INSTALLATION, OPERATION, MAINTENANCE MANUAL

MHS CONVEYOR

IntelliROL®

Motorized Roller Conveyor

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Chapter 1: IOM INTRODUCTION

IOM Purpose

It is the intent of MHS Conveyor, through this manual, to provide information that acts as a guide in the installation, operation, and maintenance of MHS Conveyor conveyors.

This manual describes basic installation practices, assembly arrangements, preventive maintenance, and assists in replacement parts identification.

This service manual is intended for use by personnel who are knowledgeable of installation and safe working practices on conveyor systems.

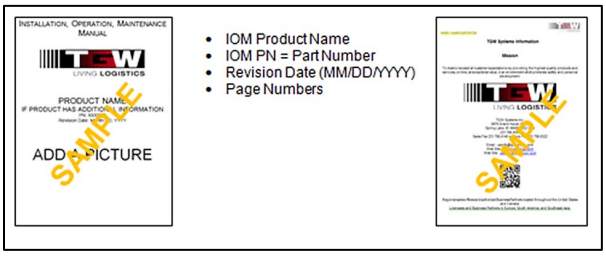
Not all applications and conditions can be covered; therefore, this manual is to be used ONLY as a guide.

If additional copies of this manual are needed or if you have any question concerning the conveyor please contact your MHS Conveyor Distributor or MHS Conveyor Lifetime Services at 231-798-4547.

Visit MHS Conveyor at mhs-conveyor.com.for maintenance videos and other application information.

Manual Structure

You should receive a separate documentation for each product line of MHS Conveyor implemented in your installation. You can identify the respective product line on the back of the folder or on the cover sheet of the IOM (Installation Operation Maintenance Manual)



⚠ WARNING

- Pay attention to the safety instructions!
- Prior to working at or in the immediate vicinity of the system it is recommended that you make yourself familiar with the safety instructions included in the present document!

Chapter 2: MHS Conveyor POLICIES

MHS Conveyor Equipment Warranty

MHS Conveyor warrants that the material and workmanship entering into its equipment is merchantable and will be furnished in accordance with the specifications stated.

MHS Conveyor agrees to furnish the purchaser without charge any part proved defective within 2 years from date of shipment provided the purchaser gives MHS Conveyor immediate notice in writing and examination proves the claim that such materials or parts were defective when furnished. For drive components specific to XenoROL® (i.e. Xeno belts, slave Xeno belts, drive spools, standard and speed-up, and spacers), this warranty shall be extended to five years of running use, provided the conveyors are applied, installed and maintained in accordance with MHS Conveyor published standards. Other than the above, there are no warranties which extend beyond the description on the face hereof. Consequential damages of any sort are wholly excluded.

The liability of MHS Conveyor will be limited to the replacement cost of any defective part. All freight and installation costs relative to any warranted part will be at the expense of the purchaser. Any liability of MHS Conveyor under the warranties specified above is conditioned upon the equipment being installed, handled, operated, and maintained in accordance with the written instructions provided or approved in writing by MHS Conveyor.

The warranties specified above do not cover, and MHS Conveyor makes no warranties which extend to, damage to the equipment due to deterioration or wear occasioned by chemicals, abrasion, corrosion or erosion; Purchaser's misapplication, abuse, alteration, operation or maintenance; abnormal conditions of temperature or dirt; or operation of the equipment above rated capacities or in an otherwise improper manner.

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, EXTENDING BEYOND THOSE SET FORTH IN THIS STATEMENT OF WARRANTY.

Rev 9/23/2016

MHS Conveyor Environment Standards

MHS Conveyor equipment is designed to be installed in a clean, dry warehouse environment. Exposure to extreme humidly, direct sunlight, blowing dirt or rain can permanently damage some components of MHS Conveyor. In particular, the curing agents in concrete are known to attack and degrade the urethane conveyor components.

When installing conveyor on a new construction site, be sure that the concrete is properly cured before setting conveyor on it. In addition, if conveyors are stored in the proximity of curing concrete, proper ventilation must be used to direct the curing agent fumes away from the conveyor.

Failure to comply with these guidelines will void the MHS Conveyor warranty on any failed components that result from these environment issues.

Chapter 3: SAFETY RECOMMENDATIONS

MHS Conveyor Safety Recommendation

For additional safety information:

MHS Conveyor agrees to the following safety instruction or guidelines listed within this manual. This is not to conflict with your state or legal requirements.

MHS Conveyor Recommends for maintenance or repair purposes, to incorporate a lock out or tag procedure. To ensure all starting devices, prime movers, or powered accessories are off before attempting to maintenance or repair.

The procedures below are designed to protect everyone involved with the conveyor against an unexpected restart. To include understanding of potential hazard of stored energy, which can exist after the power source is locked out.

For additional information, refer to the latest issue of ANSI Z244.1, American National Standard for Personnel Protection − Lockout/Tagout of Energy Sources− Minimum Safety Requirements. http://www.ansi.org/

OSHA 29CRF Part 1910.147 ***"Control of Hazardous Energy Sources (Lockout/Tagout)",*** which includes requirements for release of stored energy and OSHA Safety and Health Regulations for Construction 1926.555 Conveyors https://www.osha.gov/

Conveyor Design and Safety Guidelines

A safety risk evaluation is required for all of our standard equipment. The safety risk evaluation considers every potential hazard on the conveyor, weighs the probability and the severity of the potential injury, and addresses methods of mitigation to make the risk of injury either low or negligible. We use the ANSI B11 TR3 standards for all of our risk evaluation.

In addition, all of our equipment is designed to comply with the following national and industry standards:

- **ANSI Z535.1** – Safety Color Code
- **ANSI Z244.1 –** Lockout/Tagout of Energy Sources
- **ASME B15.1** – Safety standard for Mechanical Power Transmission Apparatus
- **ASME B20.1** – Safety standard for Conveyors and Related Equipment
- **CEMA** – Safety Standards and Labels
- **OSHA 1910.147** – The Control of Hazardous Energy
- **OSHA 1910.212** - General Requirements for all Machines
- **OSHA 1910.95** – Occupational Noise Exposure

Definitions:

- **ANSI** = American National Standard Institute
- **ASME** = American Society of Mechanical Engineers
- **CEMA** = Conveyor Equipment Manufacturers Association
- **OSHA** = Occupational Safety and Health Administration

WARNING

- Safety: Always lock out power source and follow recommended safety procedures.

3.1: MHS Conveyor RECOMMENDED STANDARDS FOR CONVEYORS

ANSI Standards for Conveyors

It is essential for safe and efficient system operation that safety information and guidelines presented here are properly understood and implemented.

MHS Conveyor recognizes American National Standard Institute (ANSI) booklet entitled ***Safety Standards for Conveyors and Related Equipment B20.1.*** For more information go to: http://webstore.ansi.org/default.aspx

With any piece of industrial equipment, conditions exist that might cause injury to you or your co-workers. Because it is not possible to describe each potentially hazardous situation that might develop, you must be alert at all times for unsafe conditions. To avoid injury, use maximum possible care and common sense and adhere to all safety standards. Take special care while maintaining and inspecting electrical equipment and devices. All personnel working on or around the system should be aware of, and adhere to, all **CAUTION**, **DANGER**, and **WARNING** signs.

Labels or signs are posted to reduce the risk of injury to all personnel. Never assume that the signs and notices are applicable only to inexperienced personnel. Maintain signs in a legible condition. Contact your supervisor to post additional safety signs if you feel they are necessary.
http://www.ansi.org/

ANSI Conveyor Safety Rules

- Conveyor safety rules, as well as specific regulations and guidelines listed in this publication:
- DO NOT touch moving Conveyor parts.
- DO NOT walk, ride, or climb on the Conveyor.
- DO NOT operate the Conveyor with chain guards or other protective guards removed.
- Keep jewelry, clothing, hair, etc., away from the Conveyor.
- Know the location and function of all start/stop devices and keep those devices free from obstruction.
- Clear all personnel from the equipment before starting the Conveyor.
- DO NOT attempt to clear product jams while the Conveyor is running.
- Allow only trained and authorized personnel to maintain or repair Conveyor equipment.
- DO NOT load the Conveyor beyond specified design limits.
- DO NOT attempt to make repairs to the Conveyor while it is running.
- DO NOT modify equipment without checking with the manufacturer.
- DO NOT operate or perform maintenance on equipment when taking any type of drug, sedative, when under the influence of alcohol, or when over fatigued.
- Report any unsafe condition to your supervisor or maintenance staff.

CEMA Standards for Conveyors

The Conveyor Equipment Manufacturers Association (CEMA) provides safety information related to conveyor systems. There are Conveyor Safety Video and Conveyor Safety Poster produced by CEMA.

MHS Conveyor recommends these videos for training and education purposes as part of a safe working environment around conveyor equipment. The videos introduce awareness of operations, personnel, maintenance technicians, and management to safety hazards commonly associated with the automated material handling conveyor equipment.

The safety posters reviews important safety labels and are intended to be posted in public places as a day-to-day reinforcement of good safety practices. These posters can be downloaded from the CEMA Website at http://www.cemanet.org/safety-label-posters or for more information for both the safety poster and the videos can be purchased from CEMA. Visit their website – www.cemanet.org

For additional information or contact them at:

CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION
5672 Strand Ct., Suite 2
Naples, Florida 34110
239.514.3441

CEMA Safety Label Meanings

ANSI Z535.4 – Product Safety Signs and Labels

The word or words that designate a degree or level of hazard seriousness. The signal words for product safety signa are: DANGER, WARNING, and CAUTION.

DANGER -Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

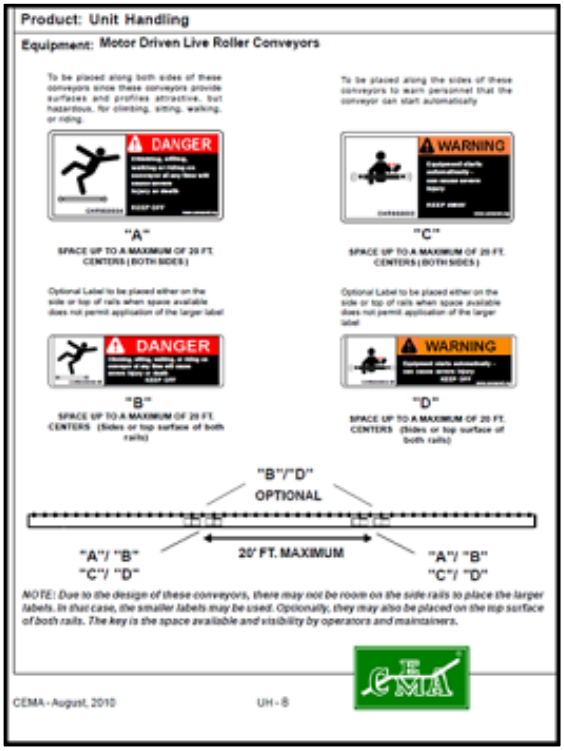
WARNING – Indicates potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

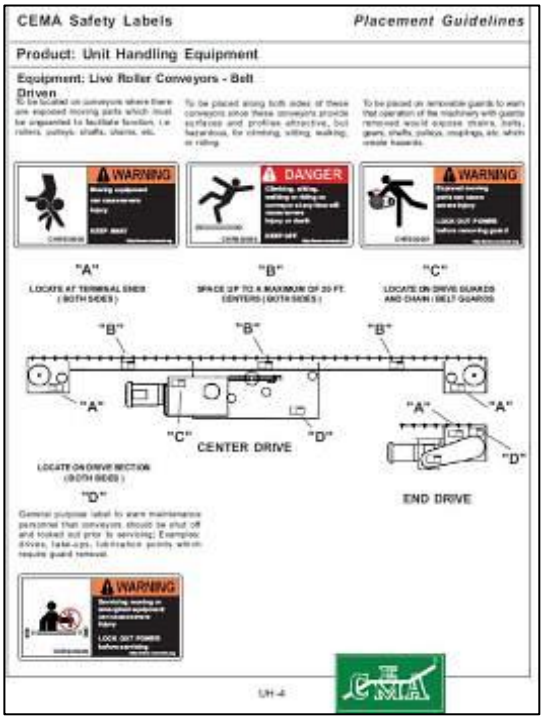
CAUTION – Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

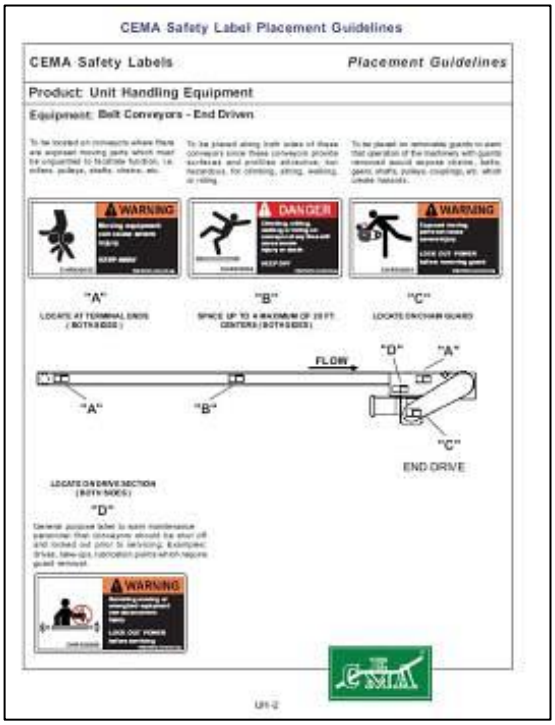
http://www.cemanet.org/cema-safety-label-meanings/

3.2: MHS Conveyor Recommends Proper Labels for Conveyor Types

Shown below are some samples of labels applicable to conveyor standards.







3.3: WARNINGS AND SAFETY INSTRUCTIONS

Failure to follow the instructions and cautions throughout this manual and warning label on the conveyor may result in injury to personnel or damage to the equipment.

Your MHS Conveyor is powered by a motor and can be stopped only by turning off electrical power to the motor. As with all powered machinery, the drive-related components – including sprockets, chains, shafts, universal joints, and pneumatic devices – can be dangerous. We have installed or provided guards to prevent accidental contact with these parts, along with warning labels to identify the hazards.

Special attention must be paid to the following areas of this manual:

⚠ WARNING

- Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

CAUTION

- Indicates a situation, which, if not avoided, could result in property damage.

3.3.1: Warnings and Safety Instructions

⚠ WARNING

- After maintenance, REPLACE guards immediately.
- Keep ALL warning labels clean and clear of any obstructions.
- Never remove, deface, or paint over WARNING or CAUTION labels. Any damaged label will be replaced by MHS Conveyor at no cost by contacting Lifetime Services.
- It is very important to instruct personnel in proper conveyor use including the location and function of all controls.
- Special emphasis must be given to emergency stop procedures.
- It is important to establish work procedures and access areas, which do not require any part of a person to be under the conveyor.
- It should be required that long hair is covered by caps or hairnets.
- Loose clothing, long hair, and jewelry must be kept away from moving equipment.
- Maintain enough clearance on each side of all conveyor units for safe adjustment and maintenance of all components.
- Provide crossovers or gates at sufficient intervals where needed to eliminate the temptation for personnel to climb over or under any conveyor.
- Walking or riding on a moving conveyor must be prohibited.
- Before performing maintenance on the conveyor, make sure the start-up controls are locked out and cannot be turned on by any person other than the one performing the maintenance.
- If more than, one crewmember is working on the conveyor, EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCKOUT.
- All pneumatic devices must be de-energized and air removed to prevent accidental cycling of the device while performing general maintenance.
- Make sure all personnel are clear of all conveyor equipment before restarting the system.
- Before restarting a conveyor which has been stopped because of an emergency, an inspection of the conveyor must be made and the cause of the stoppage determined. The starting device must be locked out before any attempt is made to correct the cause of stoppage.

⚠ WARNING

- Before servicing or performing any work in the motor control panel, disconnect and lock out air and the main incoming service. If only the panel disconnect is off, the incoming side will still be hot.

3.4: MHS Conveyor CONTROLS SAFETY GUIDELINES

The following basic conveyor control safety guidelines are recommended by MHS Conveyor even though Business Partner may or may not purchase conveyor controls from MHS Conveyor. The items listed deal with applications of controls equipment. ***The actual installation of the equipment must always follow the National Electric Code and all other local codes*.**

Start-up Warning Horn

Ideally, all conveyors should be within sight of the conveyor start pushbutton. This allows the operator to verify that no one is touching the conveyor or would be in danger if the conveyor were to start up.

If it is not possible to see the entire conveyor being started from the start pushbutton location, then some form of audible warning device is required. It could be a horn, buzzer, bell, or anything unique to that conveyor for that location. It should be loud enough to be heard at any point on the conveyor system. It should sound for approximately five seconds after the start pushbutton is pushed, prior to the actual running of conveyor. Any auxiliary equipment such as vertical lifts, turntables, etc., should also be included in the warning circuitry.

Conveyors that stop and restart under automatic control could also require a horn warning prior to restarting. If it is not easy to distinguish the difference between a fully stopped conveyor system and a momentarily stopped conveyor section, then it is advisable to add a warning horn. All conveyor sections that stop and restart automatically should be marked with appropriate signs or labels.

Start Pushbuttons

Start pushbuttons should be the flush type or guarded such that inadvertently leaning against them will not actuate the conveyor. They should be provided with a legend plate clearly defining which conveyors will be started.

Stop Pushbuttons

Stop pushbuttons should be the extended type such that any contact with it is sufficient to stop the conveyor. They would also be provided with a legend plate clearly defining which conveyors will be stopped.

Operator Controls

Additional operator controls should be designed into the system with the same guidelines that go into start and stop pushbuttons, depending upon their function. Devices which are repeated on multiple control stations, such as emergency stops, should be located at the same relative location on each station (such as lower right corner).

Emergency Stops

All locations where an operator must work directly at the conveyor should be protected by an emergency stop. An operator should not have to move from where he is to actuate the emergency stop.

Conveyors in areas of high pedestrian traffic should also be protected by emergency stop devices.

For all other instances, emergency stops should be located throughout a system such that it is possible to shut down the system without having to walk too far. In these instances the emergency stop is used more to protect the equipment from damage than to protect personnel.

Emergency stops can be of the pushbutton or cable operated switch type. The pushbutton type should be a red, mushroom head maintained pushbutton which requires resetting after it is actuated. Cable operated switches should trip by pulling the cable, and require resetting at the switch.

Actuating an emergency stop must drop-out the start circuit, requiring restarting the system using the start pushbuttons provided.

An emergency stop should normally stop all conveyors in the system. Very large systems may involve dividing a system into zones of control based on proximity of personnel, safety hazards, walls obstacles, etc.

Controls Logic

Solid state controls logic devices, such as programmable controllers are used extensively for conveyor control. They are very reliable, but a hardware failure or software bug would cause an output to function erratically. For this reason, start circuits, warning horn circuits, and emergency stops should usually be configured using conventional relay logic.

Safety Switches

All conveyor control cabinets and motors should be provided with safety (or disconnect) switches. These switches must have provisions for padlocking. As required for maintenance, equipment should be locked in the off position.

Special Devices

Special devices and equipment such as vertical lifts, turntables, high speed conveyors, etc., all have unique design and safety requirements. These should be looked at in each case to determine what the requirements might be.

Rev 08/22/2011

Chapter 4: IntelliROL Introduction

4.1: Concept

Utilizing 24V DC motorized roller, this technology is the most revolutionary since the advent of the line-shaft conveyor in the late-'60s. Its impact is currently expanding rapidly as more users and manufacturers begin to see the benefits of this technology. MHS Conveyor' experience with IntelliROL goes back to 1996 with a major tire handling system. This fast advancing technology uses a self-contained 24-volt DC motorized roller to power a segment or zone of the conveyor. Rollers adjoining the motorized roller are slave-driven with the same components MHS Conveyor developed in the '60s.

XenoROL® line-shaft driven live rollers and IntelliROL equipment both drive product through the developed tangential force at the conveyor roller surface. The relationship between tangential forces, product weight and product characteristics have been at the root of MHS Conveyor technology for the past 30 years. This natural extension places MHS Conveyor at the forefront of applying this technology.

Operation

The product-carrying rollers are slave-driven by a series of pre-tensioned belts to the motorized roller in each zone. Since every motorized roller can be individually controlled, every segment of the system can become a zero-pressure zone.

Accumulation begins when an external signal "arms" the first sensor (discharge end). External signals may originate from electrical controls, sensing devices, manually activated switches, etc. The first product stops at the discharge sensor, which arms the sensor in the upstream zone. A product travels through a zone, until blocking, the sensor (Armed from the previous zone) all carrier rollers within the zone stop. As accumulation takes place from zone-to-zone, accumulated products do not touch each other as long as the product is shorter than the zone length.

Feature/Benefits

- Flexible Modular design / easy to reconfigure
- Run on demand / less noise, wear, and energy consumption
- Non-contact zero-pressure / product protection
- Compact low profile / multi-level usage
- Reversible / less electrical hardware cost
- No scheduled maintenance / lower operating cost
- Low voltage / safety and lower cost
- Simple installation / lower cost
- Soft start/stop / low G-forces
- Variable speed / versatility to suit each requirement
- Intelligent control capabilities / cost no greater than need

Most IntelliROL modules have a maximum depth profile of 6-3/8" top of roller (TOR) to bottom of flange. Devices such as UBT, Wheel Diverters, etc… Require a deeper channel profile. A bi-directional urethane belt transfer has a maximum rate of 30 cases per minute.

CAUTION
• **Urethane belt transfer belts should only run while transferring a load. (Run on Demand)**

All curves except the minimum radius curve are based on MHS Conveyor' true taper roller for all widths.

IntelliROL optional run-on-demand software can selectively deactivate conveyor zones when not carrying product. Because each IntelliROL module has its own drive and control, any level of control sophistication is possible, including product tracking, diagnostics, and data collection.

The technology behind IntelliROL is growing and changing quickly. Most applications use a 24-volt DC, 1.9" diameter, brushless motorized roller, and these rollers are the basis of design for most IntelliROL modules. Special applications requiring slow speeds and high torque may require the use of geared motorized rollers and 3-phase AC voltage motorized rollers have been used in heavy-duty applications.

4.2: IntelliROL Application Options

The application of IntelliROL breaks down into two areas. One is complete systems; the other is the application of specific modules within a system that may be based on line-shaft or some other conveyor technology.

MHS Conveyor has standard designs for straight bed sections for transportation or zoned accumulation. Standard zone lengths are 24" or 30". MHS Conveyor also offers curves in 30°, 45°, 60° and 90°, 30° or 45° spurs, UBT transfers, three designs of product stops, belted inclines and declines, gates, minimum radius curve, and anti-rollback brakes (inclining). Many options are available including different roller centers, bearings, roller coatings, etc.

Application Specific Modules may be used to solve certain requirements within a system at a most cost-effective manner using IntelliROL conveyor.

Application Specific Module examples include:

- Short spurs
- Workstations
- Fill gaps between conveyors or devices
- Providing power to a lift bed
- Transfer car
- The bed of a turntable
- Gates
- Low Profile requirements over aisles, multi-level, etc.

In nearly all the above examples, space is a major consideration. Weight and balance may even be a consideration on something like a scale, lift, or vertical conveyor.

4.3: DEFINITION OF TERMS

Accumulation - Act of queuing, holding, or backing up of product on a conveyor.

Carrying Roller - The conveyor roller upon which the object being transported is supported. It has circumferential grooves near one end to allow the slave belts to ride below the carrying surface.

Coefficient of Friction - A numerical expression of the ratio between the force of contact between two surfaces and the resistant force tending to oppose the motion of one with respect to the other.

Conveyor Width - The dimension outside to outside of frame rails. For the inside dimension, the abbreviation "BF" (between frames) is used.

Crossmember - Structural member, which is assembled between two sides, channels of a conveyor bed.

Frame - The structure, which supports the components of a conveyor bed consisting of formed channel rails, bolted together with crossmembers.

Indexing Control - Maintains non-contact accumulation and functionality of gates, transfers, curves, etc. by not allowing accumulation in these areas.

IntelliROL Non-Contact Accumulation - "Pure" zero-pressure accumulation which guarantees that one product will not touch any other during accumulation, release, or any time. (Requires product to be inducted singularly and be 3" to 4-1/2" shorter than zone).

Roller Centers - Distance between centerlines of adjacent rollers. For curves, roller centers are measured at the inside radius.

Roller Groove - The groove that is fabricated into the carrying roller to provide a seat for the slave belt below the carrying surface.

Singulation Release - A method of individual zone release that spaces product approximately one zone length apart.

Slave Belt - An endless round belt manufactured from elastic material, typically urethane, connecting a motorized roller, or carrying rollers or other carrying rollers within a zone.

Slug Release - Simultaneous release of several products.

Tapered Roller - A conical conveyor roller for use in a curve with end and intermediate diameters proportional to their radius.

Zone - A portion of conveyor activated by a motorized roller that may be controlled by a photoeye.

Zone Length - The distance between sensing devices (typically containing one motorized roller).

Zero-Pressure Accumulation - The lack of force between products after accumulation. (Industry standard)

4.4: PRODUCT DESCRIPTION EXAMPLES

PRODUCT DESCRIPTION EXAMPLES

	TYPE	MODEL	WIDTH	ITR DRIVERCARD	FRAME	ROLLER CENTERS	ROLLER GROUPS	FLOW DIRECTION	LENGTH	ROLLER TYPE	NUMBER OF MOTORIZED ROLLERS
INTELLIROL ITR Transportation Bed	BED	ITR	22BF	CB	C6	3RC	30RG	RH	10'0"	FE60	4MR

EXAMPLE: BED,ITR-22BF-CB-C6-3RC-30RG-RH
10'0"-FE60-4MR

PRODUCT DESCRIPTION: Bed, INTELLIROL Conveyor, 22" Width Between Frame, CB Style Drivercard, C6 Frame (6" Channel), 3" Roller Centers, 30" Roller Groups, Right Hand Flow
10'0" Overall Length, FE-60 Type Motorized Rollers, 4 Motorized Rollers Total

	TYPE	MODEL	WIDTH	ITR DRIVERCARD	FRAME	ROLLER CENTERS	ROLLER ZONE LENGTH	FLOW DIRECTION	LENGTH	ROLLER TYPE	NUMBER OF MOTORIZED ROLLERS
INTELLIROL ITR Accumulation Bed	BED	ITR	22BF	HB	CZ	3RC	24Z	RH	6'0"	FE60	3MR

EXAMPLE: BED,ITR-22BF-HB-CZ-3RC-24Z-RH
6'0"-FE60-3MR

PRODUCT DESCRIPTION: Bed, INTELLIROL Conveyor, 22" Width Between Frame, HB Style Drivercard, CZ Frame (CRUZ Channel), 3" Roller Centers, 24" Roller Zone Length, Right Hand Flow
6'0" Overall Length, FE-60 Type Motorized Rollers, 3 Motorized Rollers Total

	TYPE	MODEL	WIDTH	BED TYPE	ITR DRIVERCARD	FRAME	ROLLER CENTERS	ROLLER ZONE LENGTH	FLOW DIRECTION	LENGTH	ROLLER TYPE	NUMBER OF MOTORIZED ROLLERS
INTELLIROL ITR Full Width Belt Incline Bed	BED	ITR	22BF	INCLINE	IBE	CZ	FWB	30Z	LH	10'0"	FP55	8MR

EXAMPLE: BED,ITR-16BF-INCLINE-IBE-CZ
FWB-30Z-LH-10'0"-FP55-8MR

PRODUCT DESCRIPTION: Bed, INTELLIROL Conveyor, 22" Width Between Frame, Incline Bed, IBE Style Drivercard, CZ Frame (CRUZ Channel)
Full Width Belt (Belt Over Rollers), 30" Roller Zone Length, Left Hand Flow, 10'0" Overall Length, FP-55 Type Motorized Rollers, 8 Motorized Rollers Total

	TYPE	MODEL	WIDTH	ITR DRIVERCARD	FRAME	ROLLER CENTERS	BED ZONES	CURVE ANGLE	FLOW DIRECTION	ROLLER TYPE	NUMBER OF MOTORIZED ROLLERS
INTELLIROL ITR Curve Bed, Accumulation	CURVE	ITR	34BF	HB	CZ	STD	1Z	60D	RH	FE60	2MR

EXAMPLE: CURVE,ITR-34BF-HB-CZ-STD-1Z
60D-RH-FE60-2MR

PRODUCT DESCRIPTION: Curve Bed, INTELLIROL Conveyor, 34" Width Between Frame, HB Style Drivercard, CZ Frame (CRUZ Channel), Standard Roller Centers (vs HDR, High Density Rollers), 1 Bed Zone
60 Degree Curve, Right Hand Flow, FE-60 Type Motorized Rollers, 2 Motorized Rollers Total

	TYPE	MODEL	WIDTH	BED TYPE	ITR DRIVERCARD	FRAME	ROLLER CENTERS	ANGLE	FLOW DIRECTION	ROLLER TYPE	NUMBER OF MOTORIZED ROLLERS
INTELLIROL ITR NoseOver, Decline, Accumulation	NO	ITR	22BF	DECLINE	HB	CZ	FWB	12D	RH	FE60BR	2MR

EXAMPLE: NO,ITR-22BF-DECLINE-HB-CZ-FWB
12D-RH-FE60BR-2MR

PRODUCT DESCRIPTION: Noseover Transition Bed, INTELLIROL Conveyor, 22" Width Between Frame, Decline Bed, HB Style Drivercard, CZ Frame (CRUZ Channel), Full Width Belt (Belt Over Rollers)
12 Degree Transition, Right Hand Flow, FE-60-BR Type Motorized Rollers with Anti-rollback Brake, 2 Motorized Rollers Total

	TYPE	MODEL	WIDTH	ITR DRIVERCARD	FRAME	NUMBER OF TRACKS	DIVERT DIRECTION	LENGTH	ROLLER TYPE	NUMBER OF MOTORIZED ROLLERS	NUMBER OF SOLENOIDS	PHOTOEYE
INTELLIROL ITR UBT (Urethane Belt Transfer)	UBT	ITR	22BF	IBE	C6	5S	BD	3'0"	FE60	3MR	1SOL	W/O PE

EXAMPLE: UBT,ITR-22BF-IBE-C6-5S-BD-3'0"
FE60-3MR-1SOL-W/O PE

PRODUCT DESCRIPTION: Urethane Belt Transfer (UBT), INTELLIROL Conveyor, 22" Width Between Frame, IBE Style Drivercard, C6 Frame (6" Channel), 5 Strand/Belt Transfer, Bi-Directional Transfer, 3'0" Overall Length
FE-60 Type Motorized Rollers, 3 Motorized Rollers Total, 1 Solenoid (24 VDC), Without PhotoEye

	TYPE	MODEL	WIDTH	ITR DRIVERCARD	FRAME	ROLLER CENTERS	SPUR ANGLE	FLOW DIRECTION	LENGTH	ROLLER TYPE	NUMBER OF MOTORIZED ROLLERS	TYPE OF SPUR
INTELLIROL ITR Sweep Spur	SPUR	ITR	28BF	CB	C6	2.25RC	45D	RH	4'6"	FE140	4MR	SWEEP

EXAMPLE: SPUR,ITR-28BF-CB-C6-2.25RC
45D-RH-4'6"-FE140-4MR-SWEEP

PRODUCT DESCRIPTION: Spur, INTELLIROL Conveyor, 28" Width Between Frame, CB Style Drivercard, C6 Frame (6" Channel), 2.25" Roller Center
45 Degree Spur Angle, Right Hand Flow, 4'6" Spur Length (Long Side of Spur), FE-140 Type Motorized Rollers, 4 Motorized Rollers Total, Sweep Spur

For the most current list of **"Product Description"** and **"Terms and Abbreviations"** Log into mhs-conveyor.com and select Support/Engineering Support Documents.

Chapter 5: IntelliROL Receiving & Site Preparation

General

MHS Conveyor IntelliROL units are shipped in subassemblies. These subassemblies are packaged to guard against damage in shipment, when handled properly.

Examination immediately following unloading will show if any damage was caused during shipment. If damage is evident, claims for recovery of expenses to repair damage or replace components must be made against the carrier immediately. While unloading, a check must be made against the Bill of Lading, or other packing lists provided, to confirm full receipt of listed items.

CAUTION

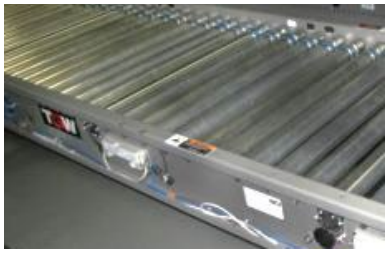
- **TAKE CARE DURING THE REMOVAL OF EQUIPMENT FROM THE CARRIER**. Remove small items and boxes first. Pull and lift only on the skid, not on the frame, cross member or any part of the equipment.

Preparation of Site

After the conveyor is received, move it to the installation site or designated dry storage area as soon as possible. Clean up all packing material immediately before parts get lost in it. Loose parts should remain in the shipping boxes until needed.

Prior to starting assembly of the conveyor, carefully check the installation path to be sure there are no obstructions that will cause interference. Check for access along the path needed to bring in bed sections and components closest to the point where they are needed. It is often necessary to give the area along the system path a general cleanup to improve installation efficiency, access, and accuracy.

5.1: PARTS INVENTORY & IDENTIFICATION



Each subassembly is shipped completely assembled. Identify and separate components by type or tag number, for inventory and ease of locating during installation.

An identification label is attached to the outside of one side channel or on a cross member, close to one end of each conveyor bed.

This label contains:

- Item number
- Description
- Job Number
- Mfg. Number
- Date of manufacture
- Tag number (if specified)
- Assembler's clock number
- QR (Quick Response) Label
  - Scan Code For IOM Manual

Scan the QR code to retrieve the IOM Manual, if nothing happens; check your scanner settings and make sure the QR Label setting is enabled.

On the supports, the tag is located on the bottom side of the foot. On special devices, it is located on a convenient flat surface that is not offensive to the appearance of the equipment but is still accessible for viewing. These numbers can be cross-referenced against the packing list. Loose parts are boxed and shipped separately.

