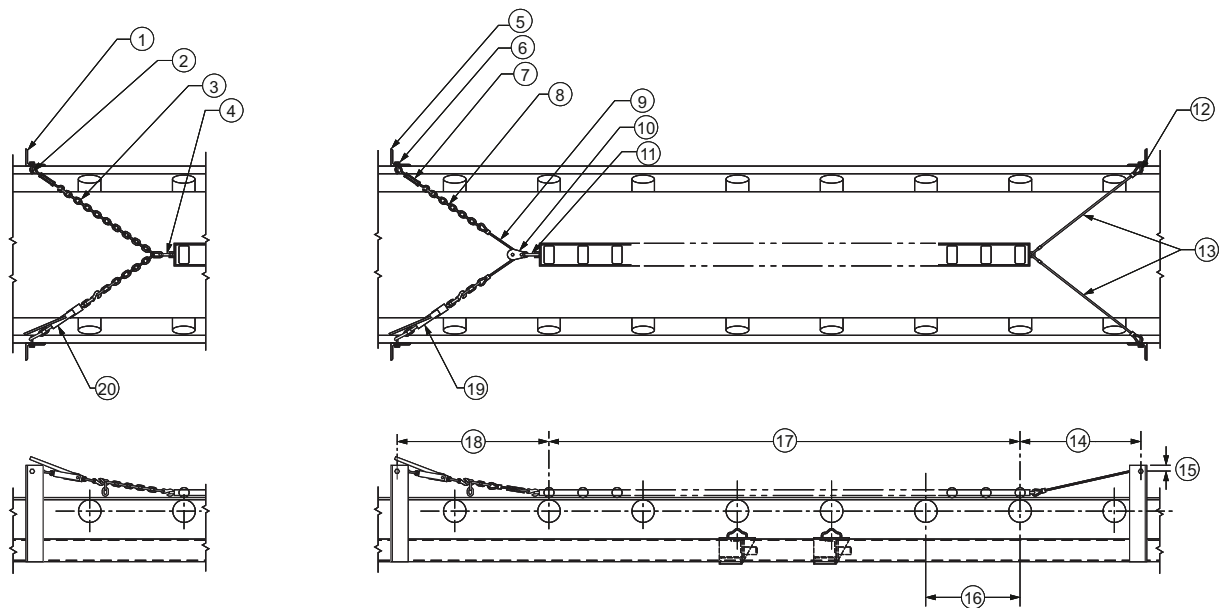
- Prevent chain movement along the belt
- Not lift the ends of the chain

Note

Turnbuckles are recommended to permit adequate adjustment of tension to ensure the chain is fully extended and each roller is turning freely.

Installing/Mounting

5.7 Positioning the chain



- | | | | |
|---|-----------------------------------|---|--------------------|
| ① | 3" X 3" (7.5 X 7.5 cm) mill angle | ⑪ | Heavy duty hook |
| ② | Eye bolt | ⑫ | Eye bolt |
| ③ | Chain | ⑬ | Equal length cable |
| ④ | Heavy duty hook | ⑭ | Belt width |
| ⑤ | 3" X 3" (7.5 X 7.5 cm) mill angle | ⑮ | 1.5" (38 mm) |
| ⑥ | Eye bolt | ⑯ | Idler spacing |
| ⑦ | Turnbuckle | ⑰ | 5 x idler spacing |
| ⑧ | Chain | ⑱ | Load binder |
| ⑨ | cable | ⑳ | Load binder |
| ⑩ | pulley | | |

Note

- Follow the calibration details for the manufacturer's belt scale to perform a Zero calibration.
- Check for and adjust to an acceptable repeatability and error. Ensure the free end of the chain has been released from the storage reel.
- Frequency of calibration is determined by the repeatability of the span results and the monitoring of the scale's performance.

 **CAUTION****Stop conveyor belt**

During this step, the conveyor belt must be stopped to prevent injury to operator.

1. Using the control station, lower the test chain onto the conveyor belt. Spread the test chain out until it spans across the weigh idler suspension: two idlers from the approach side to two idlers on the retreat side of the weigh suspension. (This is often referred to as the A2 approach idlers to R2 retreat idlers.) Refer to Positioning the chain (Page 23).
2. Secure both ends of the test chain using wire rope cables attached to the eye bolts of the frame on the storage reel and at opposite end. The test chain should lay flat on the center roll of each idler, with the links of the chain in a horizontal position to the conveyor belt.
3. Run conveyor at the normal operating belt speed and observe the performance of the test chain. The rollers of the chain should run freely without incident and track centrally to the middle of belt. No side motion or "snaking" should be observed.
4. Continue to run the conveyor and perform the span calibration as outlined in the scale manufacturer's manual.

Note

Snaking causes the results to be non repeatable and varying. Eliminate by readjusting the wire rope guide cable (stays) until the problem is solved. Tension should not be applied to the retrieving cable.

Ensure the following upon completing the exercise:

- Stop the conveyor.
- Retrieve the test chain by using the control station to raise the test chain onto the storage reel.
- Leave the wire rope cable attached to the shackle.
- During raising, ensure the chain shackle is free to move and does not bind onto any portion of the storage reel. Once completely retrieved, secure the free end of the chain using the wire rope.

NOTICE
Remove power to gear motor
Disable the gear motor by removing power from the unit. This prevents unauthorized or accidental release of the chain during normal belt operation. The test chains should never be released while material is on the belt.

Service and maintenance

7.1 Test chain

- Check all parts of the test chain regularly.
- Ensure the links and rollers are free to move on shafts.
- Replace broken or missing retaining pins.
- Ensure wire rope anchoring cables are not frayed or twisted.
- Ensure clips are tight on the cable.
- Lubricate the chain with light machine oil to prevent rusting and ensure safe and free movement. Either submerge the chain in a oil bath, or spray with common lubricants or rust prohibitor.
- Place a hood or cover over the storage reel to minimize negative effects of dirt or debris falling onto the test chain.

Annual verification of the chain should be made against a known, certified platform with scale and length to precision measurements. Recalculate with the following measurements:

Test chain mass (without shackles) _____ lb or kg

Length stretched, referenced from center of first roll to center of last roll: _____ ft or m

Roller Pitch (from technical data): _____ ft or m

Weight of 1 link: _____ lb or kg

(Mass + weight of 2 links) / (Stretched length + Pitch) _____ lb/ft or kg/m

7.2 Storage reel

All components should be inspected. Pillow block bearings of the supporting reel should be lubricated during periodic maintenance. Motor and gearbox must be obstruction free.

This assembly in whole or in part must never be used for anything other than its intended purpose.

Technical data

8.1 Test chain

Test chains

Medium conditions		
Max. ambient temperature		65 °C (150 °F)
Design		
Width between adjacent rolls	Single roll	4" (10 cm)
	Double roll	6" (15 cm)
Belt loading to meet any application		5 lb/ft (7.4 kg/m) ... 100 lb/ft (148.8 kg/m)
Material	Chain rollers	Oiled bronze bushings
	Side plates	C1018 and C1020 cold rolled steel
	Pins	C1018 and C1020 cold rolled steel
	End shackles	C1018 and C1020 cold rolled steel
		Fitted with eye links for attachment of wire rope Fixed to brass plate bearing the calibrated weight in lb/ft or kg/m
	Rollers	C1010 hot rolled steel
	Roll bars/Cotter pins	304 stainless steel
	Connection links	Retained by stainless steel roll bars
Chain	Sprayed with rust inhibitor ^{a)}	
Approvals	CE C-TICK approved	

^{a)} Nickel plated chains are available on special request.

8.2 Storage reel

Test chain storage reels

Design		
Compartment	Width	One to two inches wider than the length of the chain roller pins or shafts
	Material	Made of ¼" (6.5 mm) thick discs available in diameters of 36, 42, 48, and 60" (91.5, 107, 122, 152 cm) ^{a)}
Disc		Each disc has a small through-hole adjacent to the 4" (10 cm) diameter shaft centre ^{b)}
Reels		Supplied with 30 feet (9.14 m) of wire rope and two clamps per chain, polyester painted, shipped bolted to wooden skids
Reel frame construction		Mild steel structural components that are welded and bolted
Disc compartments		Welded to a 4" (10 cm) diameter tube, or pipe, serving as the rotating drum
Solid cold rolled drive shaft		Welded to drum assembly for attachment to gear-motor and pillow blocks for mounting to main support frame
Curved slide plate		Welded to a cross member to prevent chain snagging at the cross member
Approvals		CE C-TICK approved

^{a)} Depending on the chain length.

^{b)} This is used to insert the wire rope and fittings needed to attach the test chain to the reel.

Reel horsepower	
Motor horsepower	Varies with application loading and is available in 0.75, 1, 1.5, 2, 3, 5, 7.5, 10, 15, and 20 hp
Typical reel gear-motor	Totally enclosed in fan cooled (TEFC) housing, intermittent (30-minute duty) motor operating at either 230 or 460 volts, 3 cycle, 50 or 60 Hz. ^{a)}
Gearing ratios	Approximately 180 to 200:1 with output RPMs in the 7 to 10 RPM range. Depending on the chain parameters, this equates to an average chain rollout time of about 3 minutes to 30 seconds.

^{a)} Other voltages are also available.

For more information

www.siemens.com/level

www.siemens.com/weighing

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