You should have all conveyor sections and supports for a particular conveyor prior to installation. It is cost-effective to identify and procure any missing parts before they are needed for assembly. Small items like nuts and bolts are weigh-counted and packaged by size and type.

⚠ WARNING

- The Installation Supervisor must be experienced with conveyor, qualified in the mechanics of the equipment, and enforce safe working procedures for the protection of the crew, customer, and customer's property.

⚠ WARNING

- Before restarting a conveyor which has been stopped because of an emergency, an inspection of the conveyor must be made and the cause of the stoppage determined. The starting device must be locked out before any attempt is made to correct the cause of stoppage.

Chapter 6: IntelliROL Installation

General

IntelliROL conveyors are offered in four standard widths of 16BF, 22BF, 28BF, and 34BF with the overall conveyor width being 3.25" plus the BF. Standard available bed lengths are multiples of the two standard zone lengths of 24" and 30", up to 10' (both) or 12’ (24” zones only). Standard roller center distance is 3". Other roller centers and widths may be available.

Driver Cards

The driver cards that are supplied with each motorized roller are mounted inside the side channel of a bed, opposite the slave O-ring side of the conveyor. These driver cards condition the 24VDC power coming from a separate power supply. Standard IntelliROL beds are prewired and tested prior to shipping. MHS Conveyor provides an optional plastic shroud that snaps into grooves in the 7.5” deep CRUZchannel to cover the driver cards and wiring. These shrouds are translucent to allow monitoring of the LED condition lights on the driver cards.

Drive / Slave Belt Break-in

The roller-to-roller round drive belts is installed under tension with predetermined initial tension. After a time of static and running time, this initial tension drops to a running tension.

Run all IntelliROL transportation conveyors 48 hours empty before running product. This will ensure motorized rollers are not overloaded under the higher initial belt tension. This run time is best accomplished during installation as soon as the power supplies are wired and during the commissioning phase.

Commissioning of Equipment

Commissioning of the equipment can best be defined as the final adjustments and test of the installed equipment required for its proper operation. The need for commissioning is inherent, since the individual components of equipment are brought together at the installation site to operate as a system.

Mechanical and electrical commissioning is most often carried out simultaneously. Commissioning must simulate the actual operation of the system as close as possible to demonstrate its ability to perform reliably at the specified rate in the prescribed operational sequence.

During the Commissioning Phase, it is necessary to load the equipment with product to be conveyed, which provides the means of detecting those areas requiring adjustment. Personnel will be required to support operational functions and may serve as part of operator training and familiarity with the system. During the commissioning activity, special attention should be directed toward personnel safety.

No unnecessary risks should be taken that would endanger the safety of any commissioning personnel. All personnel must familiarize themselves with all safety features of the system such as emergency stops and power supply disconnects.

After commissioning, conduct operator training on all safety and operational aspects of the system. This must include systems start-up, location of emergency stops and familiarity with all operator controls.

Precautions

ULTRAVIOLET RAYS of sunlight will weaken polyurethane slave belts.

OILY OR WET CONDITIONS impair frictional drive characteristics between polyurethane slave belts and roller grooves. **CORROSIVE SUBSTANCES**, such as concrete curing agents will adversely affect various components, voiding the warranty.

6.1: SUPPORTS & CONNECTIONS

Roll Formed (RF) supports replace all existing MHS Conveyor floor supports.

For details on Supports & Connections see Support & Connections IOM (#1200485) at https://mhs-conveyor.com/support/iom-manuals/supports-and-connections

6.2: GAP FILLER BED

Application

- The application of Gap Filler Beds is for transportation conveyor.
- When using a Gap Filler Bed between two transportation conveyors, use a roller spacing the same as the beds adjacent to the filler bed.

Features/Benefits

Gap Filler Beds aid the modularity of conveyors. Filler beds fit between straight sections of transportation to add length to the conveyor layout. The following is a list features and their benefit.

- Modular design - Easy to reconfigure
- C6 and Cruz channel beds available in both 2” and 3” roller spacing
- No scheduled maintenance - Lower operating cost
- Simple installation - Lower cost
- Few moving parts -Reduced maintenance cost and less noise

6.3: ENVIRONMENT

Temperature range (ambient):

+35° to +100°F. For applications that exceed this temperature range, please consult Applications Engineering.

Ultraviolet Rays:

Avoid exposure of polyurethane O-rings to sunlight.

Oily or Wet Conditions:

Will impair frictional drive characteristics.

Corrosive or Abrasive Substances:

Will adversely affect various components.

Cleaning O-Rings

Manufacturer suggested for cleaning O-rings is to use a cloth with a de-natured alcohol when cleaning the O-ring. This cleaning product would also work for cleaning the rollers.

Note:

Do NOT immerse the O-rings or any component in a container of this cleaning product.

Accumulation with Application Engineering approval.

6.4: Dimensional Reference Points

The path of each conveyor in the system is determined by establishing a reference point at each end. The centerline of the conveyor is established and a chalk line is snapped between these points.

Conveyors should be installed with the centerline of the bed matching the centerline of the conveyor path within 1/8" of true center. Locate and mark the center of the crossmembers at each end of the conveyor. Use a plumb line or other acceptable means to ensure accuracy to the chalk line.

Always carry out a thorough check for any obstructions such as building columns, manholes, etc. It may be necessary to reroute the conveyor to avoid the obstruction. In this case it would be advisable to begin installation at this point, using the obstruction as a reference point (Datum), and install the sections in either direction as required.

All conveyor sections must be checked for squareness prior to installation as "racking" or being knocked out of square may have occurred during shipping and handling.

6.5: IntelliROL Installation

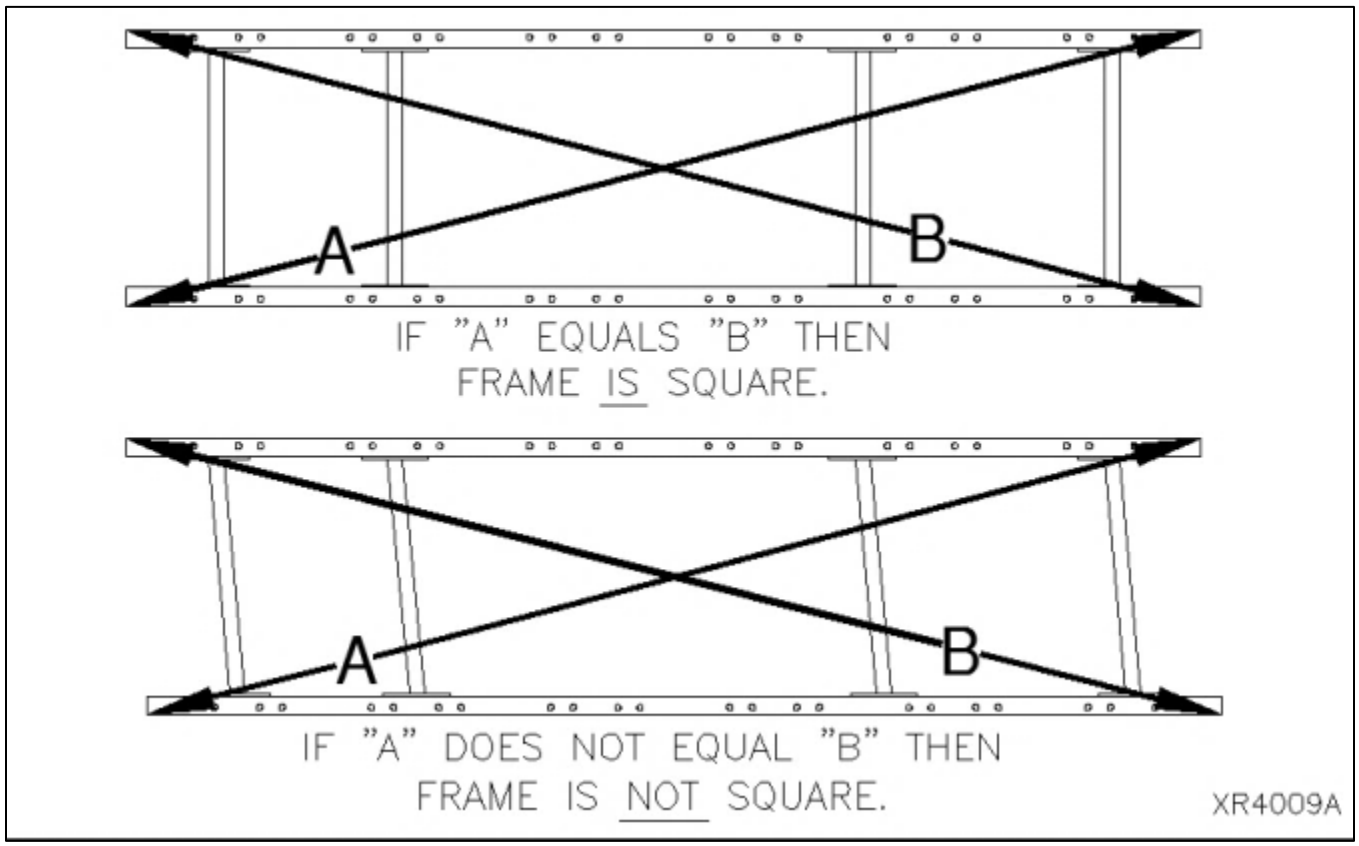
Basics IntelliROL Installation

IntelliROL conveyor may be installed using any of the supporting arrangements described under Support & Connections chapter of this manual. As each bed is installed in the system, level the conveyor from side to side using a bubble level on the roller at each support. The bubble location should be within the level indicator lines of the level. The centerline of the conveyor should not bow to the right or left more than 1/8" in either direction from a centerline drawn between the centers of the conveyor end assemblies.

A simple way to check this is to tie a nylon string around the center of the end roller, pull it taut, and tie it to the center of the roller at the opposite end. Put a wood spacer under the string at each end so it does not rest on the rollers. With the taut string centered on each end and suspended above the rollers, check the center of the rollers at each support relative to the string and adjust accordingly. (Note that this must be done after side-to-side leveling of the conveyor at each support.)

When joining bed frames it is important to align the side channels. Care must be taken to make sure the rollers are level (carrying surfaces) from bed to bed.

All bed frames should be checked for squareness. To check, measure diagonally from corner to corner. Measure the opposite corners in the same manner. If the bed is square, the two measurements will be the same within 1/16".



6.6: ELEVATIONS

All conveyors should be installed in accordance with the elevations shown on the drawings. In addition, all conveyors must be level across the frame width and length (if horizontal). Leveling of the frames is best done using a rotating laser level or a builder's level.

After the first elevation is established at a critical point, the elevation of all other points shall be relative to this first point. Normal practice is to dimension the layout and measure elevations from the floor at each point of support.

As the conveyor system proceeds onto another floor or into another building or room, a new elevation will be measured from the floor at that point. This new elevation will then become the reference for subsequent elevations.

When installing an overhead system, the first elevation is measured from the floor and becomes the reference elevation point until a change in elevation is shown on the layout. Any new elevation is also measured from the floor and becomes the new reference point. The process is repeated each time an elevation change occurs.

CAUTION

- Consult the building architect or a structural engineer regarding ceiling loading or structural limitations of the building if any conveyor section is ceiling hung.

Component Orientation

Using your conveyor system layout drawing and the numbers on the I.D. tags on each component, position and align the conveyor sections, you must know:

- The direction of product flow
- The elevation height
- Charge and discharge end beds

IMPORTANT!

Do not make alterations to the equipment without consulting with user's representative and MHS Conveyor. Unauthorized modifications to the equipment may impair its function, create a hazardous condition, affect its useful life, and/or void the warranty.

Establishing Conveyor Flow

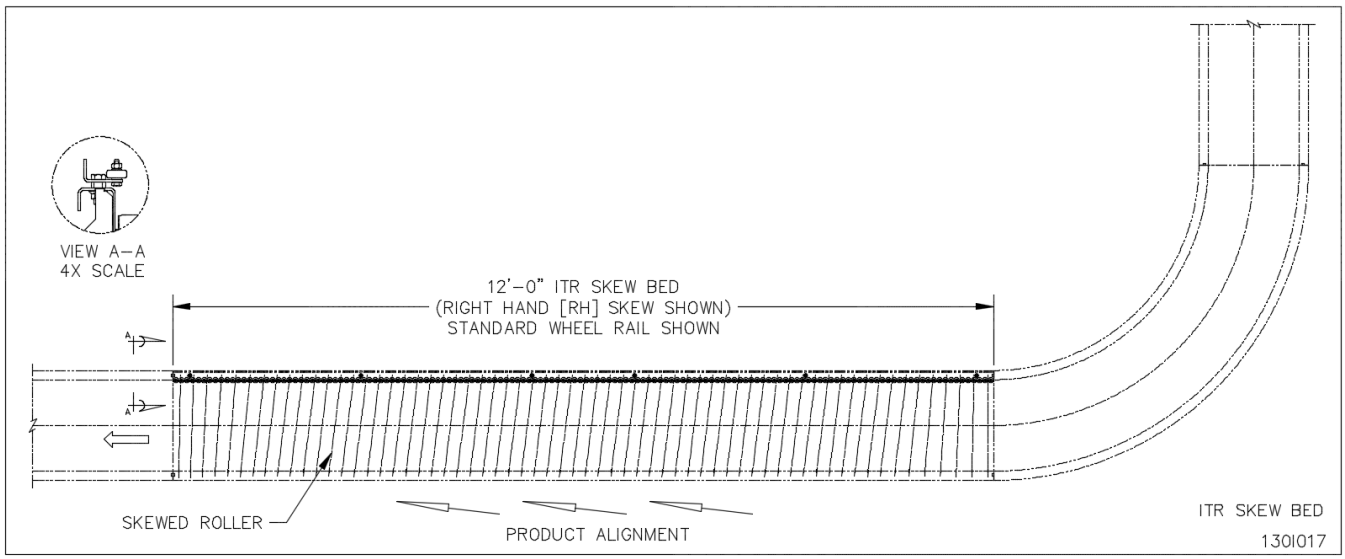
Standard IntelliROL beds are supplied as either RH or LH flow. Looking across from the side of the IntelliROL bed the O-rings away from you and the product conveying to the right, the bed is considered a right hand (RH) flow bed. Using the same position as noted above and with the product conveying to the left, the bed is considered a left hand (LH) flow bed. The identification label described under Parts Inventory & Identification has all of the information required to identify the piece of equipment.

Chapter 7: ITR Skewing Bed Rollers

Skewing rollers is recommended on ITR conveyor if the between frame (BF) dimension of your conveyor is double the width of the smallest product. The normal method of skewing is to install a factory skew bed at the charge end of your conveyor. If your conveyor line is over 100' long and you have small product on it, you may want to add a shorter maintenance skew bed midway down the conveyor to preserve the product alignment.

7.1: Factory Skew Section

Standard 12', 10', or 5' skew beds are available with factory skewed rollers at 7 degrees. These beds are available in left or right hand and a factory installed wheel guard rail is standard. The skewed bed will move products across the conveyor approximately 16" over the 12' length. This side movement is dependent on the bottom condition of the product.

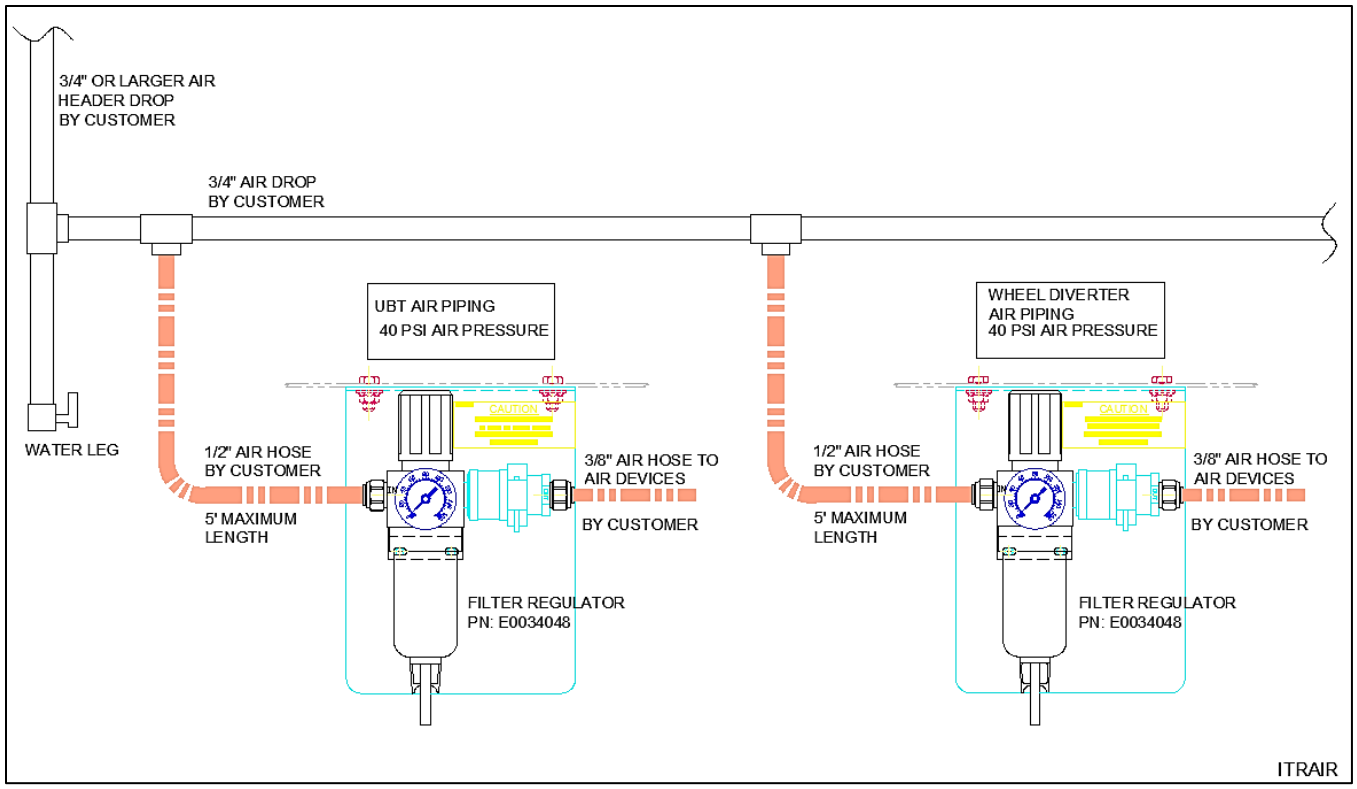


7.2: Skew Bed Installation

MHS Conveyor dedicated skew beds are typically installed as the first bed section in an ITR conveyor line starting from the charge end. The rollers are factory skewed to the requested side and the installation is the same as any other ITR transportation bed section.

A wheeled guard rail is standard to prevent the stalling of product as it is forced against the side channel by the skewed rollers. The wheeled rail is shipped installed at our factory.

Chapter 8: IntelliROL Air Supply Requirements



General

Every conveyor system is unique, with its own specific requirements. Therefore, the following is a general guide.

Main Feeder

Air velocity through the main feeder piping can be kept smooth with lower losses using large diameter pipe with minimum bends and restrictions. Standard weight black pipe or copper is suitable for plumbing the compressed air overhead to all points of use.

Air Drops

MHS Conveyor recommends using 3/4" pipe on air drops for low pressure loss. The drop is terminated with a drain at the bottom. A tee located prior to the drain (drop leg) branches off to the conveyor. This branch line must contain a lockout/shutoff. A shutoff must also be located in the drop before the branch tee.

OSHA Rule 29, CFR1910.147 https://www.osha.gov/ requires energy sources (air drops) be turned off and capable of being locked or labeled with a warning tag.

IMPORTANT!

If your air compressor uses synthetic oil, a coalescing filter plus a regular filter of 5 micron is required. Synthetic oils will shrink the seals in pneumatic devices.

Low Pressure Switch

An air pressure switch is recommended to be installed into the pneumatic circuit to detect a drop in air pressure below required levels. If pressure drops below approximately 20 PSI, the conveyor system should shut off.

Pneumatic Requirements

- Regulator pressure set at 40-45 PSI with pop-off set to 35 PSI.
- Maximum conveyor length each way from regulator is 100'.
    - Locate regulator in center of conveyor for maximum efficiency.
- Low pressure switch to be set at 20 PSI.
- In high humidity or low temperature, use air dryer.
- Use 5 micron filter.
- Lockout/shutoff valve to be provided by air system installer.

Chapter 9: IntelliROL Power Supply Standards

9.1: ITR Power Supply Standard

The IntelliROL product line includes power supplies that convert various AC power sources to 24VDC power sources. These power supplies are used to supply power to the motorized roller components included in our IntelliROL product line. Power supplies are available for most standard input voltages. Available output currents include 10, 20, 40, and 80 amperes. IntelliROL power supplies are available with internal branch circuit protection. If branch circuit protection is already provided upstream by others, IntelliROL power supplies are available without internal branch circuit protection at a lower cost. All IntelliROL power supplies are designed and built to UL508A standards.

Standard IntelliROL Power Supply with Puls power supply

The 40 amp power supply has (2) 20 amp circuits and the 80 amp power supply has (4) 20 amp circuits. Each 20 amp circuit will support up to 9 motorized rollers. These supplies require either 120 or 240 VAC single-phase or 480 VAC three-phase (480 VAC 10A requires two-phase), and the DC power side is wired to the motorized rollers.

Wiring for the 24 VDC power along the length of the conveyor is provided by MHS Conveyor. See Replacement Parts in this chapter for other parts and cables for IntelliROL. All power supplies are offered with or without branch circuit protection. All power supplies except 80 amps include a 10.5' power harness
(1102286) to connect to bed 24VDC power harness. All standard 80 amp power supplies include 33' power harness (1138166) to connect to bed 24VDC power harness. All power supplies also include a common ground (1161502) and splice connector kit (1207178).

For more ITR Power Supply Application Control Guidelines:

https://mhs-conveyor.com/support/application-control-guidelines

Note:

With Branch Circuit Protection on the supply side, fuses are included with power supply. Without Branch Circuit Protection, fuses are not included with power supply. Fuses on the DC output side are included.

Standard 24VDC power supplies are used for IntelliROL conveyor only. Standard power supplies can be powered from a separate power source input or tapped into a high voltage motor to a corresponding conveyor that the IntelliROL conveyor will directly interface with. Use only with motors without VFD.

24VDC STANDARD POWER SUPPLIES WITHOUT BRANCH CURCUIT PROTECTION FOR INTELLIROL									
Item Number	Drawing Number	Input Voltage	Power Supply Size	Input Current	Output Current	Typical Number of MDR	Enclosure Type	UL Listed	Enclosure Dimensions (H x W x D)
1176628	130E234	480VAC/3PH/60HZ	80A	2.8A	**80A**	36	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1166697	130E177	480VAC/2PH/60HZ	10A	0.6A	**10A**	3	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1166698	130E178	240VAC/1PH/60HZ	10A	1.13A	**10A**	3	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1166699	130E179	120VAC/1PH/60HZ	10A	2.15A	**10A**	3	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1159647	130E122	480VAC/3PH/60HZ	20A	0.65A	**20A**	9	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160954	130E124	240VAC/1PH/60HZ	20A	2.23A	**20A**	9	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160956	130E126	120VAC/1PH/60HZ	20A	4.64A	**20A**	9	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1159645	130E121	480VAC/3PH/60HZ	40A	1.4A	**40A**	18	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160953	130E123	240VAC/1PH/60HZ	40A	4.5A	**40A**	18	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160955	130E125	120VAC/1PH/60HZ	40A	8.6A	**40A**	18	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"

24VDC STANDARD POWER SUPPLIES WITH BRANCH CURCUIT PROTECTION FOR INTELLIROL									
Item Number	Drawing Number	Input Voltage	Power Supply Size	Input Current	Output Current	Typical Number of MDR	Enclosure Type	UL Listed	Enclosure Dimensions (H x W x D)
1176603	130E233	480VAC/3PH/60HZ	80A	2.8A	**80A**	36	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1166694	130E174	480VAC/2PH/60HZ	10A	0.6A	**10A**	3	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1166695	130E175	240VAC/1PH/60HZ	10A	1.13A	**10A**	3	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1166696	130E176	120VAC/1PH/60HZ	10A	2.15A	**10A**	3	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160915	130E116	480VAC/3PH/60HZ	20A	0.65A	**20A**	9	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160949	130E118	240VAC/1PH/60HZ	20A	2.23A	**20A**	9	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160951	130E120	120VAC/1PH/60HZ	20A	4.64A	**20A**	9	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160913	130E115	480VAC/3PH/60HZ	40A	1.4A	**40A**	18	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160948	130E117	240VAC/1PH/60HZ	40A	4.5A	**40A**	18	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160950	130E119	120VAC/1PH/60HZ	40A	8.6A	**40A**	18	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"

9.2: ITR AND CRUZCONTROL POWER SUPPLY COMBINATION

Combination 24VDC power supplies are used with IntelliROL and conveyor with CRUZcontrol. The power supplies have two 24VDC circuits, Class I for the IntelliROL and Class II for the CRUZcontrol. Combination power supplies can be powered from a separate power source input or tapped into a high voltage motor to a corresponding conveyor that the IntelliROL conveyor will directly interface with. Use only with motors without VFD.

24VDC COMBINATION POWER SUPPLIES WITHOUT BRANCH CURCUIT PROTECTION FOR INTELLIROL AND CRUZCONTROL									
TGW Item Number	Drawing Number	Input Voltage	Power Supply Size	Input Current	Output Current		Typical Number of MDR	Enclosure Type	UL Listed	Enclosure Dimensions (H x W x D)
					ITR	CRUZ				
1166703	130E183	480VAC/2PH/60HZ	10A	0.6A	6	4	2	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1166704	130E184	240VAC/1PH/60HZ	10A	1.13A	6	4	2	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1166705	130E185	120VAC/1PH/60HZ	10A	2.15A	6	4	2	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160924	130E110	480VAC/3PH/60HZ	20A	0.65A	16	4	8	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160926	130E112	240VAC/1PH/60HZ	20A	2.23A	16	4	8	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160928	130E114	120VAC/1PH/60HZ	20A	4.64A	16	4	8	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160923	130E109	480VAC/3PH/60HZ	40A	1.4A	36	4	17	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160925	130E111	240VAC/1PH/60HZ	40A	4.5A	36	4	17	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160927	130E113	120VAC/1PH/60HZ	40A	8.6A	36	4	17	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"

24VDC COMBINATION POWER SUPPLIES WITH BRANCH CURCUIT PROTECTION FOR INTELLIROL AND CRUZCONTROL									
TGW Item Number	Drawing Number	Input Voltage	Power Supply Size	Input Current	Output Current		Typical Number of MDR	Enclosure Type	UL Listed	Enclosure Dimensions (H x W x D)
					ITR	CRUZ				
1166700	130E180	480VAC/2PH/60HZ	10A	0.6A	6	4	2	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1166701	130E181	240VAC/1PH/60HZ	10A	1.13A	6	4	2	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1166702	130E182	120VAC/1PH/60HZ	10A	2.15A	6	4	2	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160918	130E104	480VAC/3PH/60HZ	20A	0.65A	16	4	8	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160920	130E106	240VAC/1PH/60HZ	20A	2.23A	16	4	8	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160922	130E108	120VAC/1PH/60HZ	20A	4.64A	16	4	8	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160917	130E103	480VAC/3PH/60HZ	40A	1.4A	36	4	17	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160919	130E105	240VAC/1PH/60HZ	40A	4.5A	36	4	17	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"
1160921	130E107	120VAC/1PH/60HZ	40A	8.6A	36	4	17	Type 12	Yes	15-3/4" X 15-3/4" X 7-7/8"

9.3: ITR POWER SUPPLY MOTOR CONTROL

The Motor Control 24VDC power supply is used with a 480 VAC motor. The Motor Control power supply is powered from the same power source as the high voltage motor that IntelliROL will directly interface with. Use only with motors without VFD.

MOTOR CONTROL 24VDC POWER SUPPLIES FOR INTELLIROL (USED ONLY WITH MOTORS W/O VFD)									
TGW Item Number	Drawing Number	Input Voltage	Power Supply Size	Input Current	Output Current	Typical Number of MDR	Enclosure Type	UL Listed	Enclosure Dimensions (H x W x D)
1145930	130E042	480VAC/3PH/60HZ	10A	0.6A	10A	3	Type 12	Yes	12"X 12" X 8"
1145931	130E043	480VAC/3PH/60HZ	20A	0.65A	20A	9	Type 12	Yes	12"X 12" X 8"

9.4: General Electrical Requirements

⚠ WARNING

- All electrical controls must be installed, wired, and connected by a licensed electrician only.
- All motor controls and wiring must conform to the National Electrical Code as published by the National Fire Protection Association and approved by the American National Standards Institute, Inc. Since specific electrical codes vary from one area to another, be sure to check with proper authorities before starting.

The electrical voltage of motorized rollers will be stamped on a metal name plate affixed to one end of the roller. This voltage should be checked to see that it matches the output voltage of your power supply. Consult the appropriate MHS Conveyor wiring diagram for the proper connections. If a single speed three phase motorized roller runs the wrong direction, two leads must be switched to reverse rotation.

⚠ WARNING

- Do not connect the driver card to any other voltage than the one listed on its name plate.

NOTE:

All controls equipment is covered by the original manufacturer's equipment warranty.

WARNING

- All safety devices, including wiring of electrical safety devices, shall be arranged to operate in a “fail safe” manner. That is, if power failure or failure of the device itself would occur, a hazardous condition must not result.

WARNING

- Before restarting a conveyor which has been stopped because of an emergency, an inspection of the conveyor must be made and the cause of the stoppage determined. The starting device must be locked out before any attempt is made to correct the cause of stoppage.

Chapter 10: IntelliROL Drivercards Guidelines

10.1: ITR Application Standard

The ITR product line is based on the following features and concepts: http://itohdenki.com/

- Itoh Denki motorized rollers and drivercards (CBM-105, HB-510 or IB-E03) are standard.
- Cables are pre-engineered with the appropriate connectors.
- All channels are designed to accommodate any of the electrical variations.
- All CRUZchannels including C6 channels have welded connectors and CRUZbelt tube crossmembers.
- AutoCAD blocks for ITR devices are available upon request.

10.2: ITR$_{CB}$ – CBM-105 (transportation)

- Standard product offered in Core Technologies.
- Transportation conveyor based on the Itoh CBM-105 drivercard and FE-60 motorized roller.
- Each drivercard is wired to power, but requires a 24VDC run signal (provided by others) to run each card. Beds include a run harness distributing that signal to each card.
- C6 channel with welded butt bolt bed connectors.
- 30” roller groups with 3” centers are standard.

10.3: ITR$_{HB}$ – HB-510 (accumulation)

- Standard product offered in Core Technologies.
- ZPA conveyor based on the Itoh HB-510 drivercard and FE-60 motorized roller.
- Can be a standalone conveyor. It may not require an input from a control panel depending on application.
- CRUZ channel with welded butt bolt bed connectors and integrated photoeyes.
- 24” and 30” zones with 3” centers are standard.
- A start signal can be used to activate the conveyor when using run on demand.

10.4: ITR$_{IBE}$ – IB-E03 (programmable)

- Standard product offered in Core Technologies.
- Conveyor based on the Itoh IB-E03 drivercard and FE-60 motorized roller.
- Programmable drivercard (Programming by customer).
- CRUZchannel with welded butt bolt bed connectors and integrated photoeyes.
- Accumulation or transportation depending on customer needs.
- A signal can be sent from central PLC to activate the conveyor through the cards LAN line or the card can activate the conveyor with internal programming logic using the cards inputs.

10.5: ITR Bed Construction

- Straight bed, curve, & spur channels – CZ or C6.
- C6 channel standard has 1.625” flanges.
- C6 channel top flange are punched at ends for transition bezel (1120166) from C6 to CRUZchannel.
- All channels come with a welded bed connector.
- Straight bed crossmembers are tube style as used in the CRUZbelt product line.
- Straight beds will be punched for drivercards in every zone.

10.6: ITR Skew Bed Construction

- Straight bed – CRUZchannel.
- CZ channel standard has 1.625” flanges.
- 2.25"RC installed at the factory.
- Transportation conveyor based on the Itoh CBM-105 cards and FE-60 motorized roller.
- All channels come with a welded bed connector.

10.7: Curve Construction

- 36” standard inside curve radius with CRUZ® side channel.
- Curve channels are notched with welded 10ga backers.
- No straight tangents, full straight section arc only.
- All channels come with a welded bed connector.
- CBM-105, HB-510, and / or IB-E03 cards located on the outer channel with an adapter plate (CBM-105 Plate: E0006531, HB-510 Plate: E0006532, IB-E03 Plate: 1165192).
- Sensor location is 6” from the end of the zone.

10.8: UBT PNEUMATIC Construction

- 3’-4” OAL standard for 6 strand, 3'0" standard for 5 strand.
- C6 channels are 10ga construction with welded butt bolt bed connectors.
- UBT transfers use 1.9" diameter carrier rollers.
- UBT transfer belts on 4” center standard.
- UBT’s with sensors, PE’s (ZL) & reflectors are available as a standard option.
- UBT's are universal LH/RH. The power harness is installed for LH flow, but can be reversed by moving a female gender adapter to the other end of the harness.

10.9: UBT Electric Construction

- 3’-4” OAL standard for 6 strand, 3'0" standard for 5 strand.
- C6 channels are 10ga construction with welded butt bolt bed connectors.
- UBT transfers require 1.9" diameter carrier rollers.
- UBT transfer belts on 4” center standard.
- UBT’s with sensors, PE’s (ZL) & reflectors are available as a standard option.
- UBT's are universal LH/RH. The power harness is installed for LH flow, but can be repowered by moving a female gender adapter to the other end of the harness.
- ITR_{IBE} is the only version of a standard electric lift UBT (transportation only).
- (2) 24VDC Lifting Gearmotors standard.

10.10: Power Merge Construction

- Standard power merge is available in ITRCB or IB-E version (Transportation only).
- Standard spur angles are 30 & 45 degree, RH/LH.
- Spur BF is 6” wider than abutting bed.
- PE’s by others.

10.11: Wheel Divert Pneumatic Construction

- Standard wheel diverter available in ITRCB or IB-E version (Transportation only).
- Standard spur angle is 30 degree RH/LH beds.

- Diverter has 4 independently acting rows. Each divert wheel row is controlled by a separate solenoid. Having separate solenoids allows for independent control to raise or lower each wheel row independently allowing increased throughput.
- Solenoids are included as standard. 120VAC or 24VDC available.
- PE's by others.
- Wheel diverts include drop out tubs. Maintain at least 10" clearance below divert for removal.

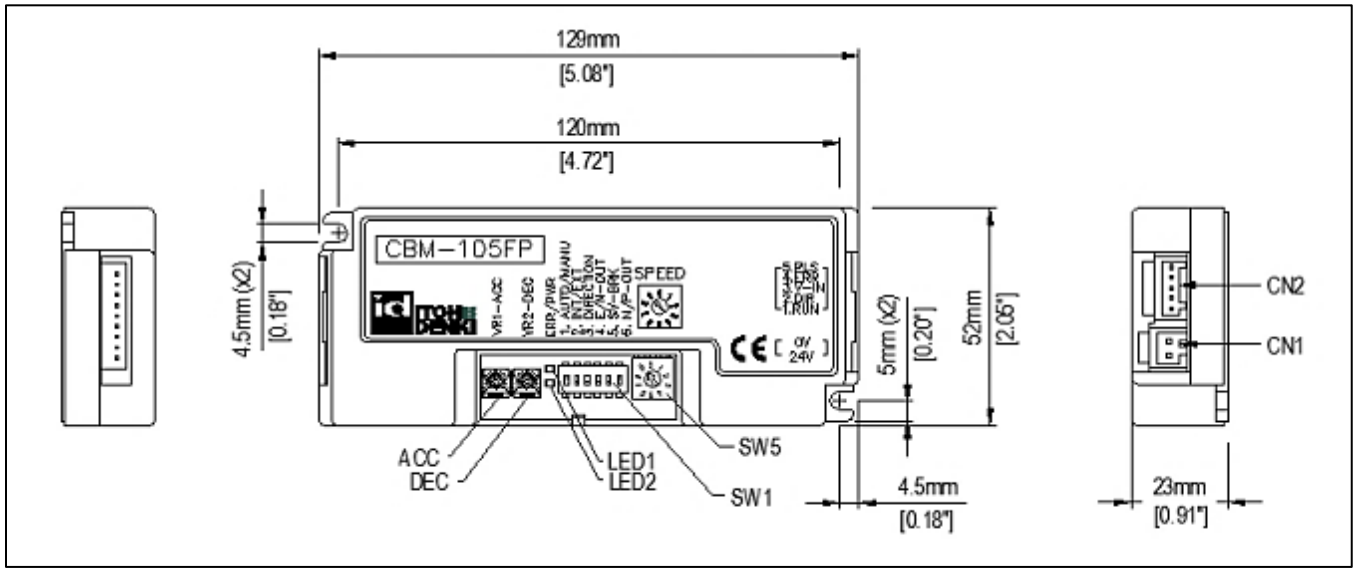
10.12: Wheel Divert Electric Construction

- ITR_{IBE} is the only version of a standard electric lift wheel diverter (transportation only).
- Standard spur angle is 30 degree RH/LH beds.
- Diverter has 4 acting rows. (2) Divert wheel rows are controlled by separate 24VDC Gearmotors.
- (2) 24VDC Lifting Gearmotors standard.
- PE's by others.
- Wheel diverts include drop out tubs. Maintain at least 10" clearance below divert for removal.

10.13: Spur Construction

- Standard spur available in ITRCB or IB-E version (Transportation only).
- Standard spur angles are created for 30 & 45 degree, RH/LH.
- Each spur has a conversion cable to allow for proper power and control signal flow.
- Each spur includes a wheeled guardrail to direct packages.

Chapter 11: ITOH DENKI CBM-105 & CB-016 DRIVERCARD



11.1: CBM-105 & CB-016 DRIVERCARD GENERAL NOTES:

- For "transportation" conveyor segments, and devices not requiring zoned accumulation (transfers, merges, wheel diverts). Requires PLC or other external control for basic run and reverse functions.
- MHS Conveyor CBM-105 (ITR^{CB}) conveyor includes:
  - Power harness – installed with taps to individual drivercards and bed-to-bed plug-in connections.
  - Drivercard – installed, connected to power harness, and speed pre-set.
  - CN2 – 5-PIN connector installed in card with "run harness" pre-wired to all cards.
  - Motorized rollers – installed in bed, motor cable connected.

All beds factory tested for flow direction, speed, and proper plug-in connections.

11.2: CBM-105 & CB-016 FEATURES:

- Adjustable acceleration and deceleration time (0 to 2.5 seconds)
- Stable speed operation
- Manual or automatic recover of the thermal overload device
- One (1) rotary switch to select up to 10 different fixed speeds or external voltage input for up to 20 fixed speeds
- Forcibly stops motor if motor is locked for more than 4 seconds or thermal overload error lasts for 1 second or more
- Two (2) LEDs (red & green) to identify the type of error and power
- Back EMF error for over speeding protection
- Pulse signal output to indicate motor revolution
- Servo brake control allows product to maintain its position after run signal is removed
- Error output selection for output in normal or abnormal status
- Low Voltage Protection – See "LED's and Error Indications" section
- External Direction control – See "User Interface Switch Settings" section

11.3: CBM-105 & CB-016 SPECIFICATIONS:

Operation:

- Cycle: 1 second ON; 1 second OFF (max on-off cycles 30/minute)
- Continuous duty permissible
- Do not overfeed by 150% of no-load operating speed (back EMF will be generated)
- Power: +24V DC +/-10% (full-wave rectified, smoothed current <10% ripple
- Power ON delay <1 second
- 4 Amp locking current
- Input signal level for activation minimum 18V for PNP
- See “Connections” section for I/O circuit current limitations/requirements
- PNP circuitry for all I/O, except for CN2 output 2-4, which is configurable as PNP or NPN.
- Servo brake mode – See “User Interface Switch Settings” section

Protection:

- Thermal Overload 185°F (85°C) on PCB
- Thermal Overload 221°F (105°C) in motor
- 5 Amp Internal fuse (non-replaceable) to power supply
- Internal diode circuit protection (Voltage Polarity)

Environment:

- Ambient Temperature 32-104°F (0-40°C)
- <90% Relative Humidity (No condensation)
- No Corrosive Gases
- Vibration <0.5G

See Itoh-Denki technical document for additional information: http://itohdenki.com/

11.3.1: CBM-105 & CB-016 Connections

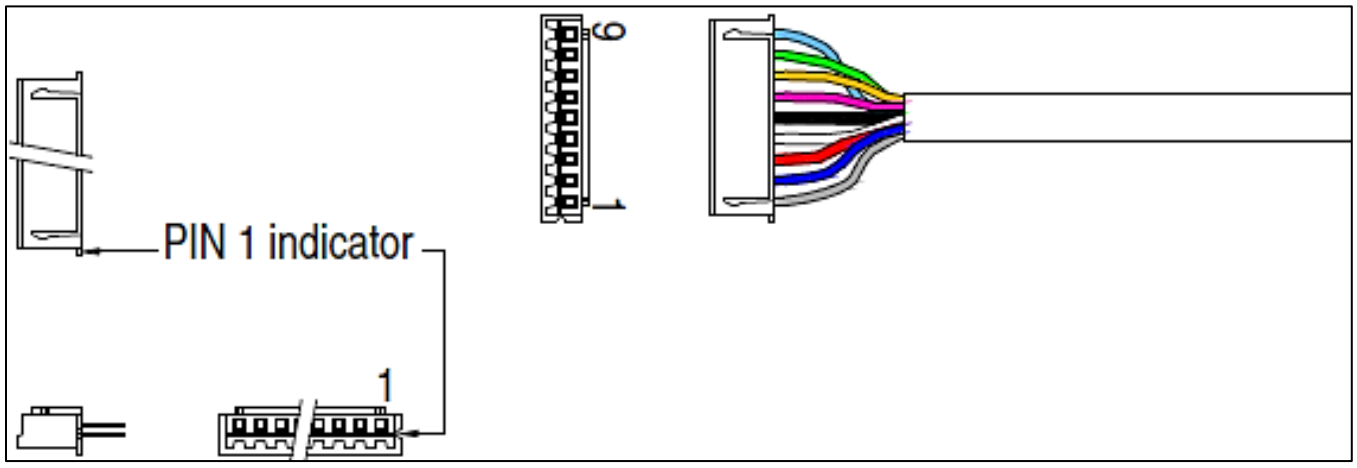
CN1 – 2 PIN connector for Power	**Male Connector on Card WAGO #734-162**	**Female Connector for Wiring WAGO #734-102 TGW PN:1104417 & 18**

PIN	**Description**	
1	+24VDC +/-10% (full-wave rectified, smoothed current <10% ripple)	Wire Size: 28-14AWG
2	0V	

CN2 5 PIN connector for external control	**Male Connector on Card WAGO #733-335**	**Female Connector for Wiring WAGO #733-105 TGW PN:733105 & 1104417**

PIN	**Description**	
1	+24V DC (Input) – RUN	Wire Size: 28-20AWG
2	+24V DC (Input) – DIR	
3	0-+10V DC (Input) – V-IN (Allows analog speed control, 1.6mA/card)	
4	+24V DC (Output) – ERR (Open collector: 25mA max)	
5	+24V DC (Output) – PLS (Open collector: 25mA max)	

CN3 – 9 PIN connector for Motor	Male Connector on Card JST #S9B-XH-A	Female Connector for Wiring JST #XHP-9
PIN	Description	
1	GND - Grey	Wire Size: 28-22AWG & 24-22AWG motor phases Terminal pins: JST #SXH-001T-P0.6
2	+12V DC – Blue	
3	Motor Phase U – Red	
4	Motor Phase V – White	
5	Motor Phase W – Black	
6	Hall Sensor U – Violet	
7	Hall Sensor V – Orange	
8	Hall Sensor W – Green	
9	Thermistor – Light Blue	



11.3.2: CBM-105& CB-016 Installation Precautions

Precaution	Action	Reason
Power Supply	Power supply must be sized appropriately for the number of cards/rollers it provides power to. See "Power Supply Application Information" section.	Exceeding the power supply capacity can cause low voltage issues.
Multiple power supplies	0V line of all power supplies associated with a conveyor "unit" (cards, rollers, and external controls) need to be connected.	This completes the signal path between conveyor sections and system controls.
Voltage drop across power bus	Use suitable gauge wire in relation to distance and current draw.	Voltage must not drop below 21.6V DC or voltage faults will occur

11.3.3: CBM-105 & CB-016 User Interface Switch Settings

DIP Switches (SW1) – User Settings				
DIP Switch	**Function**	**ON**	**OFF**	**Default Setting**
1	Thermal device/low voltage/back EMF recover	Manual	Automatic (Thermal restarts 1min after cool down)	**ON**
2	Speed change selection	External (0~10V DC applied)	Internal (Rotary switch)	**OFF**
3	DIR* (No external DIR signal; viewed from cable side)	FS/FP – CCW FE – CW	FS/FP – CW FE – CCW	**OFF**
4	Error signal activity	Active during normal status	Active during abnormal status	**ON**
5	Brake mode	Servo	Dynamic	**OFF**
6	Error output (FN type)	PNP	NPN	**OFF**
	Error output (FP type)	PNP	NPN	**ON**

*External direction signal only. If a direction change signal should occur while the motor is running, the motor will first stop for 0.5s. The motor will then start in the new direction.

Rotary switch (SW2)

Applicable when using internal speed control (DIP-SW2 OFF)

Factory default position 9 (highest speed), MHS Conveyor presets speeds on production beds

Potentiometers*

VR1 – Acceleration

Adjust acceleration time from 0~2.5 seconds after the RUN signal is applied

VR2 – Deceleration

Adjust deceleration time from 0~2.5 seconds after the RUN signal is removed

*VR's turn 270°

Brake

Servo Brake mode with DIP-SW 1-5 ON

- Holds Power Roller in position 0.2 seconds after the RUN signal is removed
- If external force moves the Power Roller it will return back to its initial stopped position

- Maximum holding force is 17.7 lb.-in at 1.0 Amp (Based on a PM486FE-60)
- Servo brake does not function during an error condition

Motor pulse output signal

- NPN (0V) output from CN2-5
- Two (2) pulses per motor revolution

11.3.4: CBM-105& CB-016 LED's and Error Indications

Status	LED1 (green)	LED2 (red)	ERR Output (DIP-SW4 setting)		Error Condition*	Result	Solution
			OFF	ON			
Normal	● (ON)	○ (OFF)	○	●	n/a	n/a	n/a
No power	○ (OFF)	○ (OFF)	○	○	n/a	No operation	
Thermal overload	● (ON)	● (ON)	●	○	Motor or PCB above operating temperature		1
Motor lock	● (ON)	Blinks (1Hz) ● ○	●	○	Motor locked (>4s)		2
Motor unplugged	● (ON)	● (ON)	●	○	Motor not connected to card		3
Open Fuse	○ (OFF)	Blinks (6Hz) ●○●○●○ ●○●○●○	●	○	Current exceeded 5A		4
Back EMF	● (ON)	Blinks/off (6Hz) ● ○ ● ○ ● ○ ○ ○ ○ ○ ○ ○	●	○	Supply voltage >40V DC for 2s, or 60V DC for 0.1s		5
Low voltage (<15V)	● (ON)	Blinks (6Hz) ●○●○●○ ●○●○●○	●	○	<15V DC (>1s or 5x in 0.5s)		6

11.3.5: CBM-105 & CB-016 Solution

1. See more information under Input / Output Settings, DIP switch 1-8
    - A signal applied to CN2-1 (RUN) or CN2-2 (DIR) will reset this error status
    - Thermal overload can only be reset if the temperature has fallen back into the operating range
2. Remove the cause of the motor lock and clear the zone
3. Remove power from the card, plug in the motor connector, and then reapply power
4. Replace the card
5. If card detects back EMF over 40V DC for 2sec or 60V DC for 0.1sec, the motor will stop running and go into dynamic brake condition to slow the product down
    - Back EMF results from forcing a roller to run at >150% of its set operating speed
    - If DIP-SW1 is ON (Manual recovery), card must be reset 1sec after voltage drops under 30V DC. Applying a signal to CN2-1 or CN2-1 will reset error.
    - If DIP-SW1 is OFF (Automatic recover), card will restart roller 1sec after the voltage drops below 30V DC (if run signal is active
6. Check power supply output, voltage drop along power bus, and roller count per power supply.

11.3.6: ITR CBM-105 and CB-016 Electrical Components

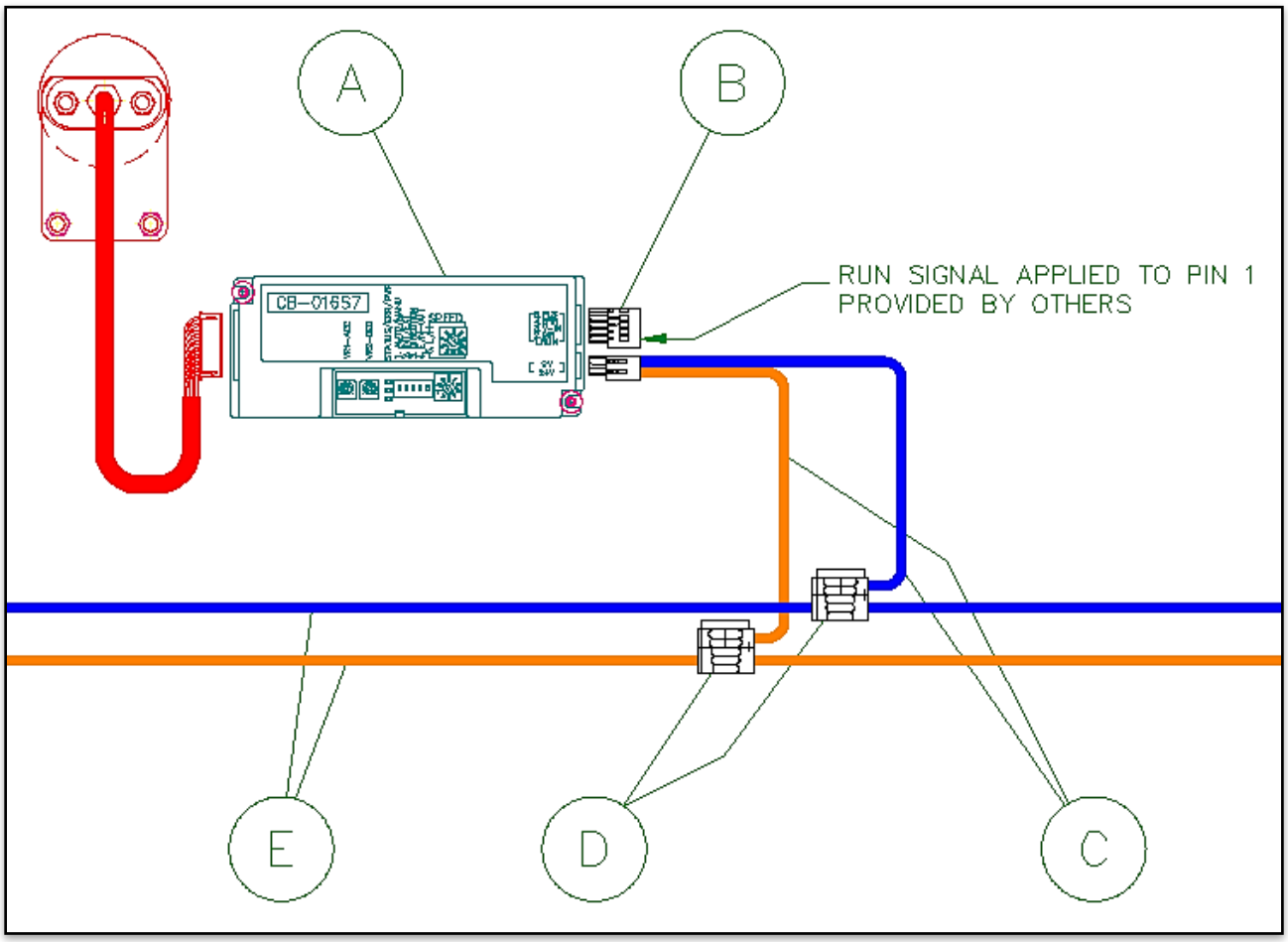


Figure 1 –CBM-105 Drivercard and CB-016

A. CB-016P7 (P/N 1139716 with hardware) or
   CB-105FP (P/N 1153931 with hardware)
B. 5-Pin connector (for run signal connection): 733105
C. Power tap cable (for short distances < 6”): 1139543
D. Scotchlok connectors (connect power tap to power harness): 3M567 (Brown)
E. Power harness – see power harness table

Table1: Power Harness

Item No.	Description
1102286	HARNESS,ITR-POWER-10AWG-10.5'
1102287	HARNESS,ITR-POWER-10AWG-8'
1102288	HARNESS,ITR-POWER-10AWG-5.5'
1102289	HARNESS,ITR-POWER-10AWG-3'

11.3.7: CBM-105 Drivercard Speed Chart

CBM-105 DRIVERCARD / FE- _ _ _ ROLLER

ROLLER: FE-17			ROLLER: FE-60			ROLLER: FE-100			ROLLER: FE-140		
NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)	NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)	NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)	NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)
6	0	6.9	**25**	0	24.6	**85**	0	87.5	**85**	0	87.5
9	1	9.2	**30**	1	32.8	**115**	1	116.6	**115**	1	116.6
13	2	13.8	**45**	2	49.2	**170**	2	174.9	**170**	2	174.9
18	3	18.4	**65**	3	65.6	**230**	3	233.2	**230**	3	233.2
25	4	27.7	**95**	4	98.4		4	349.7/(285.7)	**345**	4	349.7
35	5	36.9	**130**	5	131.2		5			5	466.3/(408.2)
40	6	41.5	**145**	6	147.6	**285**	6			6	524.7/(408.2)
45	7	46.1	**160**	7	164		7	433.1/(285.7)	**405**	7	
50	8	50.7/(48.0)	**180**	8	180.4/(170.6)		8			8	566.2/(408.2)
	9	55.3/(48.0)		9	196.8/(170.6)		9			9	

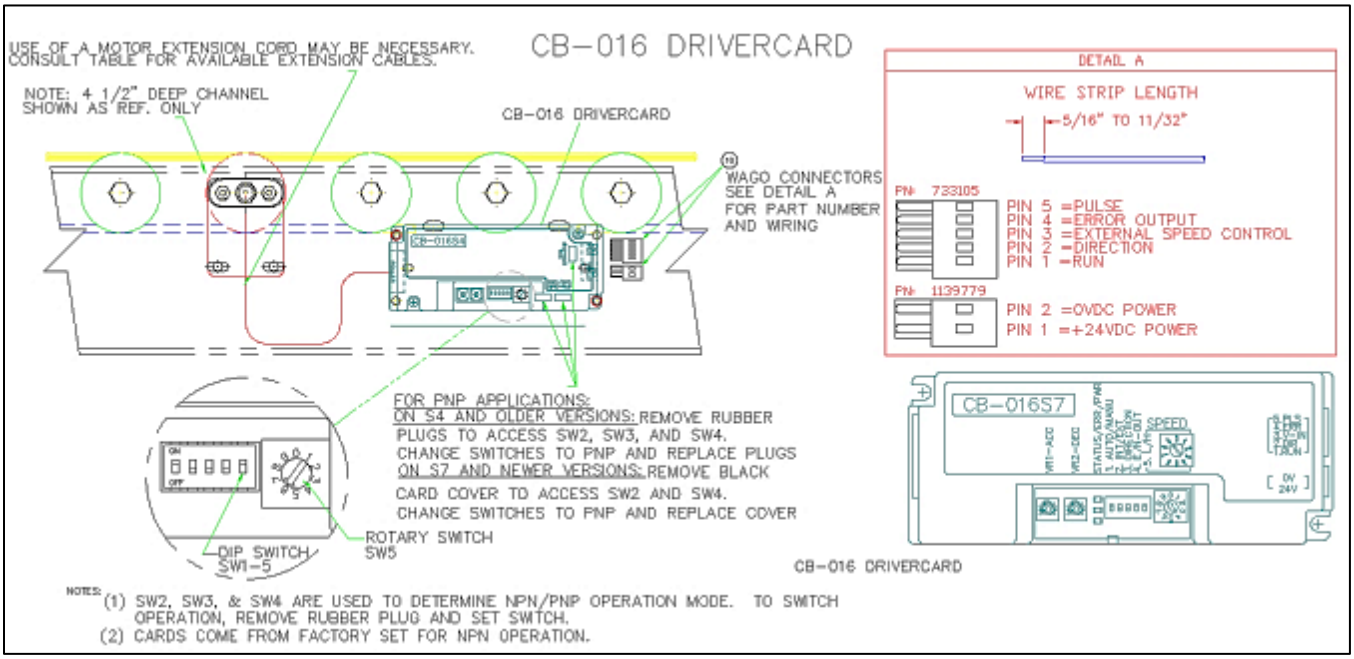
Note: Speed with two numbers are " NO-LOAD / RATED". Rated numbers are what the roller is capable of doing under a continuous duty full load condition.

CBM-105 DRIVERCARD / FP- _ _ _ ROLLER

ROLLER: FP-55			ROLLER: FP-100			ROLLER: FP-140		
NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)	NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)	NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)
25	0	26.7	**120**	0	121.7	**120**	0	121.7
35	1	35.6	**160**	1	162.3	**160**	1	162.3
50	2	53.4	**240**	2	243.4	**240**	2	243.4
70	3	71.2		3	324.5/(306.3)	**320**	3	324.5
105	4	106.8		4			4	486.6/(470.7)
140	5	142.4		5			5	
160	6	160.2	**305**	6	446.0/(306.3)		6	
175	7	178.0/(175.5)		7		**470**	7	627.1/(470.7)
180	8	195.8/(175.5)		8			8	
	9	213.7/(175.5)		9			9	

Note: Speed with two numbers are " NO-LOAD / RATED". Rated numbers are what the roller is capable of doing under a continuous duty full load condition.

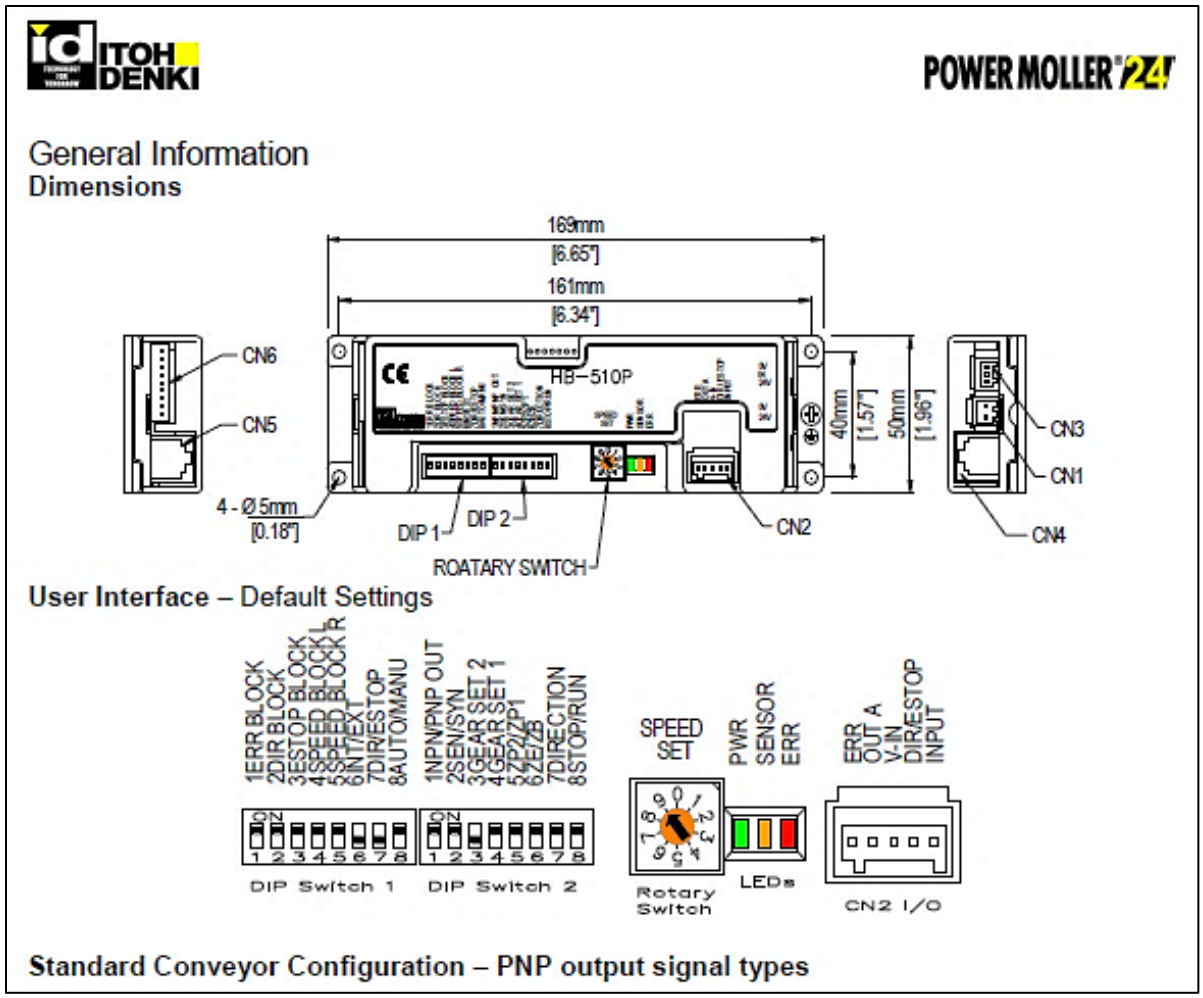
11.3.8: CB-016 Drivercard Speed Chart



SPEED CHANGE TABLE — CB-016 DRIVERCARD

20 DISCREET SPEED CHANGE STEPS FOR INTERNAL CONTROL VIA DIP SWITCH AND ROTARY SWITCH		FP ROLLERS (FPM)			FE ROLLERS (FPM)			FS ROLLERS (FPM)	
DIP SW1-5	ROTARY SW5	100,140, 190,255	20,30, 45,55	5,8, 10,15	70,100,140 0180,210	20,30,45 55,60	5,8,10, 15,17	20,30, 45,55	5,8, 10,15
ON	9	971.9	214.1	56.8	698.9	197.5	55.4	214.1	56.8
ON	8	890.9	196.3	52.1	640.6	181.0	50.8	196.3	52.1
ON	7	850.4	187.3	49.7	611.5	172.8	48.5	187.3	49.7
ON	6	809.9	178.4	47.3	582.4	164.5	46.2	178.4	47.3
ON	5	769.4	169.5	45.0	553.3	156.3	43.9	169.5	45.0
ON	4	728.9	160.6	42.6	524.1	148.1	41.6	160.6	42.6
ON	3	647.9	142.7	37.9	465.9	131.6	36.9	142.7	37.9
ON	2	607.4	133.8	35.5	436.8	123.4	34.6	133.8	35.5
ON	1	566.9	124.9	33.1	407.6	115.2	32.3	124.9	33.1
ON	0	526.4	116.0	30.8	378.5	106.9	30.0	116.0	30.8
OFF	9	485.9	107.0	28.4	349.4	98.7	27.7	107.0	28.4
OFF	8	445.4	98.1	26.0	320.3	90.5	25.4	98.1	26.0
OFF	7	404.8	89.2	23.7	291.1	82.3	23.1	89.2	23.7
OFF	6	364.3	80.3	21.3	262.0	74.0	20.8	80.3	21.3
OFF	5	324.0	71.4	18.9	233.0	65.8	18.5	71.4	18.9
OFF	4	283.5	62.5	16.6	203.9	57.6	16.2	62.5	16.6
OFF	3	243.0	53.5	14.2	174.8	49.4	13.9	53.5	14.2
OFF	2	202.5	44.6	11.8	145.6	41.1	11.5	44.6	11.8
OFF	1	162.0	35.7	9.5	116.5	32.9	9.2	35.7	9.5
OFF	0	121.5	26.8	7.1	87.4	24.7	6.9	26.8	7.1

Chapter 12: ITOH DENKI HB-510 DRIVERCARD



12.1: GENERAL NOTES

- Local accumulation control with minimal higher level control system interface requirement (infeed zone, line full status, discharge zone). See Application Guideline section for details.
- MHS Conveyor HB-510 conveyor (ITRHB) includes:
  - Zone sensor – installed, connected, and pre-aligned to reflector.
  - Power harness – installed with taps to individual drivercards and bed-to-bed plug-in connections.
  - Drivercard – installed, connected to power harness and sensor, and speed pre-set.
  - Card-to-card communication cables (CAT5E) factory installed.
  - CN2 – 5-PIN connector installed in card.
  - Motorized rollers – installed in bed, motor cable connected.
  - All beds factory tested for PE alignment, flow direction, speed, and proper plug-in connections.

See Itoh-Denki technical document for additional information: http://itohdenki.com/

12.2: HB-510 Features

- Built in thermal protection for both driver card and power roller
- Three LED's to identify type of error and number of occurrences
- Dynamic brake control
- Stable speed function to ensure articles of different weights travel at the same rate
- Variable speed control by rotary switch or by external voltage input for up to 10 speeds
- Direction control by onboard DIP switch or external signal input
- Logic for general zero pressure accumulation (ZPA) control is built in
- Direct connection for photo eye to both power it and receive its output signal
- Easy connection between adjacent HB-510's with Cat5E communication cable to simplify wiring
- Flexible Zone Recognition (patented) to handle long articles which simultaneously block multiple sensors
- Also available for rollers with built-in brakes, HB-510B
- Compatible with Motorized Rollers PM486FS, PM486FE, PM486FP, PM570FE, PM605FE, PM635FS

12.3: ITR HB-510 Electrical Components

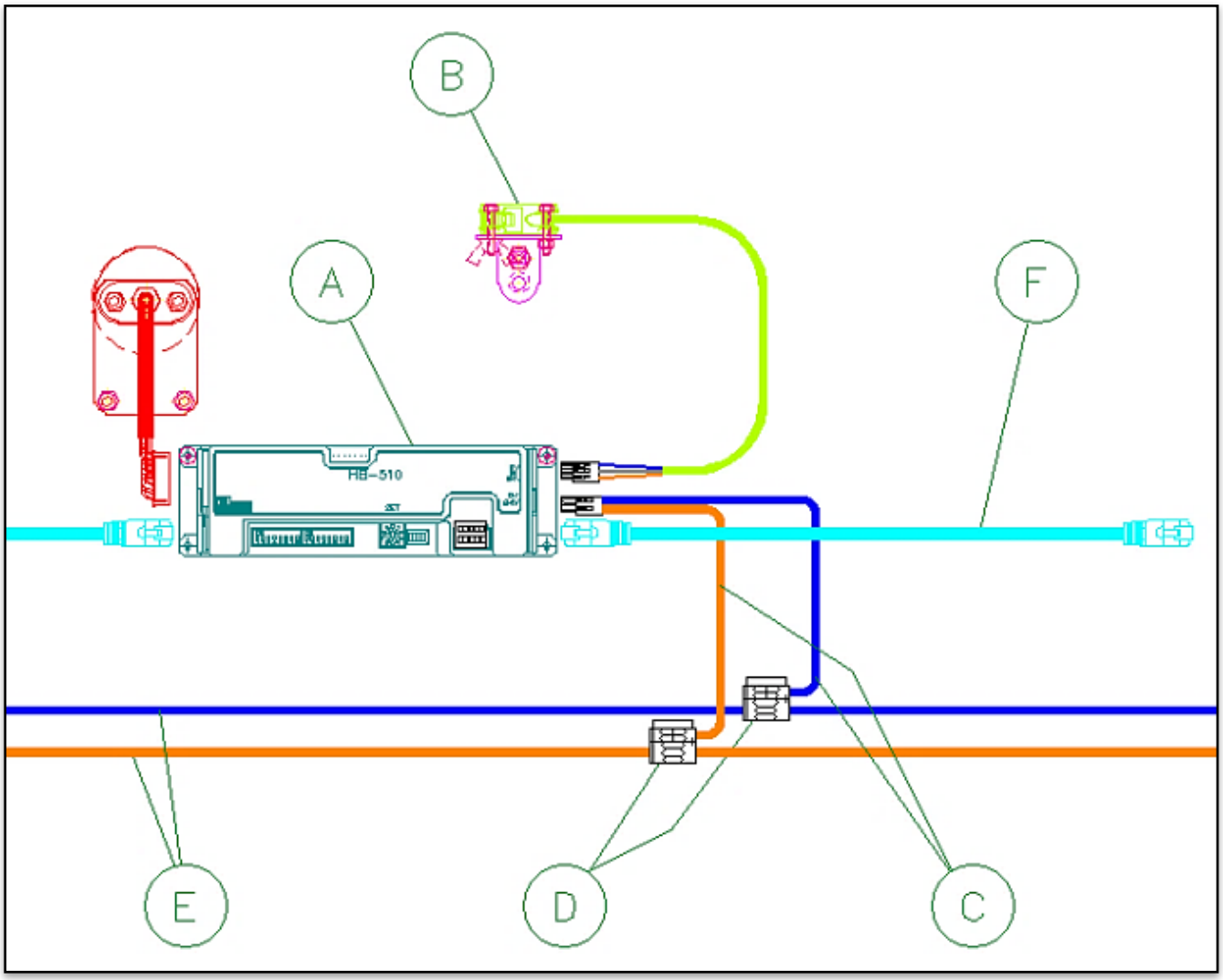


Figure 2 – HB-510 Drivercard

A. HB-510 item (includes hardware and 5-pin connector): P/N 1137754
B. Photoeye (ZL eye with 3-pin connector mounted to bracket with reflector in bag): PN1137686
C. Power tap cables (for short distances < 6”): PN1139543
D. Scotchlok connectors (connect power tap to power harness): P/N 3M567 (Brown)
E. Power harness: See table 1 below
F. Cat5E communication cable: See table 2 below.

Table 1: Replacement Parts –Power Harness

Item No.	Description
1102286	HARNESS,ITR-POWER-10AWG-10.5'
1102287	HARNESS,ITR-POWER-10AWG-8'
1102288	HARNESS,ITR-POWER-10AWG-5.5'
1102289	HARNESS,ITR-POWER-10AWG-3'

Table 2: Communication Cables

Item No.	Description
E0034025	CABLE,CTRLS-CAT5E-3'-GRAY
E0034026	CABLE,CTRLS-CAT5E-5'-GRAY
E0034027	CABLE,CTRLS-CAT5E-7'-GRAY
E0030796	CABLE,CTRLS-CAT5E-10'-GRAY
E0009905	CABLE,CTRLS-CAT5E-14'-GRAY
E0009904	CABLE,CTRLS-CAT5E-25'-GRAY

Cat5E cable (Upstream cable goes in right side of card, and downstream cable comes out the left side of the card, RH generally requires a longer cable). See diagrams below:

Figure 3 – HB 510 Communication Cable LH Flow

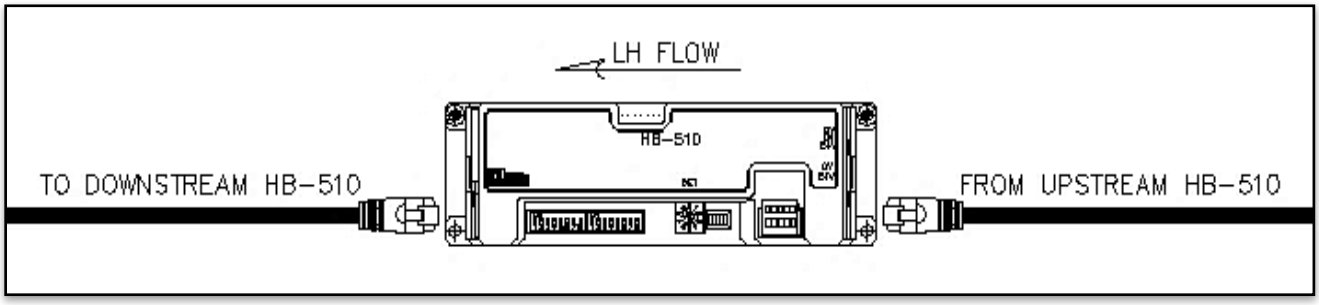
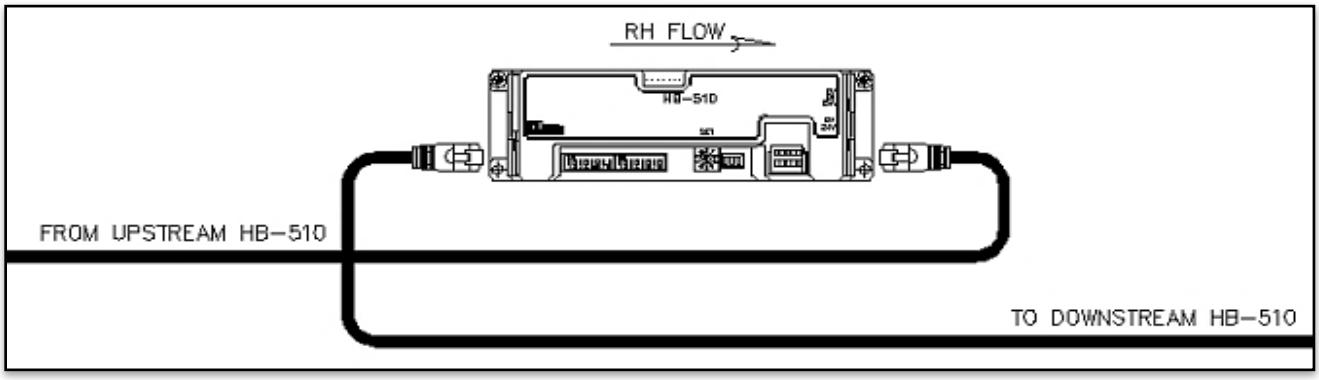


Figure 4 – HB-510 Communication Cable RH Flow



12.3.1: HB-510 Specifications

Operation:

- Cycle: 1 second ON; 1 second OFF (max on-off cycles 30/minute)
- Continuous duty permissible
- If being fed by faster upstream equipment, do not exceed 150% of no-load operating speed (back EMF will be generated)
- Power: +24V DC +/-10% (full-wave rectified, smoothed current <10% ripple)
- See “Connections” section for I/O circuit current limitations/requirements
- PNP circuitry for all I/O, except for CN2 outputs 2-4 & 2-5, which are configurable as PNP or NPN

Protection:

- Thermal Overload 185°F (85°C) on PCB (Printed Circuit Board)
- Thermal Overload 221°F (105°C) in motor
- 5A Internal fuse (non-replaceable) to power supply
- Internal diode circuit protection (Voltage Polarity)

Environment:

- Ambient Temperature 32-104°F (0-40°C)
- <90% Relative Humidity (No condensation)
- No Corrosive Gases
- Vibration <0.5G

12.3.2: HB-510 Connections

CN1 – 2 PIN connector for Power	**Male Connector on Card WAGO #734-162**	**Female Connector for Wiring WAGO #734-102**

PIN	**Description**	
1	+24VDC +/-10% (full-wave rectified, smoothed current <10% ripple)	Wire Size: 28-14AWG
2	0V	

CN2 – (Included with Card) 5 PIN connector for external control	**Male Connector on Card WAGO #733-335**	**Female Connector for Wiring WAGO #733-105**

PIN	**Description**	
1	+24V DC (Input) – Release, Force Run, or Force Zone Stop	Wire Size: 28-20AWG
2	+24V DC (Input) – DIR/E-stop	
3	0-+10V DC (Input) – V-IN (Allows analog speed control, 1.6mA/card)	
4	+24V DC (Output) – OUT-A (Open collector: 25mA max)	
5	+24V DC (Output) – ERR (Open collector: 25mA max)	

CN2 – (Included with Card) 5 PIN connector for external control	Male Connector on Card WAGO #733-335	Female Connector for Wiring WAGO #733-105

PIN	Description	
1	+24V DC (Input) – Release, Force Run, or Force Zone Stop	Wire Size: 28-20AWG
2	+24V DC (Input) – DIR/E-stop	
3	0-+10V DC (Input) – V-IN (Allows analog speed control, 1.6mA/card)	
4	+24V DC (Output) – OUT-A (Open collector: 25mA max)	
5	+24V DC (Output) – ERR (Open collector: 25mA max)	

CN3 – 3 PIN connector for Sensor	Male Connector on Card WAGO #733-363	Female Connector for Wiring WAGO #733-103

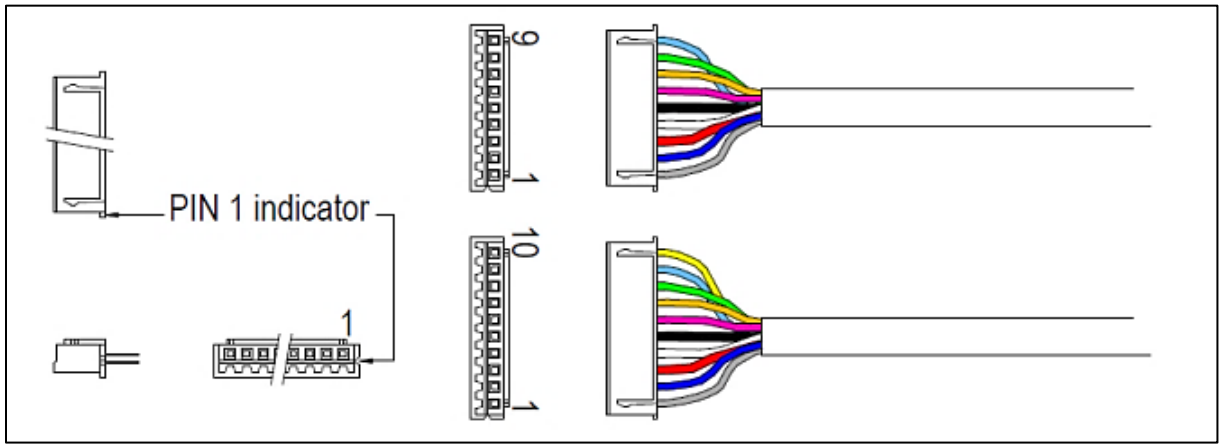
PIN	Description	
1	+24V DC (Power supply to Sensor)	Wire Size: 28-20AWG
2	+24V DC (sensor signal input) – Dark Operate PNP sensor	
3	0V	

12.3.3: CN4 & CN5 – Control Interconnect

- CAT5E cable connection is for card to card signaling only, is not a network, and does not follow Ethernet PIN order.
- See Itoh Denki for additional information on CN 4 & 5 pin outs, as well as information for interfacing HB-510 drivercards with previous generation cards (HB-508).

CN6 – 9 or 10 PIN connector for Motor (10 PIN for brake roller)	**Male Connector on Card JST #S9B-XH-A (S10B if brake)**	**Female Connector for Wiring JST #XHP-9 (-10 if brake)**

PIN	Description	
1	GND - Grey	Wire Size: 28-22AWG & 24-22AWG motor phases Terminal pins: JST #SXH-001T-P0.6
2	+12V DC – Blue	
3	Motor Phase U – Red	
4	Motor Phase V – White	
5	Motor Phase W – Black	
6	Hall Sensor U – Violet	
7	Hall Sensor V – Orange	
8	Hall Sensor W – Green	
9	Thermistor – Light Blue	
10	Brake - Yellow	



12.3.4: HB-510 Installation Precautions

Precaution	Action	Reason
More than 30 cards connected together with the CAT5E communication cable	The first card after each set of 30* must be set as follows: DIP Switch 1-1: OFF DIP Switch 1-2: OFF DIP Switch 1-3: OFF *Standard conveyor configuration; starting with first upstream card. If using ERR, DIR or ESTOP, signal must be connected to each group of 30 cards.	When a card has it ERR, DIR or ESTOP signal activated, that signal is communicated through the CAT5E cable by sinking the signal. Each card's circuitry must be able to handle the current sourced by other cards on the chain. More than 30 cards will exceed the current limit and damage the printed circuit boards.
Powering ON	Maintain safe distance from the system when powering on, as equipment will start automatically.	When the system is first powered on, a 5-7 second startup cycle will initiate. Unoccupied zones will run at a slow speed to advance articles which may be between photo-sensors (Seek to Sensor function). After this, occupied zones will start running if there are open downstream sensors.
Low impedance connection to PNP output(s)	DO NOT connect an output terminal (CN2-4, CN2-5) set for PNP directly to 0V, GND, or a low impedance input on a controller.	When the PNP signal is active, the low impedance input will draw a high current, potentially damaging both the drivercard and the controller.
Multiple power supplies	0V line of all power supplies associated with a conveyor "unit" (cards, rollers, and external controls) need to be connected.	This completes the signal path between conveyor sections and system controls.
Voltage drop across power bus	Use suitable gauge wire in relation to distance and current draw.	Voltage must not drop below 21.6V DC or voltage faults will occur.

12.3.5: HB-510 User Interface Switch Settings

Signal Block Settings						
DIP Switch	Function	On		Off		Default Setting
		CN5 (Left)	CN4 (Right)	CN5 (Left)	CN4 (Right)	
1-1	ERR signal transmission	Transmit & Receive	Transmit & Receive	Transmit & Receive	Blocked	ON
1-2	DIR signal transmission				Blocked	ON
1-3	ESTOP signal transmission				Blocked	ON
1-4	SPEED signal transmission Left (Downstream)		n/a	Blocked	n/a	ON
1-5	SPEED signal transmission Right (Upstream)	n/a	Transmit & Receive	n/a	Blocked	ON

Input / Output Settings				
DIP Switch	**Function**	**ON**	**OFF**	**Default Setting**
1-6	SPEED adjustment	External: 0-10V DC	Internal: Rotary switch	**OFF**
1-7	DIR or ESTOP input (CN2-2)	ESTOP signal input	DIR signal input	**OFF**
1-8	Reset for thermal recovery	Manual input recover	Automatic recover	**ON**
2-1	Output signal type (CN2-4 & CN2-5)	PNP signal output	NPN signal output	**ON****
2-2	Sensor or Synchronous output (CN2-4)	Output is active (+24V) while internal motor RUN signal is ON.	Output is active (+24V) while photo-sensor (CN3-2) signal is ON.	**ON**
2-8	STOP or RUN input (CN2-1)	RUN signal input	STOP signal input	**ON**

Timer Settings – Allows card timers to be adjusted for fast (single stage) down to slow (three stage) rollers, default setting is for two stage. Also can be used to lengthen run timers for long (>36") zones.

Dip Switch		Gear Stages	Time (seconds)		
2-3	2-4		**Sensor Timer**	**Run Hold Timer**	**Jam Timer**
OFF	OFF	1	0.3-1.2	0.3-1.2	0.6-2.2
OFF (Default)	**ON (Default)**	**2**	1.0-4.0	1.0-4.0	2.0-8.0
ON	OFF	3	4.0-14.0	4.0-14.0	7.5-27.0
ON	ON	n/a	Motor runs continuously; for trouble shooting only		

Other Settings						
DIP Switch	**Function**	**ON**		**OFF**		**Default Setting**
2-5	Release modes	ZP1 Train/Slug release		ZP2 Singulated release		**ON**
2-6	Last zone mode	ZB Standard zone		ZE Last (discharge) zone		**ON**
2-7	Motor direction*	FE	FS/FP	FE	FS/FP	**ON**
		CCW	CW	CW	CCW	

*Motor direction (as viewed from the cable side; PM486 series) is independent of ZPA logic flow direction.

Notes:

- Table based on PM486FE-60 roller
- See Roller Performance Tables for additional card/roller speed combinations
- When using an analog signal for external speed control, note that roller speed selections are in fixed increments and not infinitely adjustable.

12.3.6: HB-510 LED's and Error Indications

Status	LED1 (green)	LED2 (orange)	LED3 (red)	ERR Signal (CN2-5)	Error Condition	Result	Solution*
Normal	(ON)	(ON) When sensor signal is ON	(OFF)	(ON)	n/a	n/a	n/a
	Blinks (1Hz) while running						
Thermal overload	(ON)		(ON)	(OFF)	Motor or PCB above operating temperature	No operation	1
Motor lock			Blinks (1Hz)	(ON)	Motor locked (>4s)		2
Motor unplugged			(ON)		Motor not connected to card		3
JAM error		Blinks (1Hz)	(OFF)	(OFF)	Jam Timer activated		4
Open fuse Low voltage	(OFF)	(ON) When sensor signal is ON	Blinks (1Hz)		Low voltage or current exceeded 5A		5
Current limit	Blinks (1Hz) while running		Blinks (6Hz)	(ON)	High current draw	n/a	6

12.3.7: Solution

1. See more information under Input / Output Settings, DIP switch 1-8
   - A signal applied to CN2-1 (INPUT) will reset this error status
   - Thermal overload can only be reset if the temperature has fallen back into the operating range
2. Remove the cause of the motor lock and clear the zone
   - A signal applied to CN2-1 (INPUT) AND DIP switch 2-8 set to ON (RUN) will reset this error status
3. Remove power from the card, plug in the motor connector, and then reapply power
4. Remove the cause of the jam and clear the zone
   - A signal applied to CN2-1 (INPUT) will reset this error status

- As long as a signal is applied to CN2-1, jam error status will not turn ON

5. Replace the card
6. Not usually a cause for concern, unless it is occurring frequently over the entire running cycle

12.3.8: HB-510 Drivercard speed chart

HB-510 DRIVERCARD / FP- _ _ _ ROLLER

ROLLER: FE-17			ROLLER: FE-60			ROLLER: FE-100			ROLLER: FE-140		
NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)	NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)	NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)	NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)
13	0	13.8	**45**	0	49.2	**170**	0	174.8	**170**	0	174.9
18	1	18.4	**65**	1	65.6	**230**	1	232.9	**230**	1	233.2
20	2	23	**80**	2	82		2	290.3/(239.4)	**290**	2	291.4
25	3	27.6	**95**	3	98.4		3	349.3/(239.4)	**345**	3	349.7
30	4	32.5	**110**	4	114.8		4		**405**	4	408.2
35	5	37.1	**130**	5	131.2	**235**	5			5	466.3/(419.8)
40	6	41.7	**145**	6	147.6		6	407.4/(239.4)		6	524.7(419.8)
45	7	46.3	**160**	7	164		7		**415**	7	
50	8	50.9/(49.9)	**180**	8	180.4/(176.8)		8			8	566.2/(419.8)
	9	55.3/(49.9)		9	196.8/(176.8)		9			9	

Note: Speed with two numbers are " NO-LOAD / RATED". Rated numbers are what the roller is capable of doing under a continuous duty full load condition.

HB-510 DRIVERCARD / FP- _ _ _ ROLLER

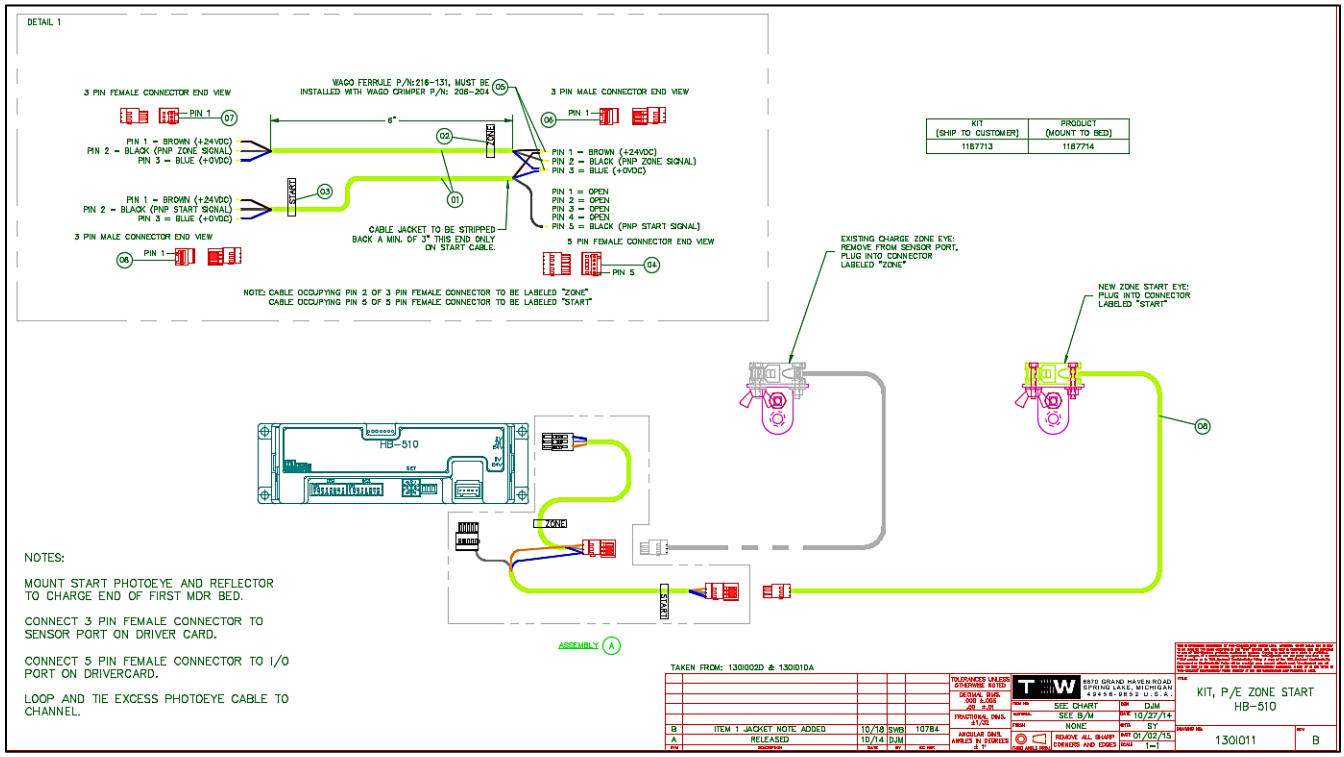
ROLLER: FP-55			ROLLER: FP-100			ROLLER: FP-140		
NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)	NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)	NOMINAL SPEED	ROTARY SWITCH	ACTUAL SPEED ± 5% (fpm)
50	0	53.5	**240**	0	243	**240**	0	243.4
70	1	71.2		1	324.1/(259.1)	**320**	1	324.5
85	2	88.9		2		**405**	2	405.4
105	3	106.9		3			3	486.6/(478.2)
120	4	124.6		4			4	567.7/(478.2)
140	5	142.4	**255**	5	404.8/(259.1)		5	
160	6	160.4		6		**475**	6	
175	7	178.1		7			7	627.1/(478.2)
180	8	195.8/(181.1)		8			8	
	9	204.3/(181.4)		9			9	

Note: Speed with two numbers are " NO-LOAD / RATED". Rated numbers are what the roller is capable of doing under a continuous duty full load condition.

ITRHB General Information

See Itoh-Denki technical document for additional information: http://itohdenki.com/

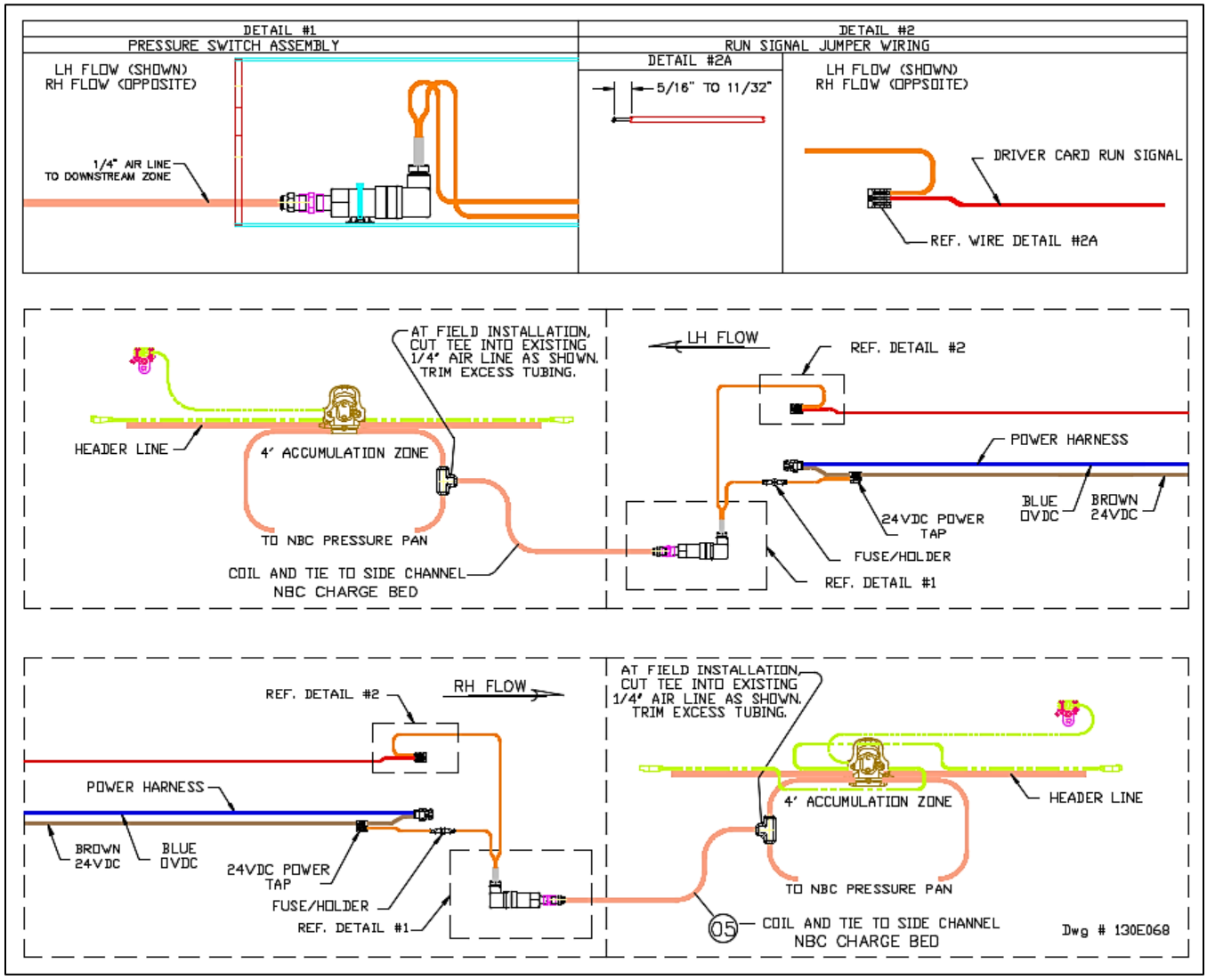
12.3.9: HB-510 Start Kit



12.3.10: Replacement Parts - HB-510 Photoeye Kit

General Photoeye Cables & Kit				
Balloon	**Item #**	**Description**	**Mounted**	**DWG #**
1 - 8	1167713	KIT,P/E ZONE START **HB-510**	FIELD MOUNTED	130I011

Chapter 13: Accumulation Charge Zone Pressure Switch Assembly

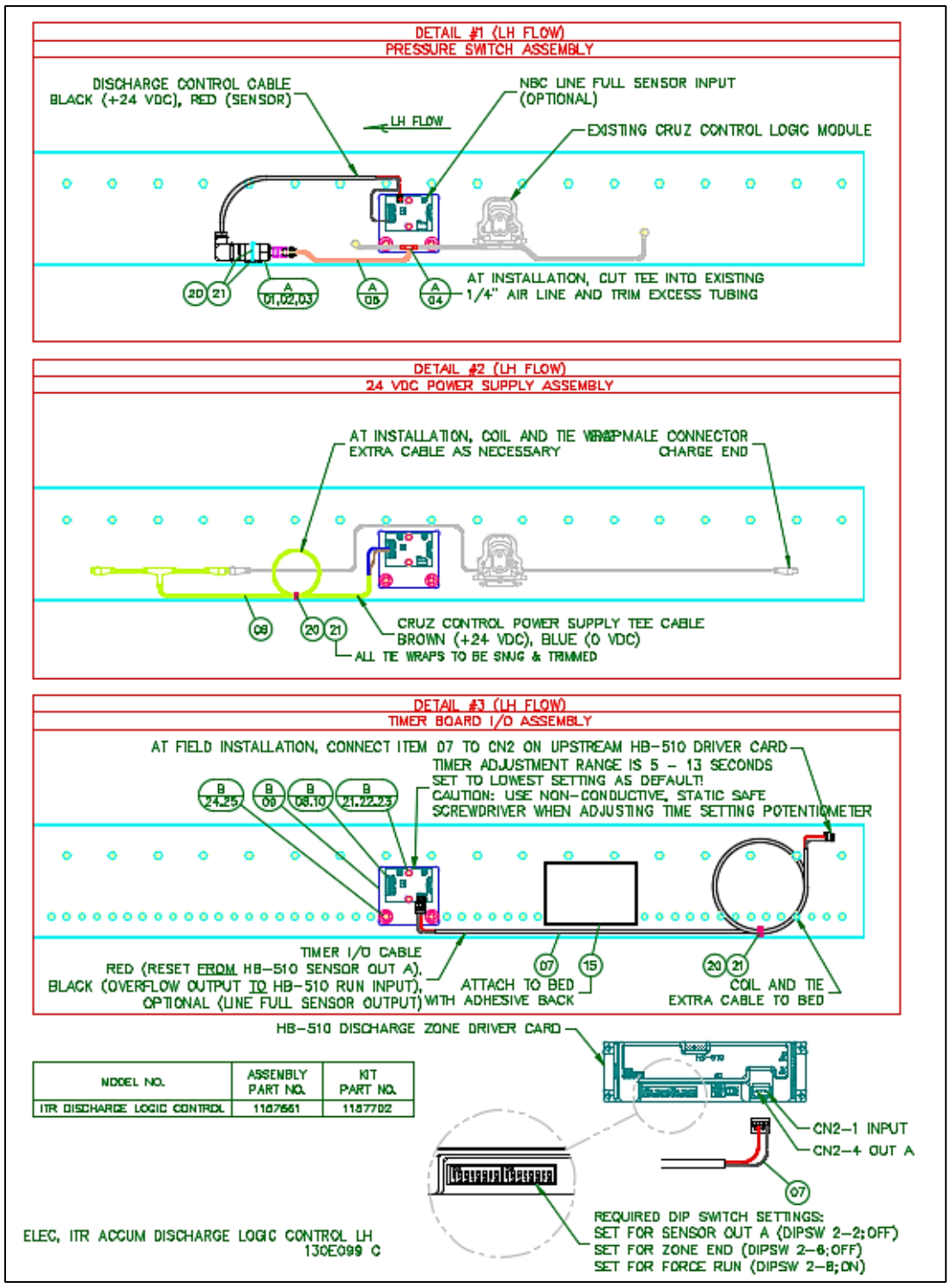


13.1: Replacement Part - Pressure Kit, CB to NBC

Pressure Switch Kit,CB to NBC				
Balloon	**Item #**	**Description**	**Mounted**	**DWG #**
ALL	1152711	KIT,ITR-PRSS SWTCH-**CB TO NBC**	FIELD MOUNTED	130E068

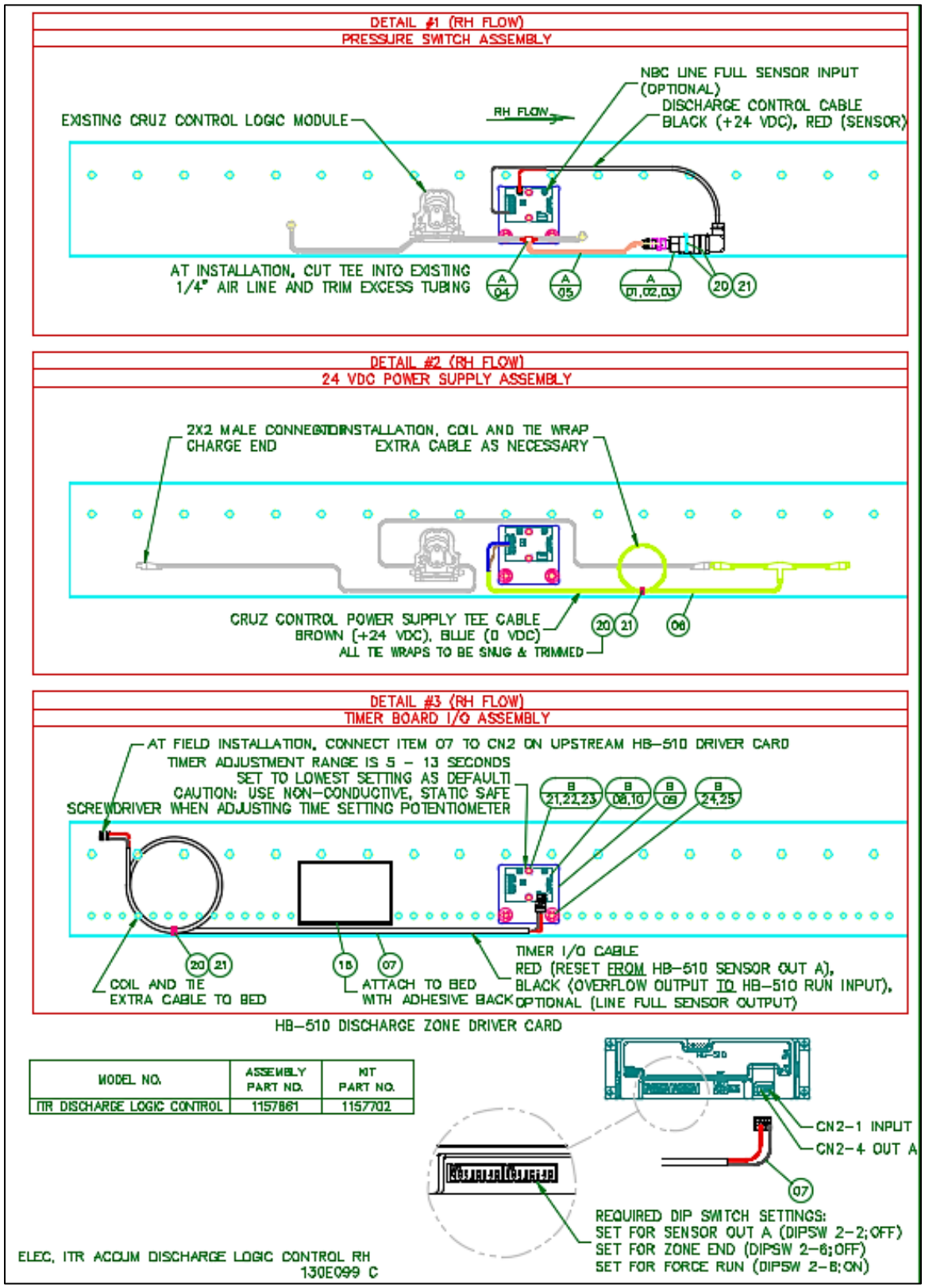
Chapter 14: Discharge Logic Ctrl Pressure Switch Kits

Discharge Logic Control Left Hand



MODEL NO.	ASSEMBLY PART NO.	KIT PART NO.
ITR DISCHARGE LOGIC CONTROL	1167661	1187702

Discharge Logic Control Right Hand

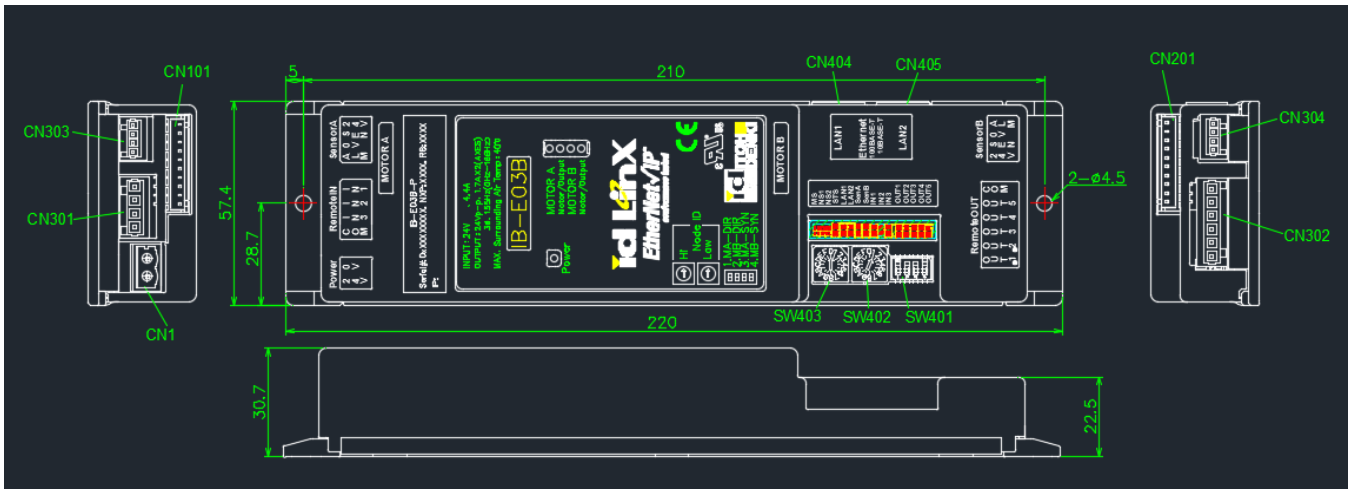


MODEL NO.	ASSEMBLY PART NO.	KIT PART NO.
ITR DISCHARGE LOGIC CONTROL	1157861	1157702

14.1: REPLACEMENT PART - PRESSURE SWITCH KITS, HB TO NBC

Accumulation Discharge Logic Control LH / RH Pressure Switch Kit,HB to NBC				
Balloon	**Item #**	**Description**	**Mounted**	**DWG #**
All	1157702	KIT,ITR-PRSS SWTCH-**HB TO NBC**	FIELD MOUNTED	130E099

Chapter 15: ITOH DENKI IB-E DRIVERCARD



15.1: GENERAL NOTES:

The IB-E is a dual 24V brushless DC motor driver module that is compact, network-ready, configurable, and programmable.

15.2: FEATURES

- For transportation and accumulation conveyor segments
- Two brushless DC motor drivers
- IB-E03B: 4A max per driver
- Built-in motor overload protections
- Two powered connections for sensors
- Three isolated auxiliary inputs
- Five isolated auxiliary outputs, two at 1A (max) each
- Motor lifetime data
- DLR (device level ring) applicable
- 2-port built-in Ethernet switch (based on RA switch technology)
- All beds factory tested for flow direction, speed, and proper plug-in connections.

See Itoh-Denki IB-E and ICE Manual for additional information: http://itohdenki.com/

15.3: Operating Environment

Conditions		Notes
Ambient temperature	-20 to 40°C (-4 to 104°F)	No condensation, water, frost, or ice
Humidity	≤ 90% Relative Humidity	
Atmosphere	No corrosive gas	
Vibration	≤ 1.0G	
Installation	Indoor	
Pollution level	2	Conforming to IEC60640-1 and UL840
Overvoltage category	2	

15.4: Power Requirements

Item	Specification
• Input Power	• 24V DC (+/- 5%)
• Typical Loaded Current Draw Per Motor* for IB-E01 and IB-E03B	• 2 ~ 3A – Motor A 2 ~ 3A – Motor B
• Maximum Current Draw Per Motor For IB-E01 and IB-E03B	• 4A – Motor A 4A – Motor B
• Typical Loaded Current Draw Per Motor* for IB-E04F	• 3 ~ 4A – Motor A 3 ~ 4A – Motor B
• Maximum Current Draw Per Motor for IB-E04F	• 7A – Motor A 7A – Motor B
• Maximum Current Draw Per Remote (Auxiliary) Output	• 1A – Remote output 1 1A – Remote output 2 20mA – Remote output 3 20mA – Remote output 4 20mA – Remote output 5

** Actual current draw is dependent on load (size and weight) and motorized roller model used.*

Note: The Remote (Auxiliary) Outputs are isolated from the IB-E power. Therefore, a separate 24V DC power source may be used. If not, the Remote Output current draw should be factored into the IB-E's overall current draw when used.

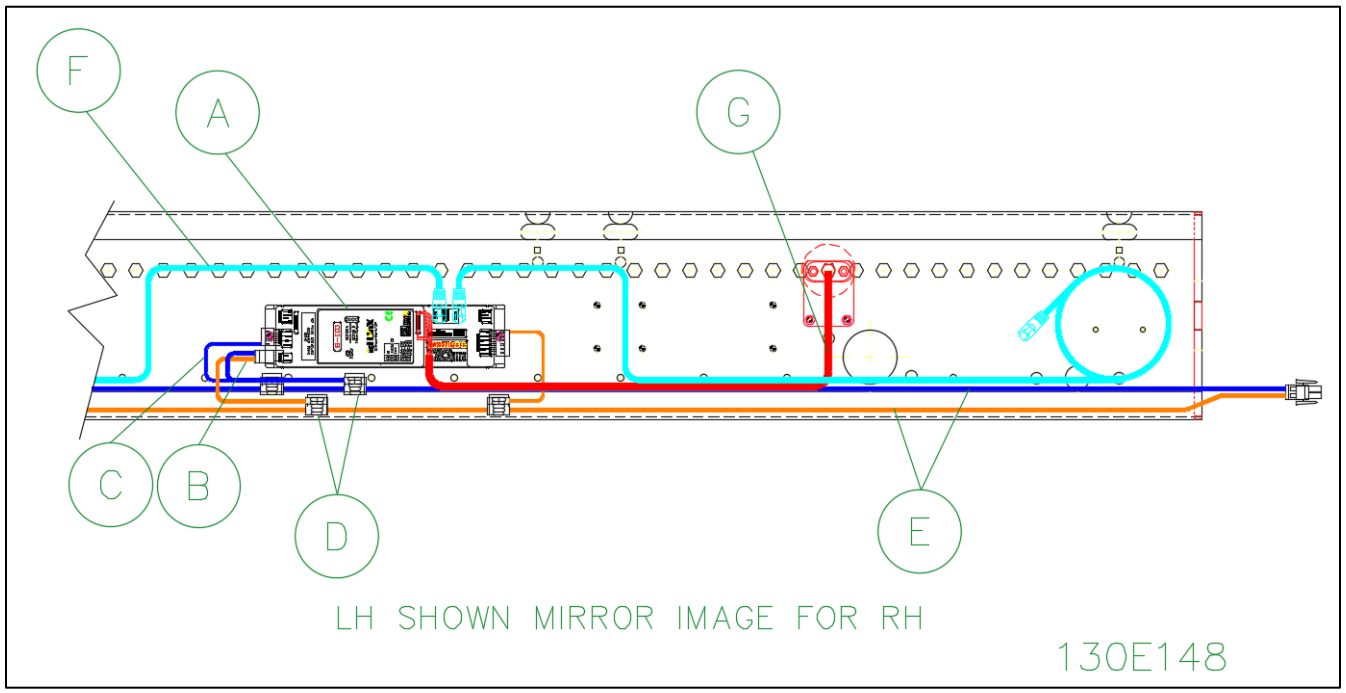
15.5: Applicable Power Rollers (Motorized Rollers)

15.5.1: IB-E01 and IB-E03B

Standard*	With Brake Option
PM486FE	PM486FE-BR
PM486FS	PM486FS-BR
PM486FP	PM486FP-BR
PM570FE	PM570FE-BR
PM605FE	PM605FE-BR
PM635FS	PM635FS-BR

* IB-E01 and IB-E03B are designed to work with both our standard models and brake models. The (mechanical) brake option requires a 10th pin for the brake coil. Therefore, standard model rollers will need to have either a 10-pin connector on the motor cable or a 9-to-10-pin extension cable.

15.6: ITR IB-E Electrical Components



A. IB-E03 driver card (includes hardware, no connectors): 1166288

B. Cable, Power IB-E (for short distances < 6"): 1165236
C. Cable, Remote in IB-E, 9” 16GA blue wire: 1165238
D. Scotchlok Connectors (connect power tap to power harness): 3M567
E. Power Harness: See Table 1.
F. Cat5E Communication Cable: See Table 2.
G. Cable, Motor Extension: See Table 3.

Table 1 IB-E Power Harness

Item No.	Description
1102286	HARNESS,ITR-POWER-10AWG-10.5'
1102287	HARNESS,ITR-POWER-10AWG-8'
1102288	HARNESS,ITR-POWER-10AWG-5.5'
1102289	HARNESS,ITR-POWER-10AWG-3'

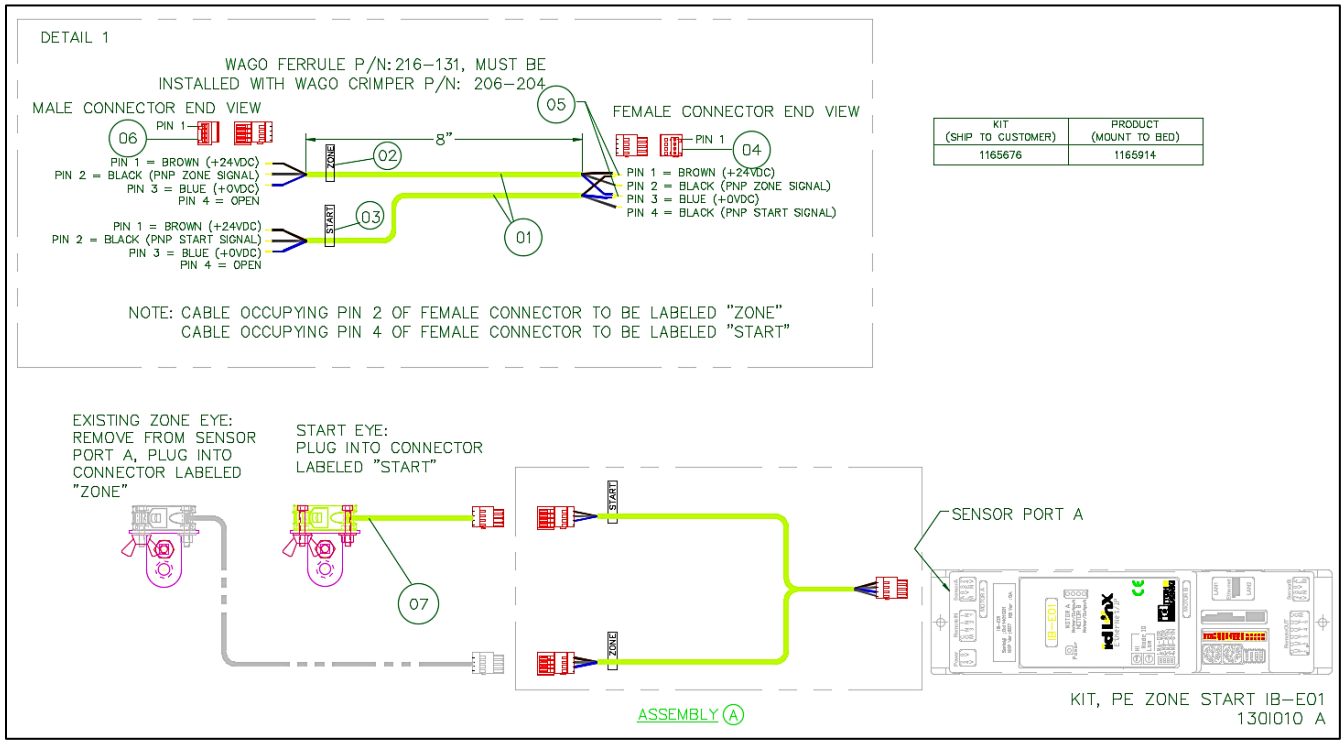
Table 2 Communication Cables

Item No.	Description
E0034025	CABLE,CTRLS-CAT5E-3'-GRAY
E0034026	CABLE,CTRLS-CAT5E-5'-GRAY
E0034027	CABLE,CTRLS-CAT5E-7'-GRAY
E0030796	CABLE,CTRLS-CAT5E-10'-GRAY
E0009905	CABLE,CTRLS-CAT5E-14'-GRAY
E0009904	CABLE,CTRLS-CAT5E-25'-GRAY

Table 3 – Cable Motor Extensions

Item No.	Description
1135339	CABLE,MOTOR EXTENSION,600MM ITOH M-F-EXT-10PIN-600 **USE W/ IB-N03/IB-E/HBM-604/BRAKE**
1135340	CABLE,MOTOR EXTENSION,1200MM ITOH M-F-EXT-10PIN-1200 **USE W/ IB-N03/IB-E/HBM-604/BRAKE**
1135341	CABLE,MOTOR EXTENSION,1200MM ITOH M-F-EXT-10PIN-1200 **USE W/ IB-N03/IB-E/HBM-604/BRAKE**

15.6.1: IBE Photoeye Cable Kit

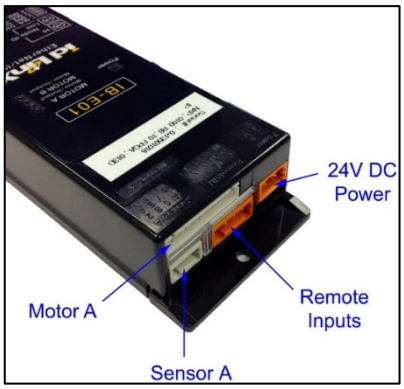


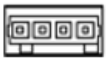
15.6.2: Replacement Parts – IB-E Photoeye Kit

General Photoeye Cables & Kit				
Balloon	**Item #**	**Description**	**Mounted**	**DWG #**
1 - 6	1165676	KIT,CTRLS-PE ZONE START-**IBE**	FIELD MOUNTED	130I010

15.7: HARDWARE CONNECTIONS

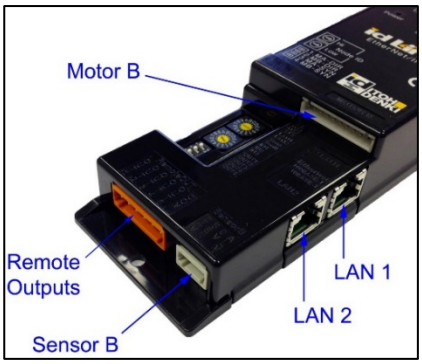
15.7.1: Left ("A") Side

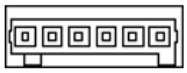
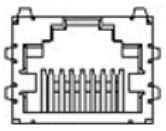


Connection	Pin Outs	Description
Motor A	1 10	Brushless DC Driver When configured as a discrete output (**NPN**, sinking, only): 3 – Discrete output U (IB-E04F pins 3 & 4) 4 – Discrete output V (IB-E04F pins 5 & 6) 5 – Discrete output W (IB-E04F pins 7 & 8) See "Precaution: Motor Port Discrete Output Wiring" below. Connector for wiring: **JST XHP-10** (IB-E04F XHP-12) Included with motorized roller
Sensor A	1 4	1 – 24V DC (550mA max) 2 – Sensor input (35mA max) 3 – 0V 4 – Sensor alarm input (35mA max) IB-E01: Inputs are auto-sensing, responding to either PNP (+24V DC) or NPN (0V) signals. In the normal state, the input pins have a **+12V DC reference**. **IB-E03B and IB-E04F**: Signal types are **set** as PNP or NPN from factory. Noted as a "-P" or "-N", respectively (e.g. IB-E03B-P) Connector for wiring: **WAGO 733-104**
Remote Inputs (Auxiliary)	 1 4	1 – Remote input 1 2 – Remote input 2 3 – Remote input 3 4 – Common (24V DC for NPN or 0V for PNP) Connector for wiring: **WAGO 734-204**

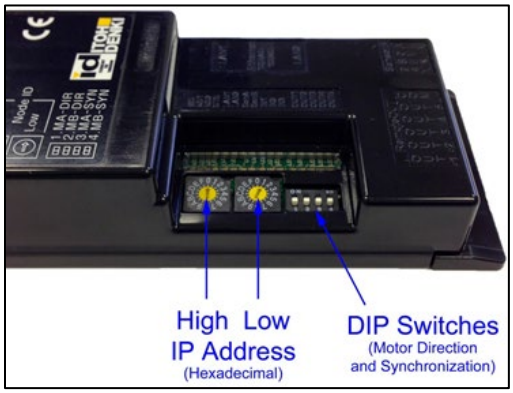
24V DC Power	1 2	Input Power 1 – 0V 2 – 24V DC Connector for wiring: **WAGO 231-302/026-000**

15.7.2: Right ("B") Side



Connection	Pin Outs	Description
Motor B	1 10	Brushless DC Driver When configured as a discrete output (**NPN**, sinking, only): 3 – Discrete output U (IB-E04F pins 3 & 4) 4 – Discrete output V (IB-E04F pins 5 & 6) 5 – Discrete output W (IB-E04F pins 7 & 8) See "Precaution: Motor Port Discrete Output Wiring" below. Connector for wiring: **JST XHP-10** (IB-E04F XHP-12) Included with motorized roller
Sensor B	1 4	1 – 24V DC (550mA max) 2 – Sensor input (35mA max) 3 – 0V 4 – Sensor alarm input (35mA max) IB-E01: Inputs are auto-sensing, responding to either PNP (+24V DC) or NPN (0V) signals. In the normal state, the input pins have a **+12V DC reference**. **IB-E03B and IB-E04F**: Signal types are **set** as PNP or NPN from factory. Noted as a "-P" or "-N", respectively (e.g. IB-E03B-P) Connector for wiring: **WAGO 733-104**
Remote Outputs (Auxiliary)	 1 6	1 – Remote output 1, 1A max 2 – Remote output 2, 1A max 3 – Remote output 3, 20mA max 4 – Remote output 4, 20mA max 5 – Remote output 5, 20mA max 6 – Common (24V DC for PNP or 0V for NPN) Connector for wiring: **WAGO 734-206**
LAN (1 & 2)	 8 1	1 – Tx + 2 – Tx - 3 – Rx + 4 – n/a 5 – n/a 6 – Rx - 7 – n/a 8 – n/a Connector for wiring: **RJ-45**

15.7.3: Rotary Switches and DIP Switches



Switch	Position	Description
IP Address High Byte	0 ~ F	Hexadecimal setting of IP address' last octet. 192.168.1.xxx Example 1: High Byte: "0" Low Byte: "1" Hexadecimal value "01" = 1 (decimal) IP Address: 192.168.1.1 Example 2: High Byte: "A" Low Byte: "7" Hexadecimal value "A7" = 167 (decimal) IP Address: 192.168.1.167
IP Address Low Byte	0 ~ F	
DIP 1	OFF	Default
	ON	Motor A's direction is opposite of configuration, reversed
DIP 2	OFF	Default
	ON	Motor B's direction is opposite of configuration, reversed
DIP 3	OFF	Default
	ON*	Motor A operates when Motor B operates, synchronized
DIP 4	OFF	Default
	ON*	Motor B operates when Motor A operates, synchronized

* If both DIP switch 3 and 4 are ON, the IB-E is set to factory reset mode. Refer to troubleshooting section for more information.

15.8: IP Address Subnet

Default: 192.168.1.xxx

If a different subnet for the IP address is needed, different from the default 192.168.1.xxx, it can be changed using the Itoh Configurator for EtherNet/IP (ICE).

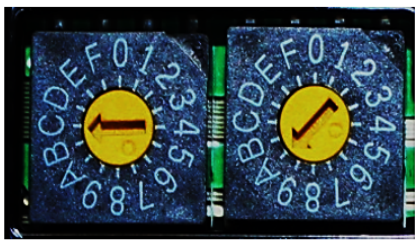
IP Address Setting (Last Octet)

The rotary switches set the last octet of the IB-E's IP address. There are 16 positions (hexadecimal base) for each rotary switch.

The following table is available to assist in determining the decimal equivalent of the hexadecimal rotary switch positions.

High Byte			Low Byte	
Position	Base Decimal Value		Position	Base Decimal Value
0	0		0	0
1	16		1	1
2	32		2	2
3	48		3	3
4	64		4	4
5	80	+	5	5
6	96		6	6
7	112		7	7
8	128		8	8
9	144		9	9
A	160		A	10
B	176		B	11
C	192		C	12
D	208		D	13
E	224		E	14
F	240		F	15

Using the decimal values, the last octet can be calculated.

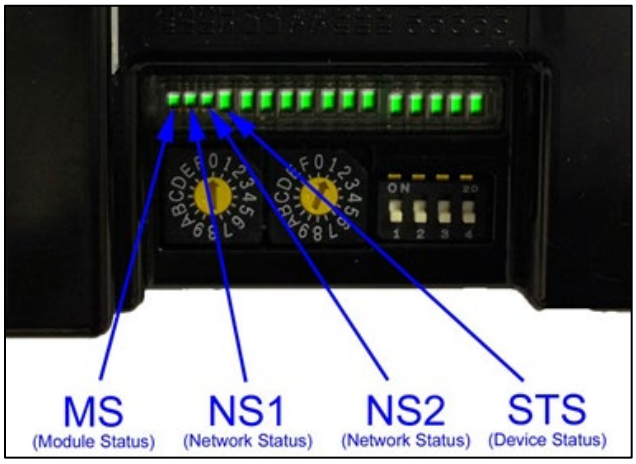


Base	High Byte		Low Byte		Last Octet
Hexadecimal	C	+	A	=	CA
Decimal	192		10		202

15.8.1: LED Indicators

See troubleshooting.

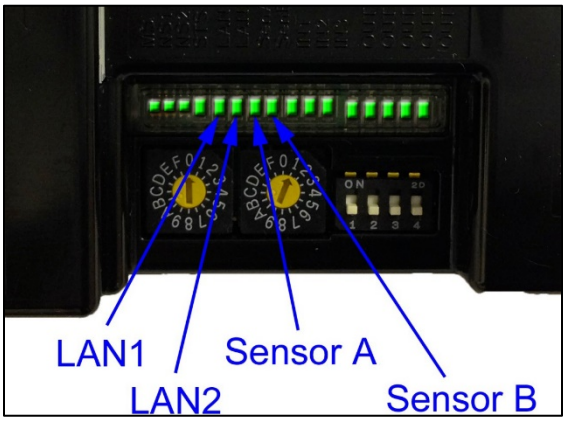
15.9: MODULE STATUS INDICATORS



LED	LED indication pattern		Description
	Green	Red	
MS	OFF	OFF	No network power
	ON	OFF	Normal operation
	ON	Flash (1Hz)	No setting on device
	OFF	Flash (1Hz)	Network error at LAN 1 or LAN 2
	OFF	ON	Network error at LAN 1 and LAN 2
	Flash (1Hz)	Flash (1Hz)	Boot up sequence
NS1 & NS2*	OFF	OFF	No communication
	Flash (1Hz)	OFF	Normal operation
	ON	OFF	I/O connection
	OFF	Flash (1Hz)	I/O connection timeout error
	OFF	ON	Duplicate IP address error
	Flash (1Hz)	Flash (1Hz)	Boot up sequence
STS	ON	-	Power ON Network PCB
	Flash (6Hz)	-	Low voltage (< 20V DC) error
	Flash (1Hz)	-	Firmware updating
	OFF	-	No power on network PCB

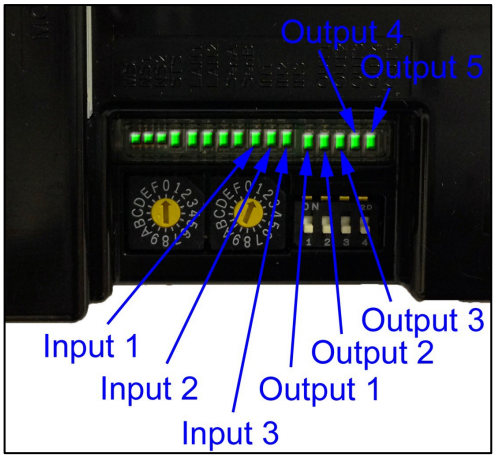
** NS2 is only on the IB-E01*

15.10: LAN AND SENSOR STATUS INDICATORS



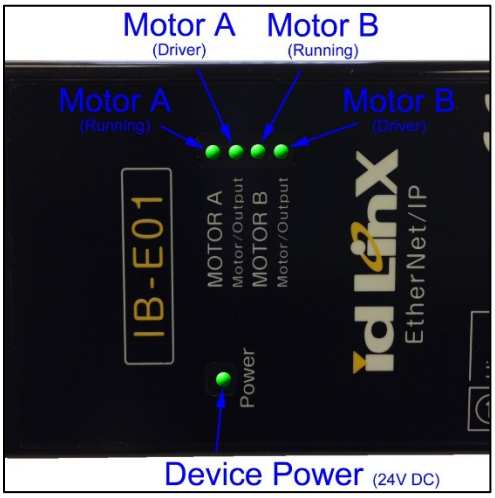
LED	LED indication pattern		Description
	Green	Red	
LAN1 & LAN2	Flash	-	Active LAN communication
	OFF	-	No LAN communication
SenA & SenB	ON	-	Sensor input is active
	OFF	-	No sensor input

15.11: REMOTE (AUXILIARY) I/O STATUS INDICATORS



LED	LED indication pattern		Description
	Green	Red	
IN1 ~ IN3	ON	-	Remote input is active
	OFF	-	No remote input
OUT1 ~ OUT5	ON	-	Remote output is active
	OFF	-	No remote output

15.12: Motor Activity and Function Indicators



LED	LED indication pattern		Description
	Green	Red	
Power	ON	-	Normal, power is on
	OFF	-	No power to device
Motor/Output	ON	-	24V brushless DC driver
	OFF	-	Discrete outputs
MOTOR A & MOTOR B	OFF	OFF	Motor is not running
	Flash (1Hz)	OFF	Motor is running, CW
	ON	OFF	Motor is running, CCW
	OFF	Flash (6Hz)	Low voltage error
	OFF	Flash (1Hz)	Motor unplugged error
	ON	Flash (1Hz)	Motor lock error
	OFF	ON	Thermal error
	ON	2 x Flash (0.6Hz)	Back EMF error
	Alternating (1Hz)		JAM error*
	Alternating (6Hz)		Sensor Timer error*

Chapter 16: TROUBLESHOOTING – IB-E MOTOR DRIVER

Error Type	Priority	Suspected Cause	Suggested Solution	Reset Method	IB-E Logic	Motor
Low Voltage	1	Supply voltage < 20V DC	Maintain supply voltage ≥ 20V DC	Automatic	Stop	
Fuse blown		Fuse is blown	Replace IB-E	-		
Motor Disconnected	2	Motor is not connected	Connect motor	Automatic or Manual		
Motor Stalled	3	Motor does not turn (stalled)	Clear the issue which prevents the motorized roller from turning	Automatic* or Manual		
PCB Thermal	4	High temperature on circuit board	Allow circuit board to cool	Automatic or Manual		Stop
Motor Thermal	5	High temperature in motor	Allow motor to cool	Automatic or Manual	Run	
Back EMF (Overspeeding)	6	Generated voltage from motor ≥ 60V DC, at least 0.1 second or ≥ 40V DC, at least 2 seconds	Remove the cause of overspeeding, then reset the error from the controller or by cycling 24V DC power	Manual		
Motor port (discrete output) current limit		≥ 4A, at least 0.1 second	Remove the cause for the high current draw	Manual		
Jam	7	ICE logic element output is active	Remove the cause of error or review ICE logic for output conditions	Based on logic conditions		Based on logic conditions
Sensor Timer	8					
Sensor Alarm	9	Occurs when the (sensor) Alarm signal is active	Check the sensor or wiring of the sensor connection	Automatic		

"Automatic" reset from a motor stalled error requires the motorized roller to be turned by hand (manually).

Error Reset

Refer to - Error Information to reset error status using ICE.

16.1: PHYSICAL BEHAVIOR

The motorized roller is not running at the set (linear/surface) speed.

- Check the “Motor” tab under properties for the following:
  - Gear Reduction setting matches the correct motorized roller model
  - Speed setting is for the correct time base
  - Roller Diameter is set correctly for millimeters
  - Roller Speed(s) are set correctly and that the logic is using the correct speed setting output
- Check input power (refer to Chapter 1 – Power Requirements)
- Make sure the motorized roller is mounted properly

The motorized roller is running in the wrong direction.

- Check “Motor” tab under properties for the following:
  - Motor Type setting matches the correct roller model
  - Direction is set for the correct default motor direction
- Check DIP switch 1 and/or 2 (refer to Chapter 1 – Rotary Switches and DIP Switches)
- Check that the logic is using (or not using) the motor direction output

The motorized roller does not run.

- Make sure “Motor Port Setting” in the “Motor” tab under properties is set as “Motor”
- Check that the logic is using the correct motor output
- Check the status LEDs on the IB-E (refer to Chapter 1 – LED Indicators)
- Check DIP switch 3 and/or 4 (refer to Chapter 1 – Rotary Switches and DIP Switches)
- Make sure the motorized roller is mounted properly

There is no response to the sensor input.

- Make sure the sensor is powered
- Make sure the sensor is wired correctly (refer to Chapter 1 – Hardware connections)
- Check the status LEDs on the IB-E (refer to Chapter 1 – LED Indicators)
- Check the logic for the correct sensor input

There is no response to the remote (auxiliary) input.

Make sure the input (device) and common are wired correctly (refer to Chapter 1 – Hardware connections and Chapter 2 – General Wiring and Precautions)

- Check the status LEDs on the IB-E (refer to Chapter 1 – LED Indicators)
- Check the logic for the correct remote input

The remote (auxiliary) output does not turn on.

- Make sure the output (device) and common are wired correctly (refer to Chapter 1 – Hardware connections and Chapter 2 – General Wiring and Precautions)
- Check the status LEDs on the IB-E (refer to Chapter 1 – LED Indicators)
- Check the logic for the correct remote output

The Discrete Output from the motor port does not work.

- Make sure “Motor Port Setting” in the “Motor” tab under properties is set as “Port(Nch)”
- Make sure the output is wired correctly (refer to Chapter 1 – Hardware connections and Chapter 2 – General Wiring and Precautions)
- Check the status LEDs on the IB-E (refer to Chapter 1 – LED Indicators)
- Check the logic for the correct discrete motor port output

16.2: SOFTWARE ISSUES

Read/write (configuration or logic) failure

- Check the IP address settings on the IB-E (refer to Chapter 1 – Rotary Switches and DIP Switches)
- Check the IP address setting in ICE (refer to Chapter 5 – Project Tree)
- Check the PC’s IP address (refer to Chapter 6 – Property Setting)
- Check the PC’s firewall settings (refer to Chapter 4 – Windows Firewall)
- Make sure the IB-E has had enough time to reboot between consecutive writes/downloads.

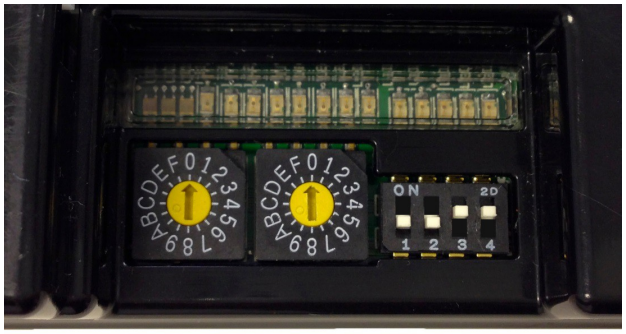
Monitor not responding to status changes

- Check the IP address settings on the IB-E (refer to Chapter 1 – Rotary Switches and DIP Switches)
- Check the IP address setting in ICE (refer to Chapter 5 – Project Tree)
- Check the PC’s IP address (refer to Chapter 6 – Property Setting)
- Check the PC’s firewall settings (refer to Chapter 4 – Windows Firewall)
- Make sure the IB-E has had enough time to reboot between consecutive writes/downloads.

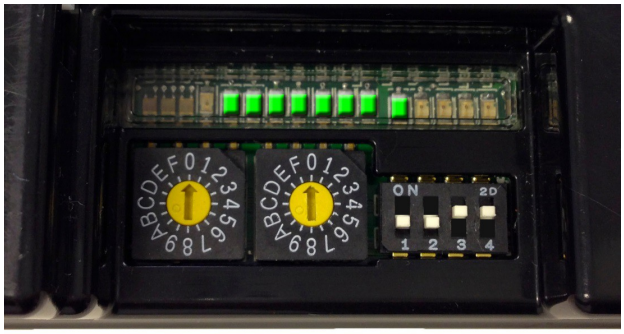
16.3: MODULE RESET

The module can be reset to factory defaults. Normally, this is not necessary.

1. Power OFF the IB-E, set both rotary switches to “0”, set DIP switches 1 and 2 to the OFF position, and set DIP switches 3 and 4 to the ON position.



2. Power ON the IB-E and wait for the central LED indicators to light up.



3. Power OFF the IB-E and set the rotary switches and the DIP switches to the previous (or other operational) settings.
4. Power ON the IB and use as normal.

See Itoh-Denki IB-E and ICE Manual for additional information: http://itohdenki.com/

Chapter 17: ITR Maintenance & Troubleshooting

General Preventive Maintenance

Preventive maintenance will save expensive downtime, wasted energy costs, and increase life of components. An accurate record keeping system will track component servicing history. Periodic maintenance intervals may vary with load, speed, hours of operation, ambient temperature, humidity, etc. Intervals can be established by fairly frequent maintenance at first, and then lengthens the intervals as justified by observation of need based on history. The following schedule is based on 5 days per week, 8 hours per day operation under normal conditions.

Daily

- Listen to everything for unusual noises or vibration.
- Visually inspect to see that conveyor sections are clear and free of debris.
- Check to see that all safety guards are in place.
- Check for loose bolts or parts.
- Listen for air leaks.

Weekly

- Check for proper PSI on air regulators.
- Check air filter bowls for accumulated water.

⚠ WARNING

- Prohibit walking or riding on conveyor by anyone.
- Care should be taken when servicing any conveyor to prevent accidental injury.
- All moving parts are potentially dangerous.

Air Systems

The best preventive maintenance for any air operated device is clean air. Dirty air will make pneumatic devices sticky, and they will not operate properly. To ensure the continued performance of filters, monitor filter / regulator bowl drain every week.

To manually drain the bowl, push the push button at the bottom of the bowl. Let all accumulated liquid drain until you hear air escaping.

⚠ WARNING

- Do not perform maintenance on the conveyor until the start-up controls, including motor safety switches, are locked out and cannot be turned by any person other than the one performing the maintenance.
- If more than one member of a crew is working on the conveyor, EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT. The air pressure must be turned off to the work area. All pneumatic devices must be de-energized to prevent accidental cycling of the device.
- Check the loosened parts have been retightened and all guards reinstalled.
- Make sure personnel are clear of all conveyor equipment before restarting the system.

17.1: INTELLIROL TROUBLESHOOTING GUIDE CONTINUED

	Problem	Possible Cause	Remedy
1.	Power Roller does not turn	ITR roller not properly installed	Check that the Power Roller is properly inserted into the frame. Adjust as necessary
			Check the tube and end caps are not contacting the frame, side rails, or other parts. Power Roller should be allowed to move freely
		Too many slave rollers connected to drive roller	Inspect MDR zone to ensure proper number of idlers is adequate related to the Powered Roller. Refer to IOM Manual for additional information
		Power Cable extensively twisted	Inspect cable for kinks or cracks in wiring.
		Check that the Power Moller's shafts are properly mounted with the applicable bracket(s). Proper mounting is required for tube rotation.	For FE series motors one bracket securing the cable side shaft.
			For FS / FP / FH series motors two brackets securing both cable side and spring loaded shafts
		When slave driving idler rollers check that the number of idlers driven is adequate for the particular model of Power Roller being used.	Check air pressure on take up assembly. Make sure belt tension is proper.
		Check that the power cable is in good condition, with no twisting or severe kinks in the cable that would indicate broken wires. Also check for any cuts in the power cable or wires near the connector end.	Locate and correct interference
			Install belt properly
2.	LED status	Red LED OFF, Green LED OFF, Orange LED OFF	Check that the power supply is on.
			Check that the card is correctly wired. Reference IOM manual.
			Measure the voltage, stable 24V DC is required.
		Red LED ON, Green LED ON, Orange LED ON if sensor is blocked	Check that the motor connector is properly plugged into the card then cycle the run / sensor signal.
			Thermal protection active – motor or card reached thermal limit, motor will not operate until one minute after the card, or motor has cooled down below thermal limit. Consider possible causes of why the Power Roller is reaching thermal limit; cycle times, ambient temperature, load changes, roller not turning freely, etc. Do not remove power to the card to reset the error, damage may occur

	Problem	Possible Cause	Remedy
		Red LED OFF, Green LED ON, Orange LED ON if sensor is blocked	Check that the sensor is properly wired in the correct position and is the proper voltage. Reference IOM manual.
			If the run signal is coming from a device on a separate power supply check that the 0V lines are connected between the device's power supply and the driver cards power supply.
			If using a run signal check the wiring to CN2 is in the correct position and wired correctly, see page 4 of the manual. Also check that dip switch 2-8 is ON for run.
			If card is set to zone begin, dip switch 2-6 ON and the downstream zone is stopped and occupied, then the roller will not run. If card is set to zone end, dip switch 2-6 OFF, zone will accumulate product at the sensor. Reference IOM manual.
			Replace roller
3.	Flashing LED	Many options	Refer to IOM Manual for detailed information OR refer to appropriate ITOH Denki driver card manuals for additional options.
4.	Rollers "dancing" or spinning uncontrollably	Too many zones on one ITR control circuit	Set direction blocking dip switch setting. Refer to IOM Manual for additional information.
		Power Supply not centered within the string of zones	Locate and Adjust Power Supply to correct current supply issue
		Supply of power not equally distributed	Set card to Basic Accumulation. Refer to IOM Manual for additional information.
		Mixture of driver cards	Within the ITR transportation product line you can only use FP or FN cards within a string. Reference IOM Manual for additional information
		Power Supply Issue	If power supply is not purchased from MHS Conveyor, please consult manufactures operation directions.
		Multiple connected Power Supply units	0V line of all power supplies connected within a conveyor "unit" need to be connected. Reference IOM for additional detailed information
5.	Infeed zone not activating or running	Need input signal	Install MHS Conveyor start eye kit, or provide 24V run signal
		Loose connection between driver cards	Inspect, and adjust, connection cables as necessary
6.	Discharge zone not releasing	Down flow sending not providing "release" signal	Make sure photo eye and reflector are in alignment
		No "release" signal being provided	Use PLC connection, or Photo Eye & Reflector to provide zone with discharge open signal.
7.	One Zone not turning	Loose wire connection	Check all stranded wires to ensure they are inserted properly
		Loose connector cable	Check all quick connection within power harness to ensure they are properly connected.

	Problem	Possible Cause	Remedy
8.	Driver Card continuously faulting	Poor supply of power	Inspect to see if power supply is transmitting correct voltage
		Power Supply unit not wired correctly to the 24V supply line	Inspect termination points to ensure proper wiring. Adjust accordingly. Reference IOM Manual for additional information.
		Bad bearing in wheel bracket or slave roller	Replace worn out component to relieve the extra stress on ITR roller.
9.	Rollers are turning slowly	Too many zones are connected to the Power Supply unit	Consult IOM Manual to ensure the proper configuration between Driver Cards and Power Supply unit.
		Wrong dip switch setting on driver card	Check dip switch setting of 1-6 is properly set to OFF for internal speed (rotary switch control) Refer to IOM Manual for additional settings.
10.	Driver cards faulting regularly in UBT	Programming issue. Transfer belt rollers running 24/7	ITR rollers driving the transfer bands only need to run when signal is provided to UBT to divert product.
11.	Thermal Limit reached	Driver Card or Roller are over heating	Check the ambient temperature. Consult IOM Manual for acceptable temperature ranges
		Back plate of driver card not touching conveyor frame	Inspect mounting plate/conveyor surface to ensure complete surface connection for maximum heat dissipation.
		Excess friction or drag on motorized roller	Inspect area around roller to ensure nothing is rubber or lodged by the roller causing extra friction.
12	Electric Lift	Lift not working	Check switch to motors are properly set Check EZ24 Card settings

Chapter 18: IntelliROL Replacement Parts

18.1: Replacement Parts Identification

This section is used to identify parts that may require replacement during the life of the conveyor. Parts which specifically pertain to IntelliROL are included with illustrations.

A "Recommended Spare Parts List" is published for all conveyor orders of $20,000 or more. This spare parts list is sent to the purchaser approximately (2) weeks after the order is received. It includes part numbers, description, pricing and recommended quantities to be kept on hand for maintenance.

If you are unable to locate this document another may be obtained by contacting the MHS Conveyor Lifetime Services at 231-798-4547 or Fax 231-798-4549.

18.2: Spare Parts Priority Level Explanations

Level #1

Failure of a priority level #1 spare part (“A” level part) may cause major disruption of system performance.

Priority level 1 spare parts must be on-hand, and available to be replaced in the event of a component failure that could shut down a critical function of a conveyor system.

Priority level 1 spare parts include motors, gear reducers, gearmotor, motorized rollers, air solenoid valves, and related components. The majorities of these parts are purchased from MHS Conveyor vendors and carry their own warranties through these vendors. For more warranty information, see MHS Conveyor Equipment Warranty.

Level #2

Failure of a priority level #2 spare parts (“B” level part) usually is gradual and should not cause a major system disruption.

Priority level 2 spare parts are parts required for smooth system operation and preventative or regular mechanical maintenance.

Priority level 2 spare parts include roller chain, sprockets, belt pulleys, rollers, air cylinders, and other related parts whose failure should not stop a conveyor system suddenly. These parts tend to wear out gradually and are not know to fail suddenly.

Level #3

Priority level #3 parts (“C” level part) rarely fails and are easily obtainable.

Priority level 3 spare parts are parts that rarely fail or maybe optionally used by the customer.

18.3: REPLACEMENT PARTS - ITOH FE60 MDR

REPLACEMENT PARTS for ITOH FE-60 MOTORIZED ROLLER STANDARD ASSEMBLIES				
Item #	Description	1) FIXING BRKT HEX AXLE-UP	Replacement Rollers	Description
1126586	ROLLER,ITR SPUR 2G ITOH	FLAT	------	-------
1139544	ROLLER,ASY ITR 13.25BF 2G	FLAT	1139545	ROLLER,ITR 13.25BF 2G
1138727	ROLLER,ASY ITR 16BF 2G	FLAT	1138722	ROLLER,ITR 16BF 2G
1143630	ROLLER,ASY ITR 16BF 2G	POINT	1138722	ROLLER,ITR 16BF 2G
1140370	ROLLER,ASY ITR 16BF 2G CTD	FLAT	1140375	ROLLER,ITR 16BF 2G CTD
1140370	ROLLER,ASY ITR 16BF 2G CTD	FLAT	1140375	ROLLER,ITR 16BF 2G CTD
1138728	ROLLER,ASY ITR 22BF 2G	FLAT	1138723	ROLLER,ITR 22BF 2G
1142531	ROLLER,ASY ITR 22BF 2G	POINT	1138723	ROLLER,ITR 22BF 2G
1140371	ROLLER,ASY ITR 22BF 2G CTD	FLAT	1140376	ROLLER,ITR 22BF 2G CTD
1138729	ROLLER,ASY ITR 28BF 2G	FLAT	1138724	ROLLER,ITR 28BF 2G
1140372	ROLLER,ASY ITR 28BF 2G CTD	FLAT	1140377	ROLLER,ITR 28BF 2G CTD
1138730	ROLLER,ASY ITR 34BF 2G	FLAT	1138725	ROLLER,ITR 34BF 2G
1144662	ROLLER,ASY ITR 34BF 2G	POINT	1138725	ROLLER,ITR 34BF 2G
1140373	ROLLER,ASY ITR 34BF 2G CTD	FLAT	1140378	ROLLER,ITR 34BF 2G CTD
				Reference DWG. 130S001 & 130S002

18.4: REPLACEMENT PARTS - ITOH DRIVERCARD STANDARDS

REPLACEMENT PARTS for ITOH DRIVERCARD STANDARD ASSEMBLIES	
Replacement Drivercard	Description
CB-02	DRIVERCARD, ITOH PM486 SERIES
1116036	DRIVERCARD, ITOH CB-016P7
1143591	DRIVERCARD, ITOH CB-016BP7
1153054	DRIVERCARD, ITOH CB-016N7
1153930	DRIVERCARD, ITOH CBM-105FP
1157157	DRIVERCARD, ITOH CBM-105FN
1101261	DRIVERCARD, ITOH HB-510P
1108863	DRIVERCARD, ITOH HB-510BP
1101261	DRIVERCARD, ITOH HB-510P
1166286	DRIVERCARD,ITOH IB-E03BP
1131443	DCM, 4-ZONE CONTROLLER

18.5: Drive and Slave O-rings

REPLACEMENT PARTS - DRIVE AND SLAVE O-RINGS			
Item #	**Description**	**Roller Centers**	**Application**
E0005536	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	3"	STRAIGHT SLAVE
1142656	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	2"	STRAIGHT SLAVE
1137420	ORING,3/16 DIA X 8.688 HT BLUE	2.50"	STRAIGHT SLAVE
1127703	ORING,3/16 DIA X 11" HT BLUE ITR **4"CTR**	4"	STRAIGHT SLAVE
1102748	ORING,.210" DIA X 9.4" HT RED	3"	CURVE SLAVE
1102845	ORING,.210" DIA. X 11.5" HT RED MARKED WITH BLACK STRIP	4.27"	CURVE DRIVE
1103665	ORING,3/16" DIA X 13" HT BLUE	N/A	SPUR (Clockwise Twist)
1133173	ORING,88A .218" DIA X 20-1/2" BLACK	N/A	UBT (Clockwise Twist)

18.6: Driver Card Communication Cables

DRIVER CARD COMMUNICATION CABLE (CAT5E)		
Item No.	**Description**	**Application**
E0034025	CABLE,CAT5E 3' GRAY	COMM. CABLE BETWEEN
E0034026	CABLE,CAT5E 5' GRAY	COMM. CABLE BETWEEN
E0034027	CABLE,CAT5E 7' GRAY	COMM. CABLE BETWEEN
E0030796	CABLE,CAT5E 10' GRAY	COMM. CABLE BETWEEN
E0009905	CABLE,CAT5E 14' GRAY	COMM. CABLE BETWEEN
E0009904	CABLE,CAT5E 25' GRAY	COMM. CABLE BETWEEN

18.7: Run Signals for CB-016 Driver Card

RUN SIGNAL HARNESS FOR CB-016 DRIVER CARD		
Item No.	**Description**	**Application**
1144782	ELEC,ITR ACCUMULATION CURVE,1 MR, CB-016 PRESSURE	USED TO POWER (1) ITR
1144783	ELEC,ITR ACCUMULATION CURVE,2 MR, CB-016 PRESSURE	USED TO POWER (2) ITR
1146833	ELEC,ITR ACCUMULATION CURVE,3 MR, CB-016 PRESSURE	USED TO POWER (3) ITR
1146832	ELEC,ITR ACCUMULATION CURVE,4 MR, CB-016 PRESSURE	USED TO POWER (4) ITR

18.8: Coated Rollers with PVC Sleeve

COATED ROLLERS - COMPLETE ROLLER WITH PVC SLEEVE		
Item No.	**Description**	**Application**
Non-Motorized Roller		
1134693	ROLLER, ITR-16BF-1.9" DIA-2G-CTD-PRBG-1/16" PVC SLEEVE	PVC SLEEVE PER ROLLER
1132204	ROLLER, ITR-22BF-1.9" DIA-2G-CTD-PRBG-1/16" PVC SLEEVE	PVC SLEEVE PER ROLLER
1131724	ROLLER, ITR-28BF-1.9" DIA-2G-CTD-PRBG-1/16" PVC SLEEVE	PVC SLEEVE PER ROLLER
1140369	ROLLER, ITR-34BF-1.9" DIA-2G-CTD-PRBG-1/16" PVC SLEEVE	PVC SLEEVE PER ROLLER
Motorized Roller		
1140375	ROLLER, ITR-16BF-1.9" DIA-2G-CTD-MDR-1/16" PVC SLEEVE	PVC SLEEVE PER ROLLER
1140376	ROLLER, ITR-22BF-1.9" DIA-2G-CTD-MDR-1/16" PVC SLEEVE	PVC SLEEVE PER ROLLER
1140377	ROLLER, ITR-28BF-1.9" DIA-2G-CTD-MDR-1/16" PVC SLEEVE	PVC SLEEVE PER ROLLER
1140378	ROLLER, ITR-34BF-1.9" DIA-2G-CTD-MDR-1/16" PVC SLEEVE	PVC SLEEVE PER ROLLER

18.9: General Cables, Connectors, & Kits

GENERAL CABLES, CONNECTOR, & KITS		
Item No.	**Description**	**Application**
1167713	KIT,CTRLS-PE ZONE START-HB-FIELD MOUNT	USED TO START HB-510 DOWNSTREAM ZONE
1167714	ASY,CTRLS-PE ZONE START-HB-FACTORY MOUNT	USED TO START HB-510 DOWNSTREAM ZONE
1125371	KIT,CH TRANSITION C6 TO CRUZ - BOTH SIDE	CH TRANSITION C6 TO CRUZ
1152538	ASY,CTRLS-PRSS SWTCH-CB TO NBC-FACTORY MOUNT	USED FOR CURVES TO INTERFACE WITH NBC CHARGE END
1157661	ASY,CTRLS-PRSS SWTCH-HB TO NBC-FACTORY MOUNT	USED FOR CURVES TO INTERFACE WITH NBC DISCHARGE
1207178	ELEC,ITR,POWER SUPPLY-SPLICE INSTALLATION	USED FOR SPLICE INSTALLATION
1120174	CONNECTOR, SIGNAL SPLICE	USED WITH RED RELEASE SIGNAL HARNESS

18.10: ITR 24VDC Power Harness

INTELLIROL 24VDC POWER HARNESS		
Item No.	**Description**	**Application**
1102286	HARNESS,ITR-POWER-10AWG-10.5'	24VDC POWER CABLE TO DRIVER CARDS
1102287	HARNESS,ITR-POWER-10AWG-8'	24VDC POWER CABLE TO DRIVER CARDS
1102288	HARNESS,ITR-POWER-10AWG-5.5'	24VDC POWER CABLE TO DRIVER CARDS
1102289	HARNESS,POWER,10AWG.12.5' A=12.5',B=12	24VDC POWER CABLE TO DRIVER CARDS
1129502	HARNESS,ITR-POWER-10AWG-12.5'	24VDC POWER CABLE TO DRIVER CARDS
1143291	HARNESS,ITR-POWER-10AWG-10'-MALE-PIGTAIL	POWER CABLE W/ MALE CONNECT ONLY
1145665	HARNESS,ITR-POWER-10AWG-10'-FEMALE-PIGTAIL	POWER CABLE W/ FEMALE CONNECT ONLY
1161502	HARNESS,ITR-PWR INTRPT-10AWG-4"-COMMON CONDUCTOR	USED BETWEEN POWER SUPPLIES TO CONNECT COMMONS
1138166	HARNESS,ITR-POWER-10AWG-33'-(10 METER)	24VDC POWER CABLE TO DRIVER CARDS
3M567	CONNECTOR, POWER SPLICE 10 AWG	----
MALE/MALE POWER HARNESS		
1141545	HARNESS,ITR-POWER-10AWG-4"-MALE/MALE CONN	USE TO CHANGE POWER FLOW
1134347	HARNESS,POWER,10AWG,1' MALE CONN BOTH ENDS, GENDER BENDER	USE TO CHANGE POWER FLOW
1134348	HARNESS,POWER,10AWG,3'-MALE CONN BOTH ENDS-GENDER BENDER	USE TO CHANGE POWER FLOW
1134349	HARNESS,POWER,10AWG,5.5' MALE CONN BOTH ENDS, GENDER BENDER	USE TO CHANGE POWER FLOW
FEMALE/FEMALE POWER HARNESS		
1141549	HARNESS,ITR-POWER-10AWG-4"-FEMALE/FEMALE CONN	USE TO CHANGE POWER FLOW
1134344	HARNESS,POWER,10AWG,1' FEMALE CONN BOTH ENDS, GENDER BENDER	USE TO CHANGE POWER FLOW
1134345	HARNESS,POWER,10AWG,3' FEMALE CONN BOTH ENDS, GENDER BENDER	USE TO CHANGE POWER FLOW
1134346	HARNESS,POWER,10AWG,5.5' FEMALE CONN BOTH ENDS, GENDER BENDER	USE TO CHANGE POWER FLOW

18.11: Motor Cables used with CBM-105, CB-016 or HB-510

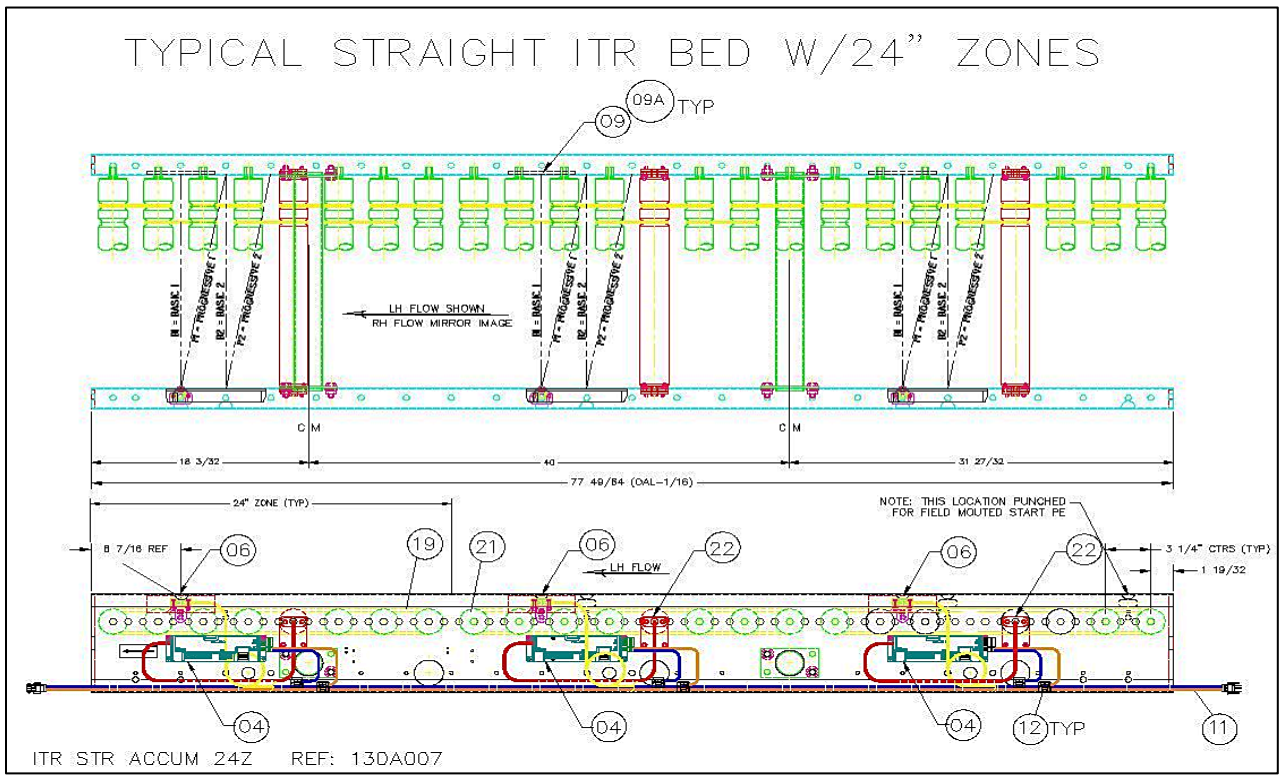
CABLE,MOTOR EXTENSION USED WITH CBM-105, CB-016 OR HB-510		
Item No.	**Description**	**Application**
1138704	CABLE,MOTOR EXTENSION,600MM ITOH M-F-EXT-9PIN-600 **USED W/ CBM-105, CB-016 & HB-510**	EXTEND DISTANCE BETWEEN DRIVER CARDS & ROLLER
1138705	CABLE,MOTOR EXTENSION,1200MM ITOH M-F-EXT-9PIN-1200 **USED W/ CBM-105, CB-016 & HB-510**	EXTEND DISTANCE BETWEEN DRIVER CARDS & ROLLER
1138706	CABLE,MOTOR EXTENSION,2700MM ITOH M-F-EXT-9PIN-2700 **USED W/ CBM-105, CB-016 & HB-510**	EXTEND DISTANCE BETWEEN DRIVER CARDS & ROLLER

18.12: Motor Cables used with IB-E03

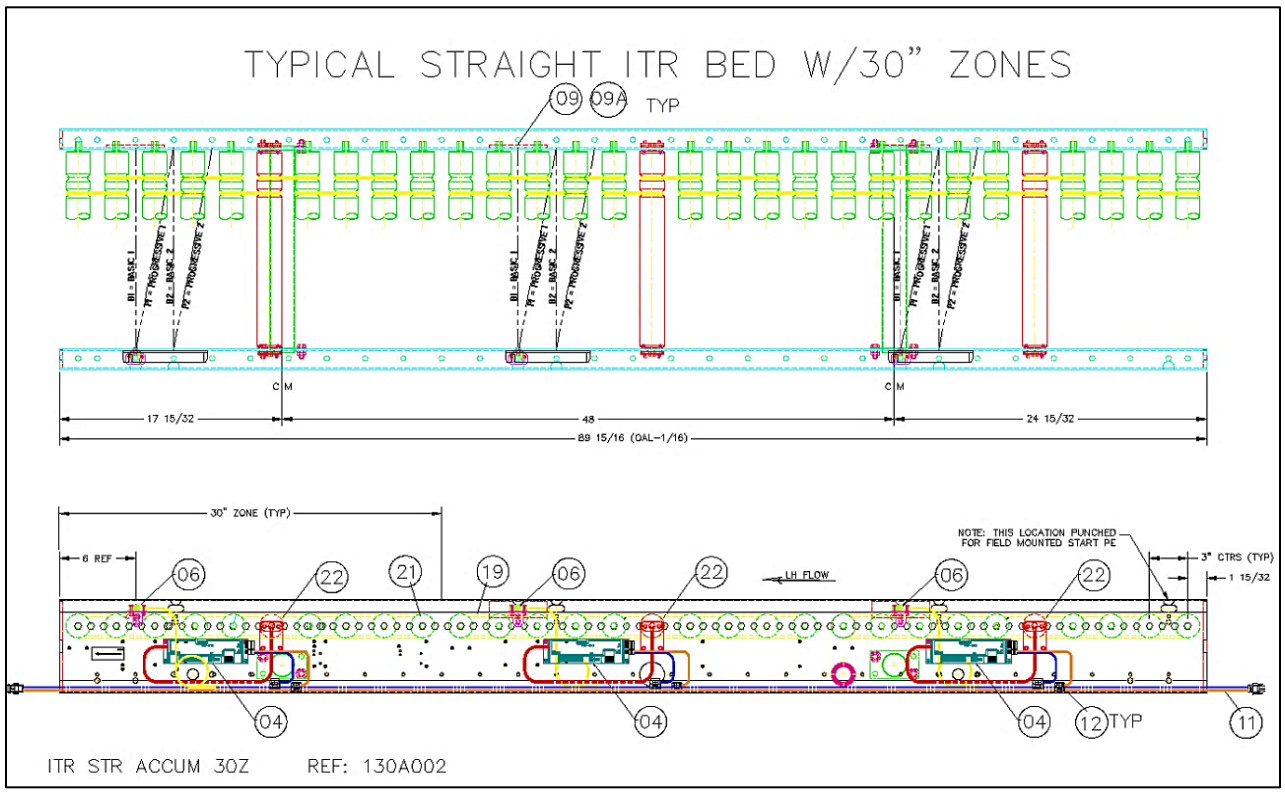
CABLE,MOTOR EXTENSION USED WITH IB-E03		
Item No.	**Description**	**Application**
1135339	CABLE,MOTOR EXTENSION,600MM ITOH M-F-EXT-10PIN-600, **USE W/ IB-N03/IB-E/HBM-604/BRAKE**	EXTEND DISTANCE BETWEEN DRIVER CARDS & ROLLER
1135340	CABLE,MOTOR EXTENSION,1200MM ITOH M-F-EXT-10PIN-1200, **USE W/ IB-N03/IB-E/HBM-604/BRAKE**	EXTEND DISTANCE BETWEEN DRIVER CARDS & ROLLER
1135341	CABLE,MOTOR EXTENSION,2700MM ITOH M-F-EXT-10PIN-2700, **USE W/ IB-N03/IB-E/HBM-604/BRAKE**	EXTEND DISTANCE BETWEEN DRIVER CARDS & ROLLER

18.13: ACCUMULATION STRAIGHT BED ZONE

18.13.1: Straight Bed 24" Zone



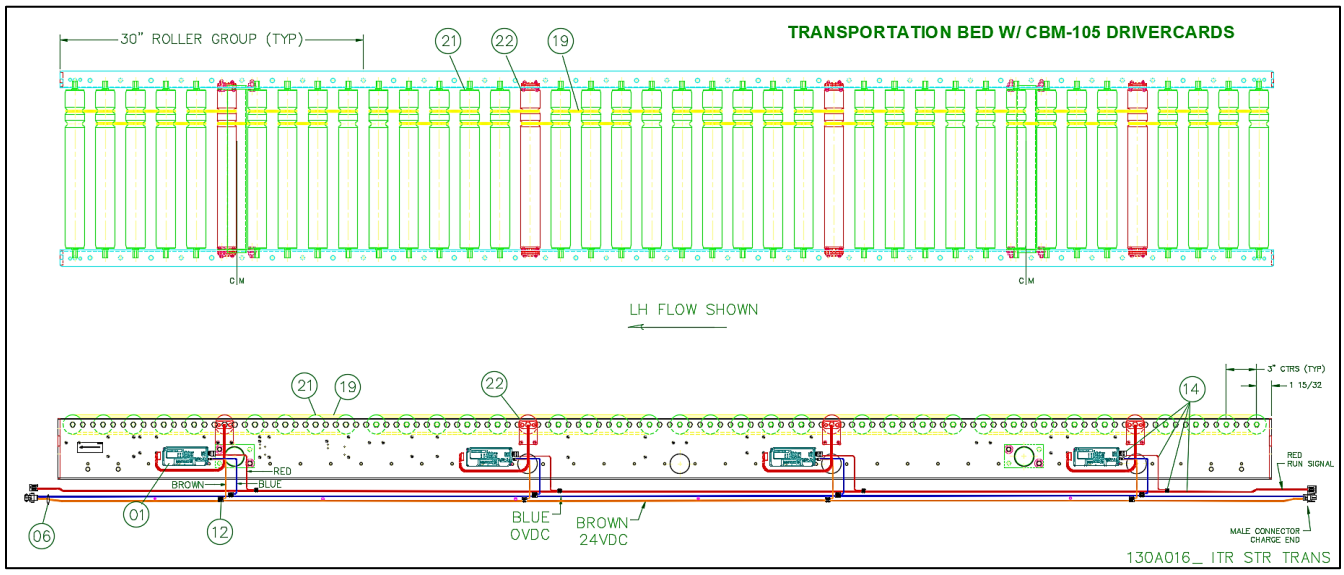
18.13.2: Straight Bed 30" Zone



18.13.3: Replacement Parts – ITR Accumulation Straight Bed 24" & 30" Zone

REPLACEMENT PARTS - ITR ACCUMULATION STRAIGHT BED (24 & 30 Zone)					
		Width & Item #			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
04	DRIVERCARD,ITOH **HB-510P**	1101261	1101261	1101261	1101261
20	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
11	CONNECTOR,IDC SCOTCH LOK 55816-22AWG RUN,16-22AWG	1120174	1120174	1120174	1120174
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
06	PE,REFLEX TYPE ZL-P2400S11 PNP DARK OPERATE 700MM CABLE	1137687	1137687	1137687	1137687
9A	PE,REFLECTOR 4-3/8" X 1-1/8"	400004	400004	400004	400004
-----	TAPE,FOAM DBL SIDED 1"SQUARE	E0005429	E0005429	E0005429	E0005429
-----	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CONN,3 COND,W/LEVERS 28 - 12 AWG	1102816	1102816	1102816	1102816
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
19	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	E0005536	E0005536	E0005536	E0005536
21	ROLLER,__ITR 1.9" DIA PLTD (__BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR__BF 2G ITOH FE-60	1138722	1138723	1138729	1138725
22	ROLLER,ITR _ _BF 2G ITOH PM 486 **FE-60** 600MM MOTOR CABLE W/10 PIN CONN **(USED W/ IBE)**	1163471	1163472	1163473	1163474
	Reference Dwg: Accumulation Straight Bed 24 & 30 Zone 130A002 & 130A007				

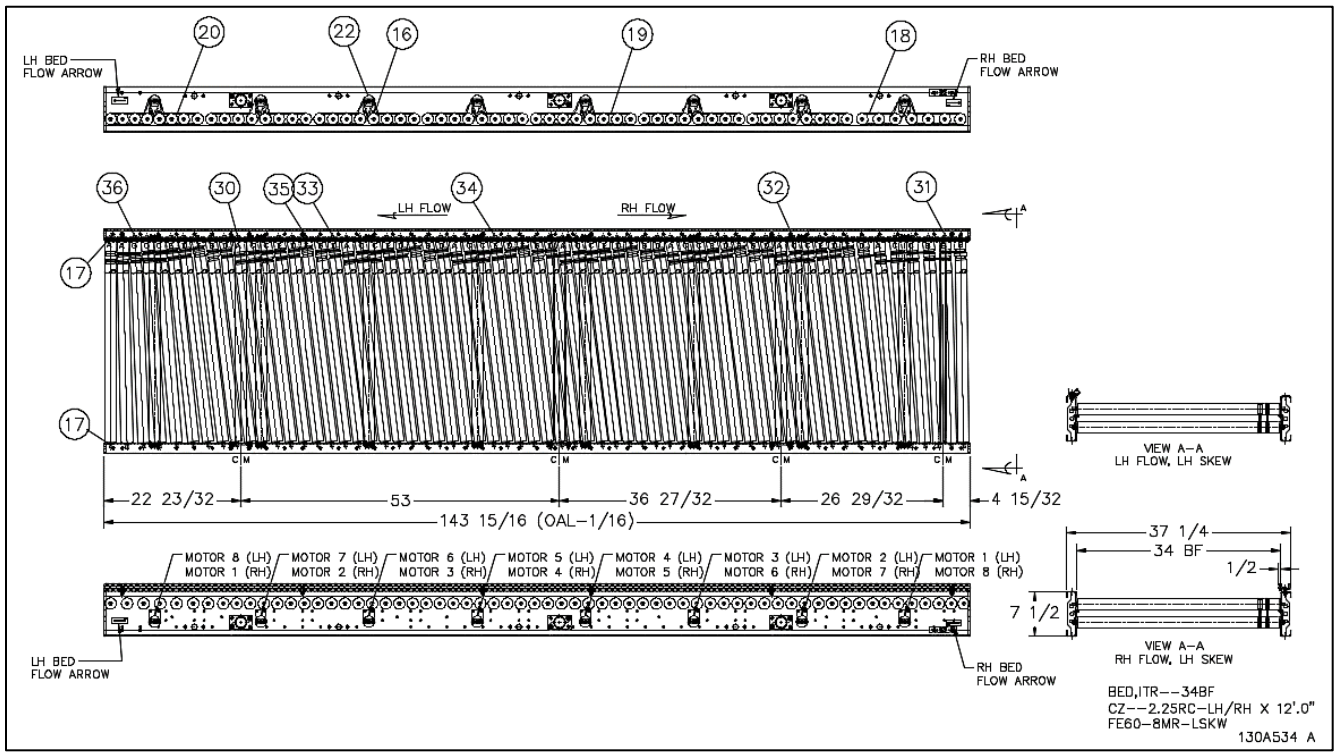
18.14: ITR TRANSPORTATION STRAIGHT BED



18.14.1: Replacement Parts – ITR Transportation Straight Bed

REPLACEMENT PARTS - ITR TRANSPORTATION STRAIGHT BEDS (2RC & 3RC)					
BED,ITR-_ _BF-CB-C6-2RC OR 3RC-30RG-LH/RH-FE60-_MR		**Width & Item #**			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
----	**ELECTRICAL COMPONENTS**	**----**	**----**	**----**	**----**
1	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
6	HARNESS,POWER BROWN & BLUE14 AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-6" L 1102288	8'-0" L 1102287	10'-6" L 1102286
14	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	**BED,ITR-_ _BF-CB (3RC Or 2RC) 30RG-FE60**	**----**	**----**	**----**	**----**
19	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	E0005536	E0005536	E0005536	E0005536
19	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
21	ROLLER,__ITR 1.9" DIA PLTD PRBG (__BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR _ _BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
					Reference Dwg. 130A016

19.1: ITR SKEW BED

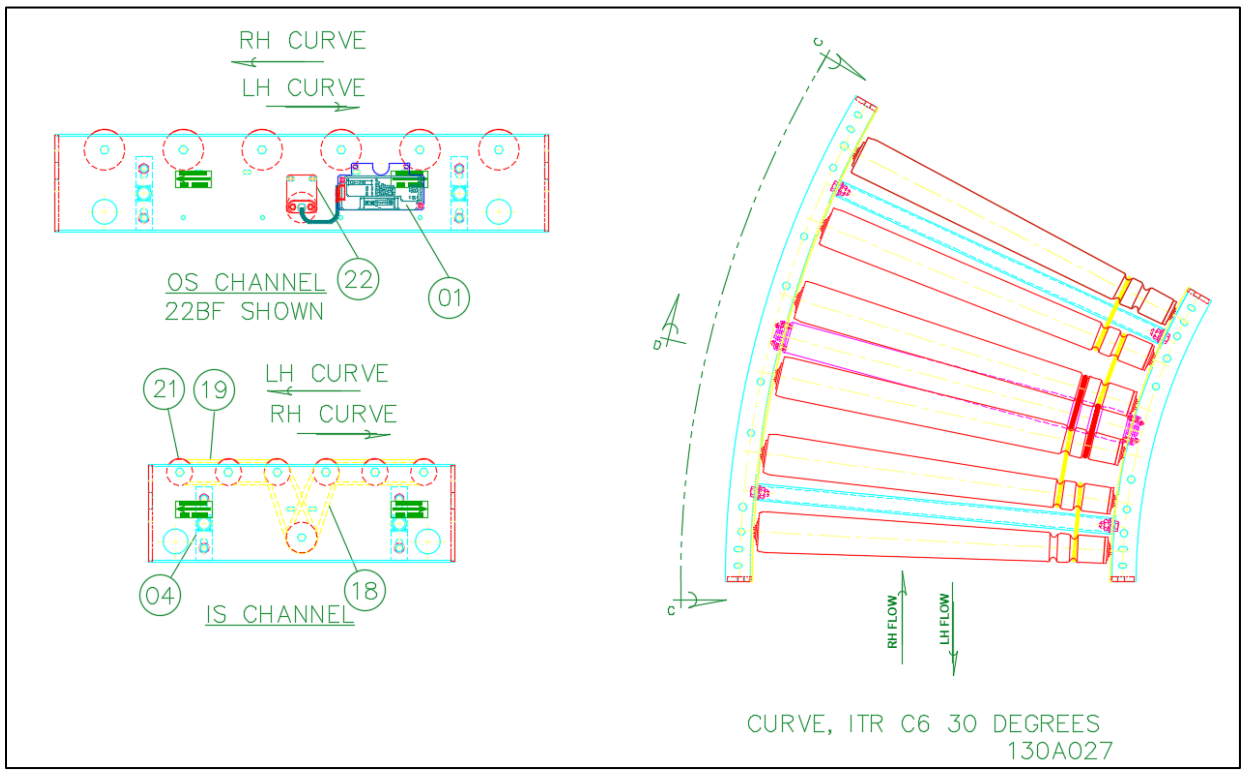


19.1.1: Replacement Parts - ITR Skew Bed

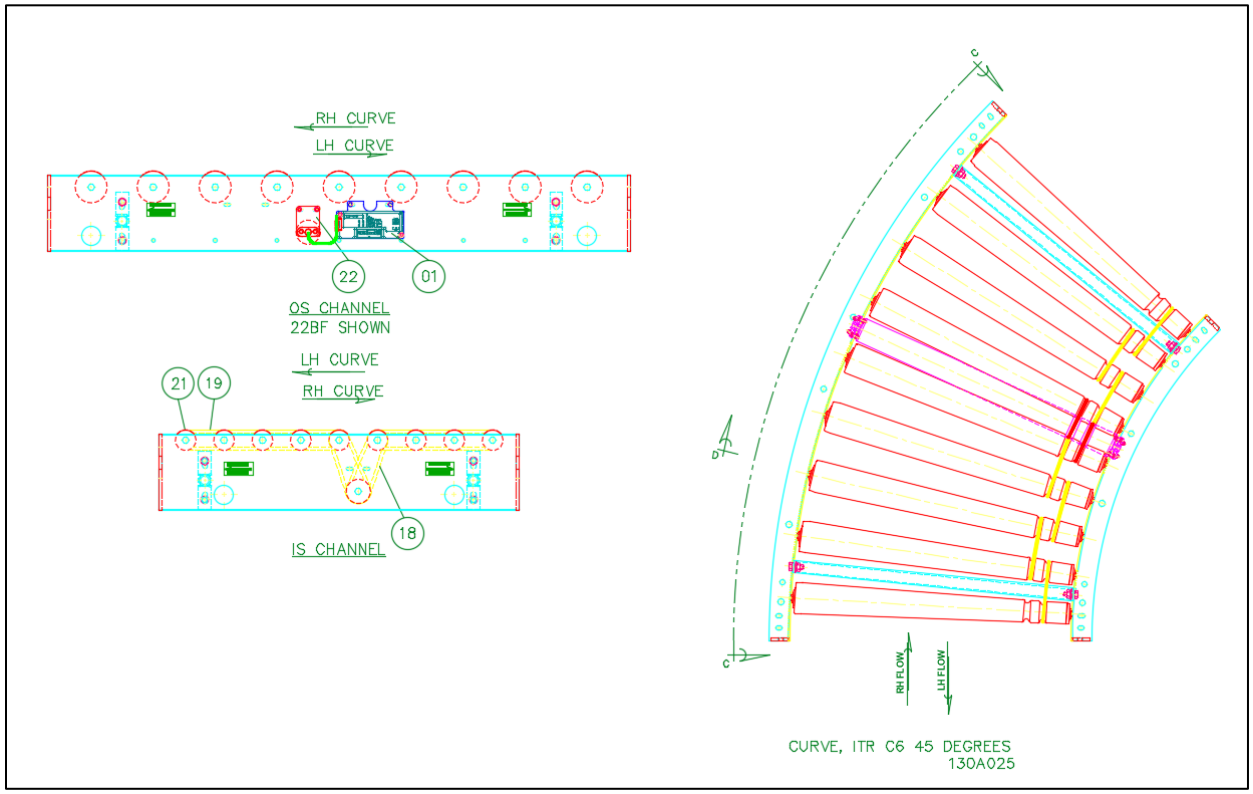
REPLACEMENT PARTS - ITR SKEW BEDS, 2.25RC,FE60					
		Width & Item #			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
16	ORING,.210 DIA X 10.0" HT RED	1130498	11304982	11304983	11304984
17	ORING,1/2"ID (3/32 WALL)	90530050	90530050	90530050	90530050
18	ORING,.210 DIA X 9-1/4" HT RED	1142106	1142106	1142106	1142106
19	ORING,.210 DIA X 8.5" HT RED	1116838	1116838	1116838	1116838
20	ORING,.210 DIA X 8.25" HT RED	1194480	1194480	1194480	1194480
30	ROLLER,16BF ITR SKEW,STYLE A	1194116	1194123	1194130	1194137
31	ROLLER,16BF ITR SKEW,STYLE B	1194117	1194124	1194131	1194138
32	ROLLER,16BF ITR SKEW,STYLE C	1194118	1194125	1194132	1194139
33	ROLLER,16BF ITR SKEW,STYLE D	1194119	1194126	1194133	1194140
34	ROLLER,16BF ITR SKEW,STYLE E	1194120	1194127	1194134	1194141
35	ROLLER,16BF ITR SKEW,STYLE F	1194121	1194128	1194135	1194142
36	ROLLER,16BF ITR SKEW,STYLE G	1194122	1194129	1194136	1194143
----	WHEEL,SKATE 7/8DIA X 1/4BORE	E0031762	E0031762	E0031762	E0031762
22	ROLLER,ITR___BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
----	DRIVERCARD,ASY ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
-----	CABLE,MOTOR EXTENSION,600MM,ITOH M-F-EXT-9PIN-600	1138704	1138704	1138704	1138704
ROLLER GROUP					
15RG	HARNESS,POWER,10AWG,W/DROPS,(4),5.5',ITR SKEW	1193743	1193743	1193743	1193743
15RG	HARNESS,RUN SIGNAL,W/DROPS,(4),5.5',ITR SKEW	1193747	1193747	1193747	1193747
17RG	HARNESS,POWER,10AWG,W/DROPS,(7),10.5',ITR SKEW	1193742	1193742	1193742	1193742
17RG	HARNESS,RUN SIGNAL,W/DROPS,(7),10.5',ITR SKEW	1193746	1193746	1193746	1193746
18RG	HARNESS,POWER,10AWG,W/DROPS,(8),12.5',ITR SKEW	1193741	1193741	1193741	1193741
18RG	HARNESS,RUN SIGNAL,W/DROPS,(8),12.5',ITR SKEW	1193745	1193745	1193745	1193745
					Reference Dwg: 130A534 REV A

19.2: ITR Transportation Curves

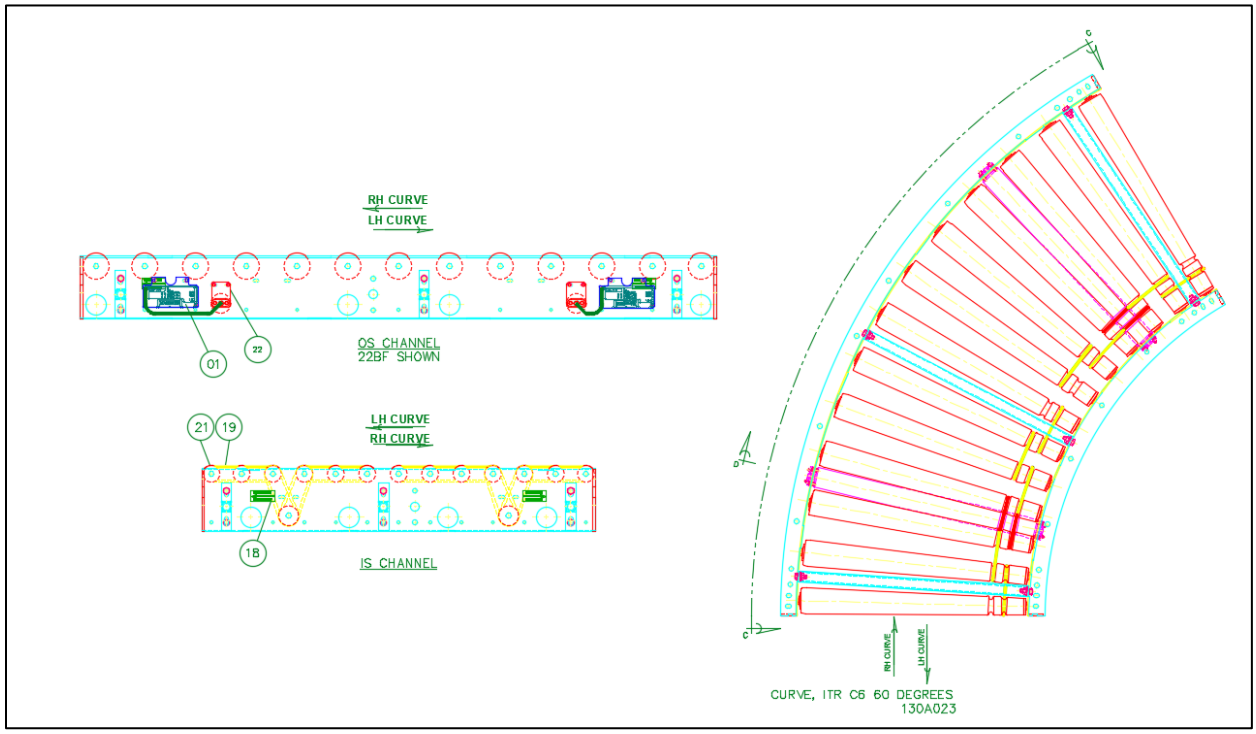
19.2.1: ITR Transportation Curve 30 Degrees



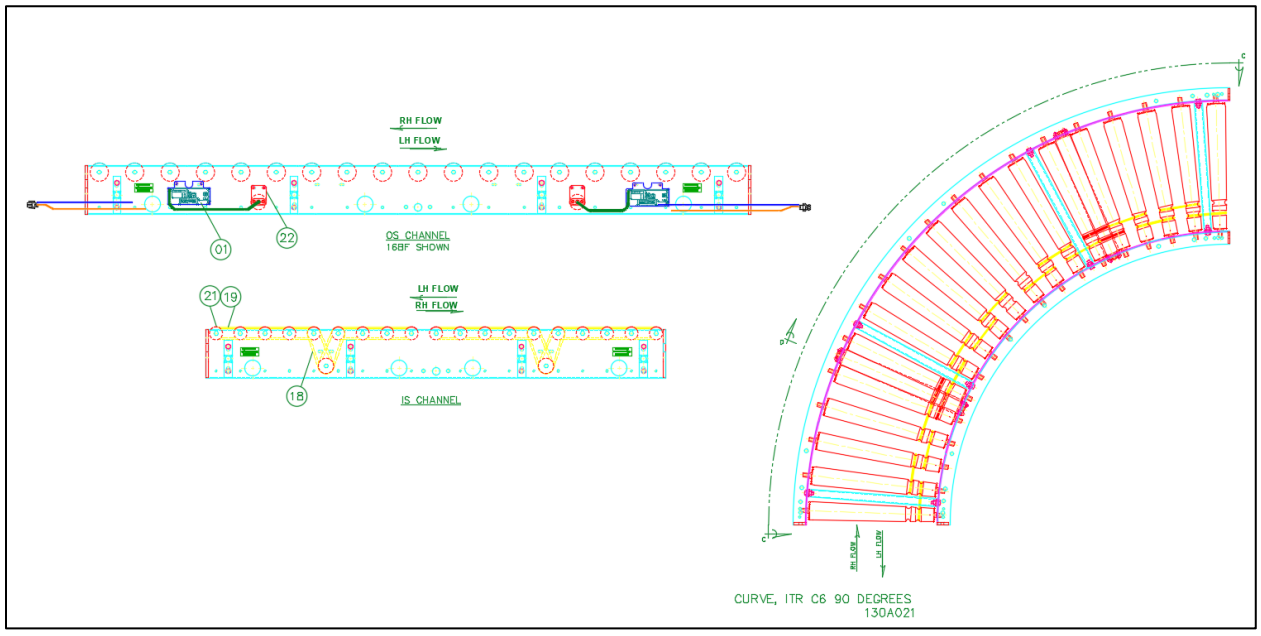
19.2.2: ITR Transportation Curve 45 Degree



19.2.3: ITR Transportation Curve 60 Degree



19.2.4: ITR Transportation Curve 90 Degree

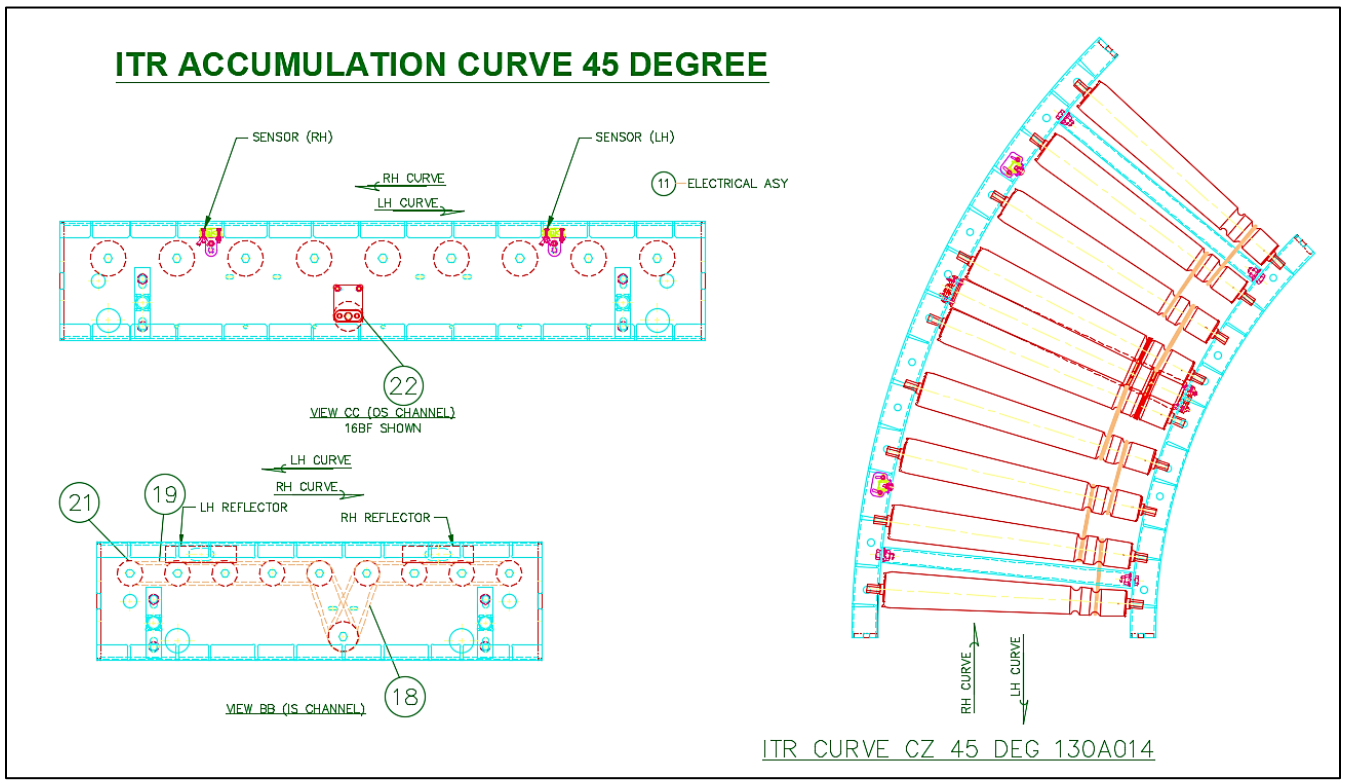


19.2.5: Replacement Parts – ITR Standard Transportation Curves

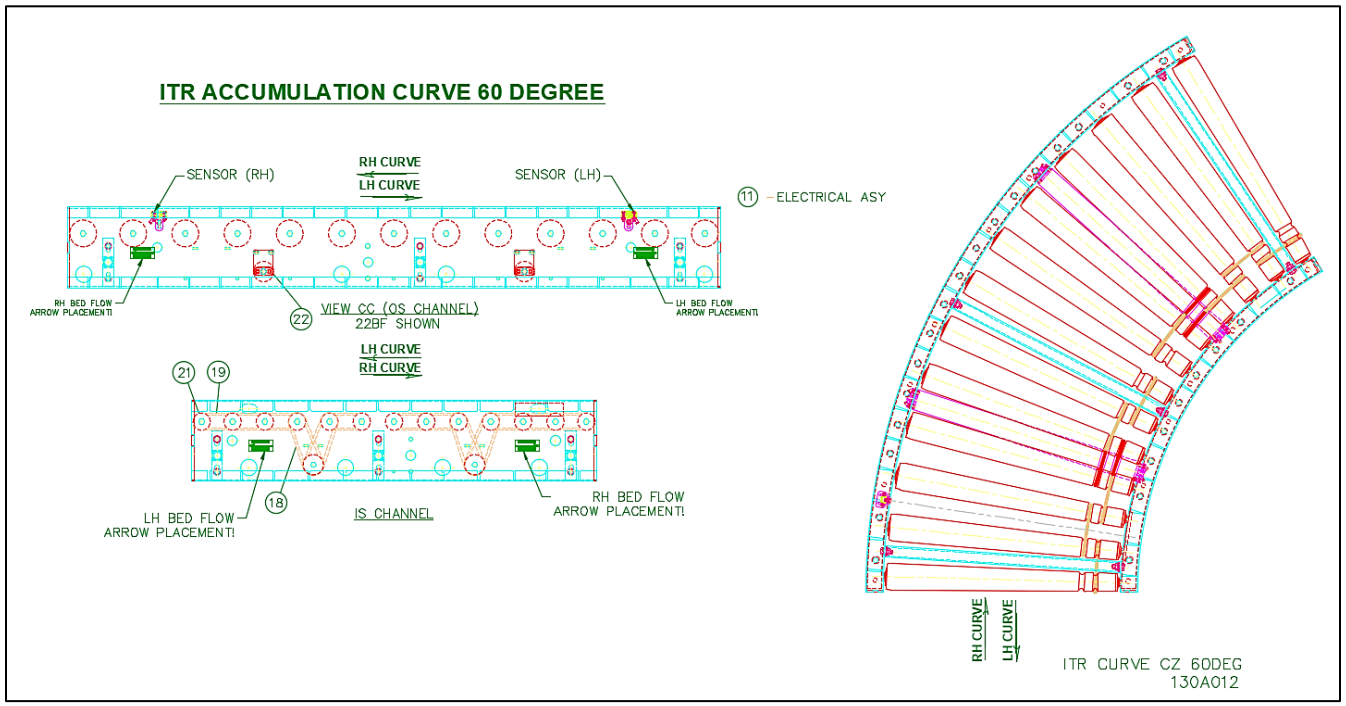
REPLACEMENT PARTS - ITR TRANSPORTATION CURVES, STANDARD OR HIGH DENSITY ROLLER					
CURVE,ITR-_ _BF-CB OR IBE-C6-STD OR HDR-_ _D-LH/RH-FE60-_MR		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
----	**ELECTRICAL COMPONENTS**	----	----	----	----
01	DRIVERCARD,ITOH **CB-016P7**	1116036	1116036	1116036	1116036
01	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
06	HARNESS,POWER BROWN & BLUE 14 AWG W/MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-6" L 1102288	8'-0" L 1102287	10'-6" L 1102286
08	CABLE,POWER **CB-016/HB-510** 14GA ITR	1139543	1139543	1139543	1139543
----	CONN, 3 COND, W/LEVERS 28 - 12 AWG	1102816	1102816	1102816	1102816
----	CONNECTOR,IDC SCOTCHLOK 558-16-22AWG RUN,16-22AWG-RED	1120174	1120174	1120174	1120174
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	**CURVE, TRANSPORTATION**	----	----	----	----
18	ORING,.210" DIA. X 11.5" HT RED MARKED WITH 1 BLACK STRIPE **(USED WITH STD)**	1102845	1102845	1102845	1102845
19	ORING,.210" DIA X 9.4" HT RED (DURA-BELT) **(USED WITH STD)**	1102748	1102748	1102748	1102748
18	ORING,.210 DIA X 11.13 HT RED MARKED WITH 1 BLACK STRIPE **(USED WITH HDR)**	1102711	1102711	1102711	1102711
19	ORING,.210 DIA X 7.5 HT RED **(USED WITH HDR)**	1185142	1185142	1185142	1185142
21	ROLLER,_ _ W TT ITR 2 GRV PRBG	E0009900	E0009901	E0009902	E0009903
22	ROLLER,ITR _ _BF 2G ITOH **FE-60**	1138722	1138723	1138724	1138725
22	ROLLER,ITR _ _BF 2G ITOH **FE-140 (USED WITH CB-016)**	1168560	1134452	1142856	1155281
	Reference Dwg: Trans Curve 130A027, 130A025, 130A023, & 130A021				

19.3: ITR ACCUMULATION CURVES

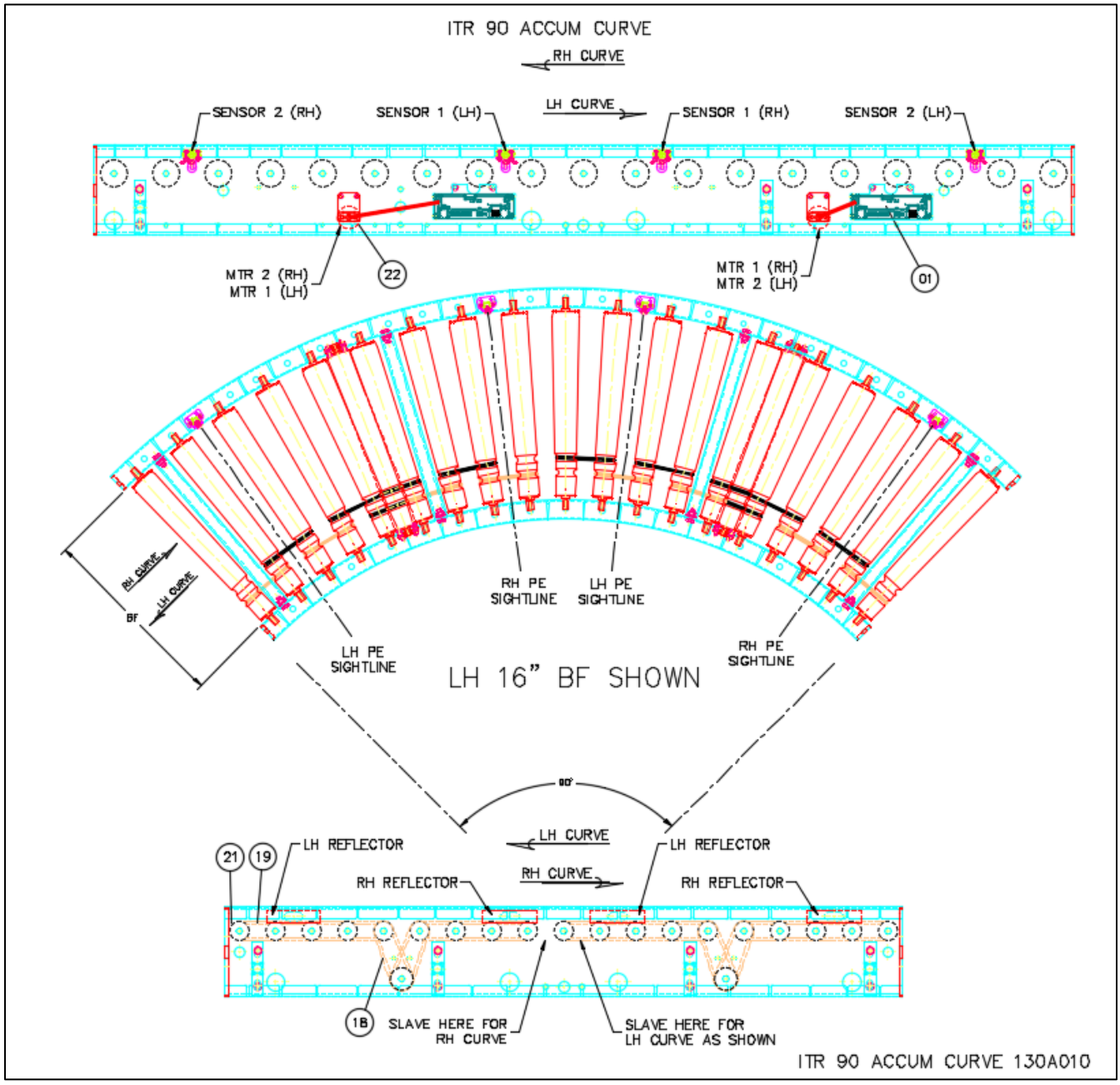
19.3.1: ITR Cruz Channel Accumulating 45 Degree Curve



19.3.2: ITR Cruz Channel Accumulating 60 Degree Curve



19.3.3: ITR Cruz Channel Accumulating 90 Degree Curve

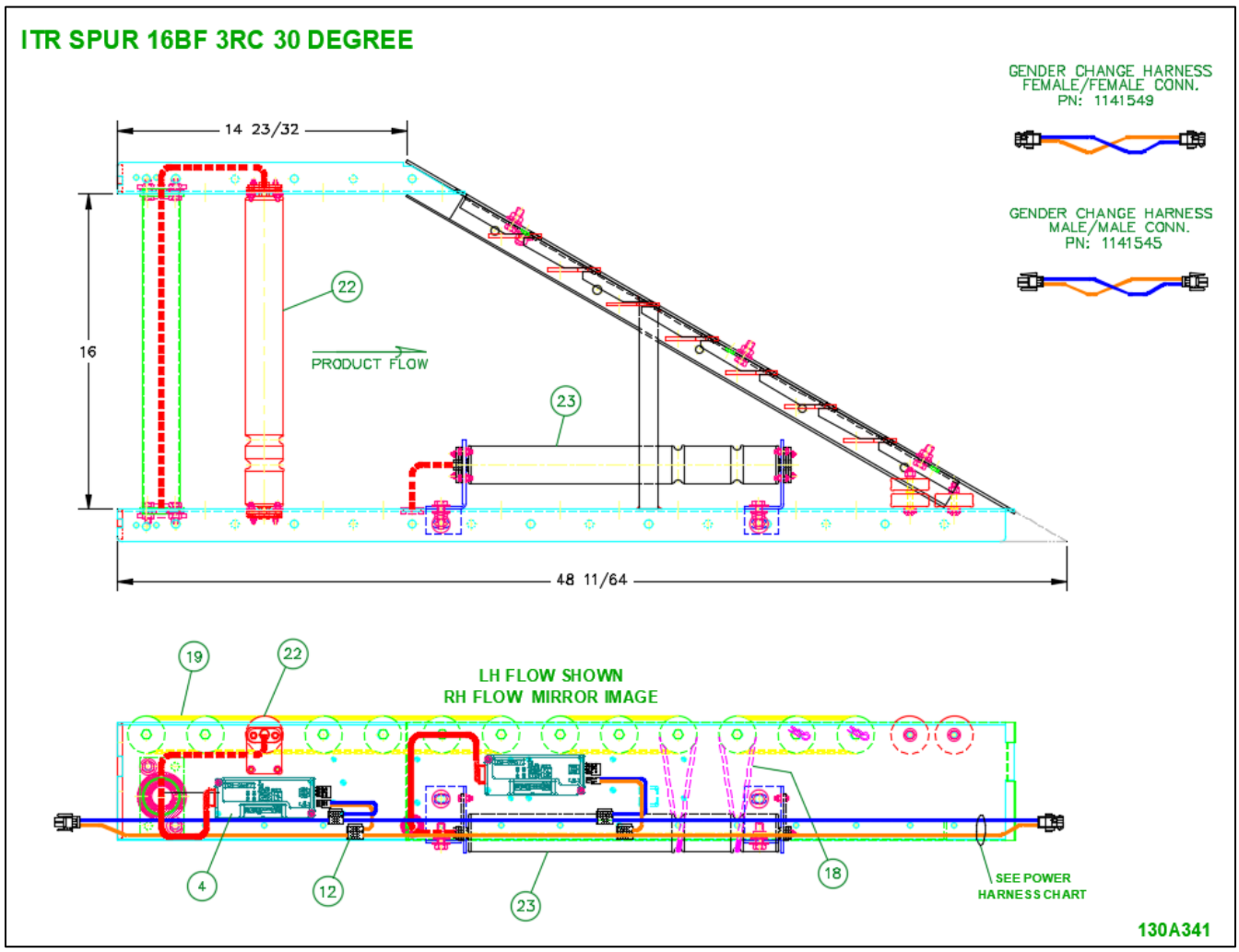


19.3.4: Replacement Parts – ITR Accumulation Curve

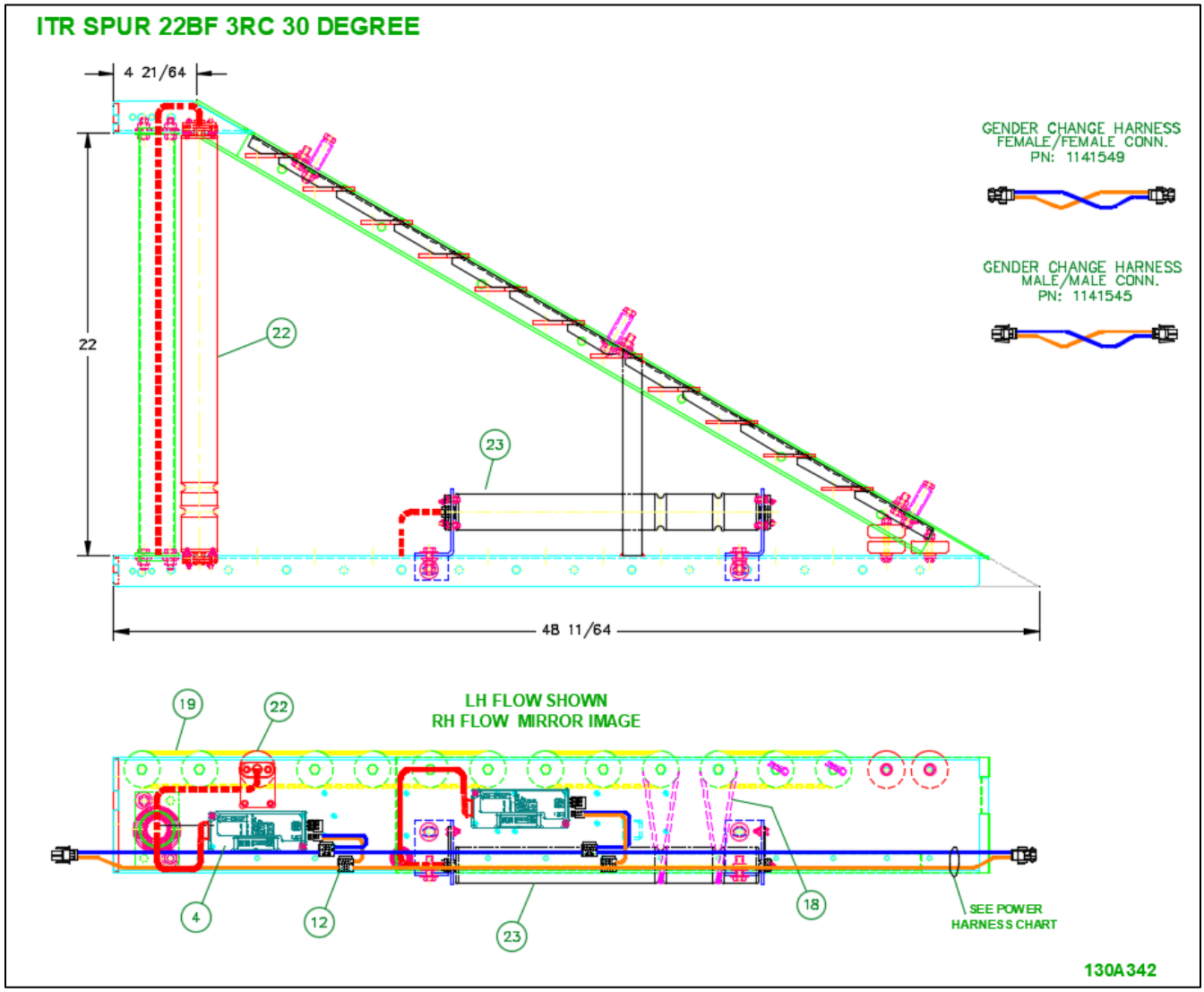
REPLACEMENT PARTS - ITR ACCUMULATION CURVES, STANDARD OR HIGH DENSITY ROLLER					
CURVE,ITR-_ _BF-(HB OR IBE)-CZ-(STD OR HDR)-_Z-30,_ _D-LH/RH-FE60-_MR		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
----	**ELECTRICAL COMPONENTS**	----	----	----	----
01	DRIVERCARD,ITOH **HB-510**	1116036	1116036	1116036	1116036
01	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
-----	HARNESS,POWER BROWN & BLUE 14 AWG W/MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-6" L 1102288	8'-0" L 1102287	10'-6" L 1102286
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
-----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
----	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	CONN, WAGO 231-302/026-000	1162204	1162204	1162204	1162204
----	PE,REFLECTOR 4-3/8" X 1-1/8"	400004	400004	400004	400004
----	PE,REFLEX TYPE ZL-P2465S14 PNP,LIGHT OPERATE,2M CABLE	1163456	1163456	1163456	1163456
----	**CURVE, ACCUMULATION**	----	----	----	----
18	ORING,.210" DIA. X 11.5" HT RED MARKED W/BLACK STRIPE **(USED WITH STD)**	1102845	1102845	1102845	1102845
18	ORING,.210" DIA. X 11.5" HT RED MARKED W/BLACK STRIPE **(USED WITH IBE HDR)**	1102711	1102711	1102711	1102711
19	ORING,.210" DIA X 9.4" HT RED **(USED WITH STD)**	1102748	1102748	1102748	1102748
19	ORING,.210" DIA X 9.4" HT RED **(USED WITH IBE HDR)**	1185142	1185142	1185142	1185142
21	ROLLER,W TT ITR 2 GRV PRBG	E0009900	E0009901	E0009902	E0009903
22	ROLLER,ITR _ _BF 2G ITOH **FE-60**	1138722	1138723	1138724	1138725
22	ROLLER,ITR _ _BF 2G ITOH PM 486 **FE-60** 600MM MOTOR CABLE W/10 PIN CONN **(USED W/ IBE)**	1163471	1163472	1163473	1163474
	Reference Dwg: Accumulation Curve 130A014 & 130A012 & 130A010				

19.4: ITR Spur Transportation 30 Degree

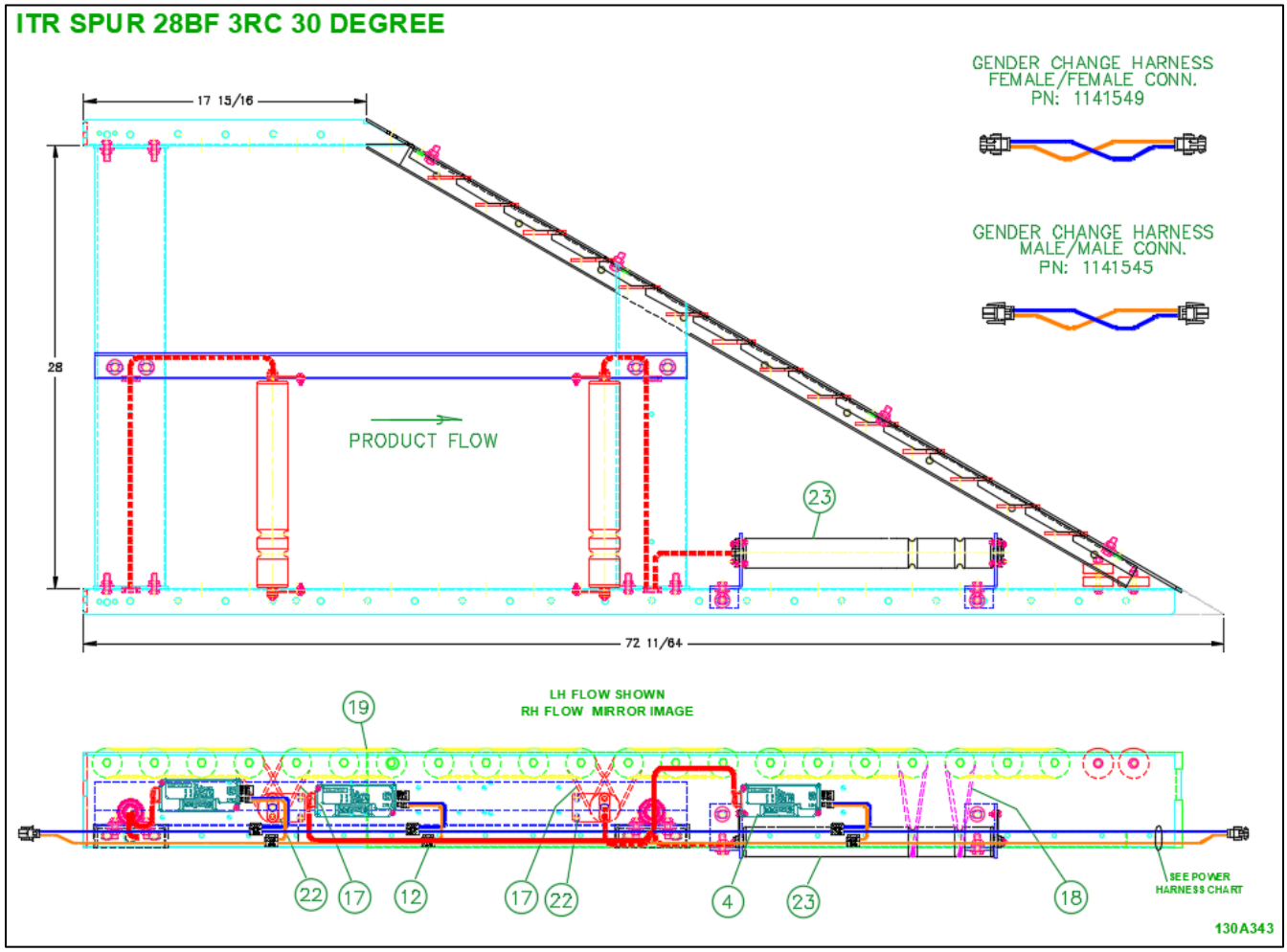
19.4.1: ITR Spur 16BF 3RC 30 Degree



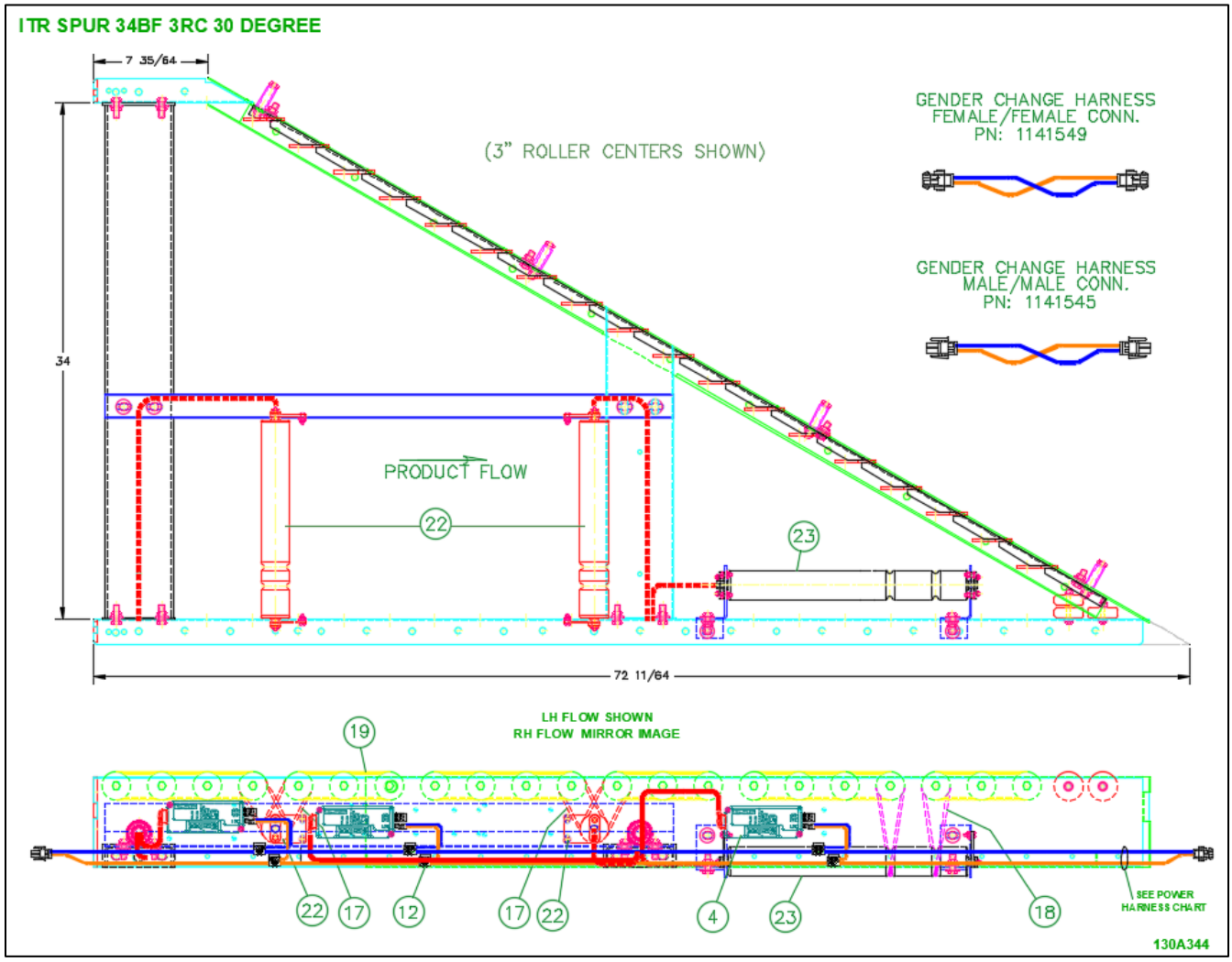
19.4.2: ITR Spur 22BF 3RC 30 Degree



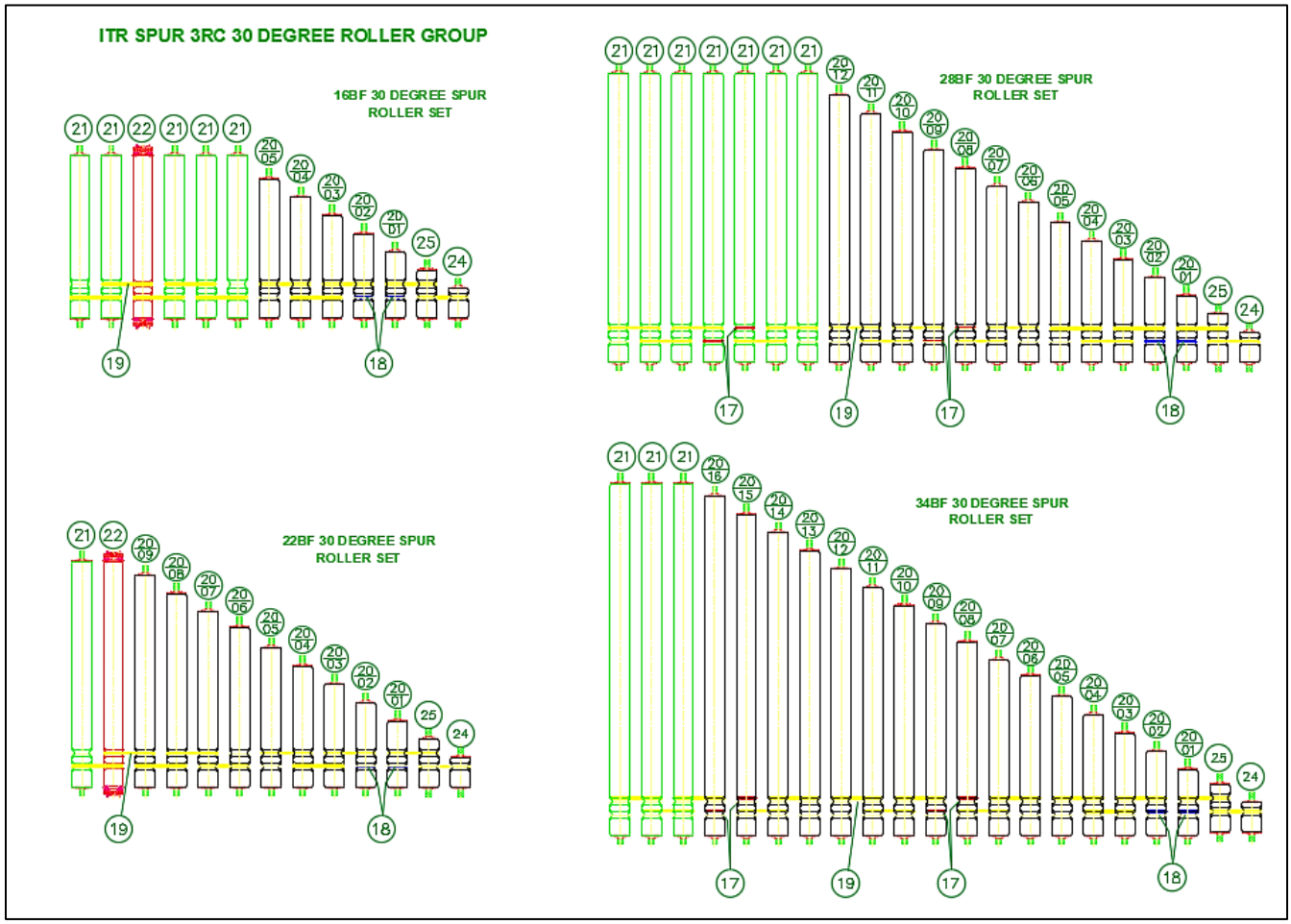
19.4.3: ITR Spur 28BF 3RC 30 Degree



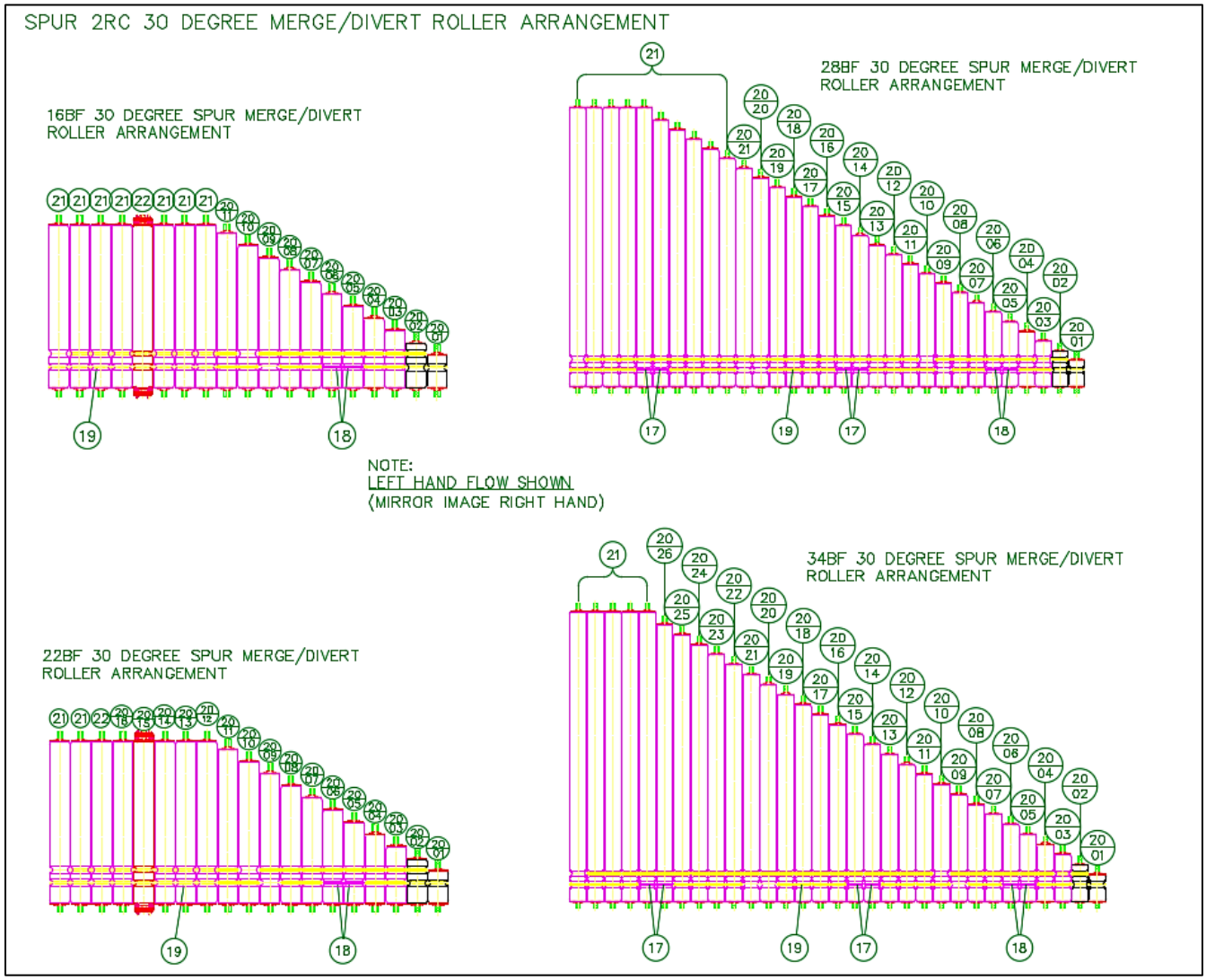
19.4.4: ITR Spur 34BF 3RC 30 Degree



19.4.5: ITR Spur 3RC 30 Degree Roller Group



19.4.6: ITR Spur 2RC 30 Degree Merge/Divert Roller Group



19.4.7: Replacement Parts - ITR Spur 3RC 30 Degree

REPLACEMENT PARTS - ITR SPUR, 3RC, 30 DEGREE					
SPUR,_ _BF-CB-C6-3RC-30D-LH/RH-FE60-_MR		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
----	**ELECTRICAL COMPONENTS**	----	----	----	----
04	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
-----	CONNECTOR,IDC SCOTCHLOK 558-16-22AWG RUN,16-22AWG-RED	1120174	1120174	1120174	1120174
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CONN,3 COND,W/LEVERS 28 - 12 AWG	1102816	1102816	1102816	1102816
----	HARNESS,POWER BROWN & BLUE14 AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-6" L 1102288	8'-0" L 1102287	10'-6" L 1102286
----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
-----	HARNESS,ITR-POWER-10AWG 4"-FEMALE/FEMALE CONN	1141549	1141549	1141549	1141549
----	**SPUR, O-RINGS**	----	----	----	----
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
17 & 19	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	E0005536	E0005536	E0005536	E0005536
----	**ROLLER SET-3RC-30D-SPUR**	----	----	----	----
20/01	ROLLER,ITR 3-3/8"BF PRBG **NO AXLE**	1143249	1143249	1143249	1143249
20/02	ROLLER,ITR 5-1/8"BF PRBG **NO AXLE**	1130836	1130836	1130836	1130836
20/03	ROLLER,6-27/32BF ITR 1.9 PLTD PRBG	1131620	1131620	1131620	1131620
20/04	ROLLER,8-9/16BF ITR 1.9 PLTD PRBG	1131621	1131621	1131621	1131621
20/05	ROLLER,10-5/16BF ITR 1.9 PLTD PRBG	1143250	1143250	1143250	1143250
20/06	ROLLER,12-1/32BF ITR 1.9 PLTD PRBG	1131622	1131622	1131622	1131622
20/07	ROLLER,13-25/32BF ITR 1.9 PLTD PRBG	1131623	1131623	1131623	1131623
20/08	ROLLER,15-1/2BF ITR 1.9 PLTD PRBG	-----	1131624	1131624	1131624
20/09	ROLLER,17-1/4BF ITR 1.9 PLTD PRBG	-----	1143251	1143251	1143251
20/10	ROLLER,18-31/32BF ITR 1.9 PLTD PRBG	-----	1131625	1131625	1131625
20/11	ROLLER,20-11/16BF ITR 1.9 PLTD PRBG	-----	1143252	1143252	1143252
20/12	ROLLER,22-7/16BF ITR 1.9 PLTD PRBG	-----	-----	1131627	1131627
20/13	ROLLER,24-5/32BF ITR 1.9 PLTD PRBG	-----	-----	1131628	1131628
20/14	ROLLER,25-29/32BF ITR 1.9 PLTD PRBG	-----	-----	1131629	1131629
20/15	ROLLER,27-5/8BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140043
20/16	ROLLER,29-3/8BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140044
20/17	ROLLER,31-3/32BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140045
20/18	ROLLER,32-13/16BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140046
21	ROLLER,_ _ITR 1.9 PLTD PRBG (_ _BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR 13.25BF 2G ITOH-PM 486 FE-60-322-D-24-P2-KF	----	----	1139545	1139545
23	ROLLER,ITR SPUR 2G ITOH PM 486 FE-60-393-D-24-P2-OS-KF	1126586	1126586	1126586	1126586
		Reference Dwg: Roller Arrangement &			130A341-344

19.4.8: Replacement Parts - ITR Spur 2RC 30 Degree

REPLACEMENT PARTS - ITR SPUR, 2RC, 30 DEGREE					
SPUR,ITR-_ _BF-CB-C6-2RC-30D-LH/RH-FE60-_MR		**Width & Item #**			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
----	**ELECTRICAL COMPONENTS**	**----**	**----**	**----**	**----**
04	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
-----	CONNECTOR,IDC SCOTCHLOK 558-16-22AWG RUN,16-22AWG-RED	1120174	1120174	1120174	1120174
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CONN,3 COND,W/LEVERS28 - 12 AWG	1102816	1102816	1102816	1102816
----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
-----	HARNESS,ITR-POWER-10AWG 5.5'	1102288	1102288	-----	-----
-----	HARNESS,ITR-POWER-10AWG 8'	-----	-----	1102287	1102287
-----	HARNESS,ITR-POWER-10AWG 4"-FEMALE/FEMALE CONN	1141549	1141549	1141549	1141549
	SPUR, O-RINGS	**----**	**----**	**----**	**----**
19	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	-----	-----	E0005536	E0005536
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
19	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
----	**ROLLER SET-2RC-30D-SPUR**	**----**	**----**	**----**	**----**
20/01	ROLLER,ITR 3-11/16" BF PRBG **(NO AXLE) 1 GROOVE**	1152360	1152360	1152360	1152360
20/02	ROLLER,ITR 4-3/4" BF PRBG **(NO AXLE)**	E0003268	E0003268	E0003268	E0003268
20/03	ROLLER,6" BF ITR 1.9" DIA PLTD PRBG	1152260	1152260	1152260	1152260
20/04	ROLLER,7-1/8" BF ITR 1.9" DIA PLTD PRBG	1152261	1152261	1152261	1152261
20/05	ROLLER,8-5/19" BF ITR 1.9" DIA PLTD PRBG	1152262	1152262	1152262	1152262
20/06	ROLLER,9-7/16" BF ITR 1.9" DIA PLTD PRBG	1152263	1152263	1152263	1152263
20/07	ROLLER,10-5/8" BF ITR 1.9" DIA PLTD PRBG	1152264	1152264	1152264	1152264
20/08	ROLLER,11-3/4" BF ITR 1.9" DIA PLTD PRBG	1152265	1152265	1152265	1152265
20/09	ROLLER,12-15/16" BF ITR 1.9" DIA PLTD PRBG	1152266	1152266	1152266	1152266
20/10	ROLLER,14-1/16" BF ITR 1.9" DIA PLTD PRBG	1152268	1152268	1152268	1152268
20/11	ROLLER,15-3/16" BF ITR 1.9" DIA PLTD PRBG	1152269	1152269	1152269	1152269
20/12	ROLLER,16-3/8" BF ITR 1.9" DIA PLTD PRBG	------	1155254	1155254	1155254
20/13	ROLLER,17-1/2" BF ITR 1.9" DIA PLTD PRBG	------	1133722	1133722	1133722
20/14	ROLLER,18-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1154742	1154742	1154742
20/15	ROLLER,19-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1144374	1144374	1144374
20/16	ROLLER,21" BF ITR 1.9" DIA PLTD PRBG	------	1133723	1133723	1133723
20/17	ROLLER,22-3/16" BF ITR 1.9" DIA PLTD PRBG	------	------	1155255	1155255
20/18	ROLLER,23-1/4" BF ITR 1.9" DIA PLTD PRBG	------	------	1131992	1131992
20/19	ROLLER,24-7/16" BF ITR 1.9" DIA PLTD PRBG	------	------	1133724	1133724
20/20	ROLLER,25-5/8" BF ITR 1.9" DIA PLTD PRBG	------	------	1155256	1155256
20/21	ROLLER,26-3/4" BF ITR 1.9" DIA PLTD PRBG	------	------	1154745	1154745
20/22	ROLLER,27-15/16" BF ITR 1.9" DIA PLTD PRBG	------	------	------	1133726
20/23	ROLLER,29-1/16" BF ITR 1.9" DIA PLTD PRBG	------	------	------	1133527
20/24	ROLLER,30-1/4" BF ITR 1.9" DIA PLTD PRBG	------	------	------	1155258
20/25	ROLLER,31-3/8" BF ITR 1.9" DIA PLTD PRBG	------	------	------	1133728
20/26	ROLLER,32-1/2" BF ITR 1.9" DIA PLTD PRBG	------	------	------	1155259
21	ROLLER,__ITR 1.9" DIA PLTD (__BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR __BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
22	ROLLER,ITR 13.25BF 2G ITOH-PM 486 FE-60-322-D-24-P2-KF	----	----	1139545	1139545
23	ROLLER,ITR SPUR 2G ITOH,2C PM486FE-60-366-D-24-P2-OS-KF	1152362	1152362	1152362	1152362
					Reference Dwg: Roller Arrangement & 130A341-344

19.4.9: Replacement Parts - ITR Spur Divert IB-E 30° 3RC

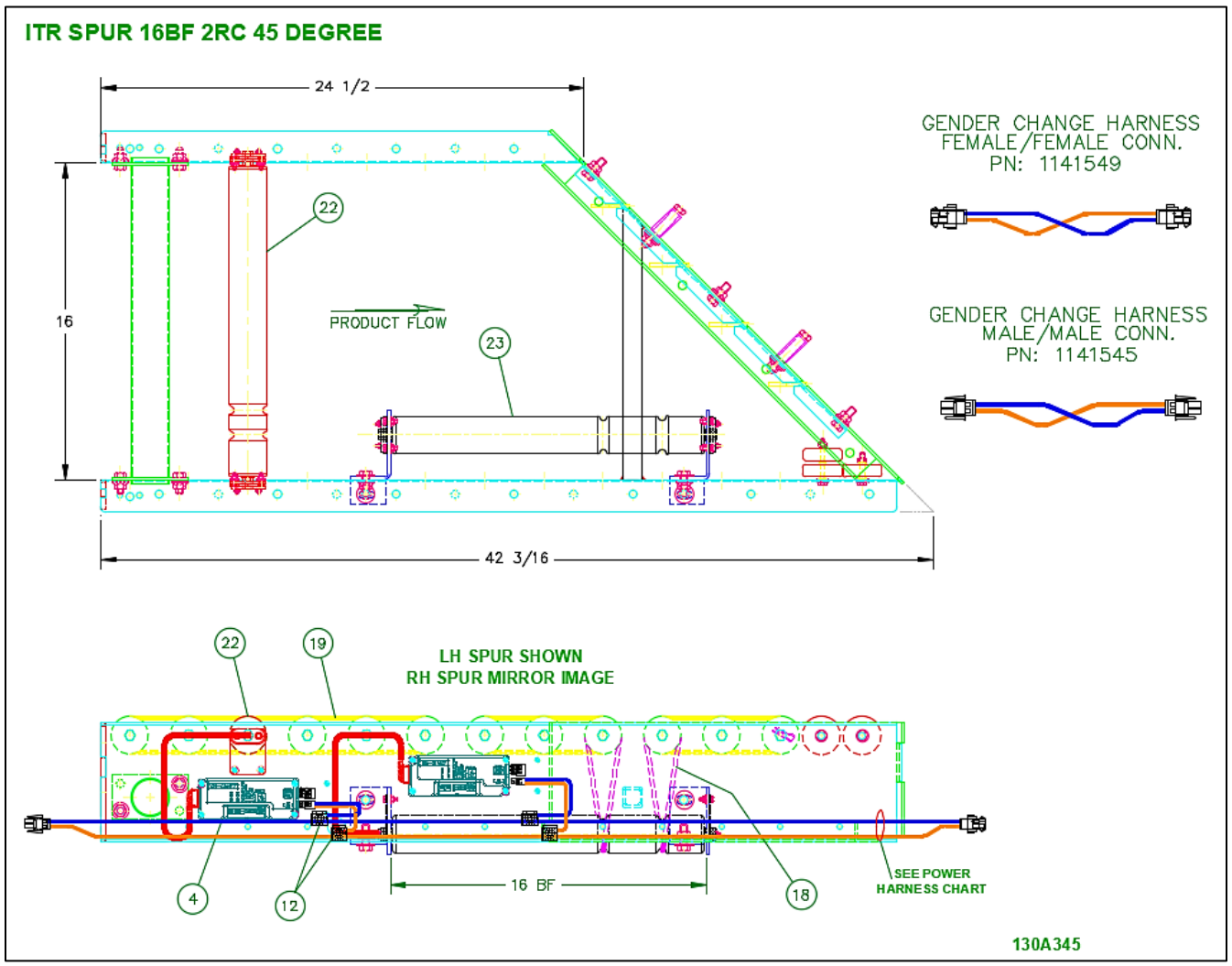
REPLACEMENT PARTS - ITR SPUR DIVERT, IB-E03, 3RC, 30 DEGREE					
SPUR,ITR-_ _BF-IBE-C6-3RC-30D-DIVERT-LH/RH-FE60-_MR		**Width & Item #**			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
----	**ELECTRICAL COMPONENTS**	**----**	**-----**	**-----**	**----**
-----	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CONN,WAGO 231-302/026-000	1162204	1162204	1162204	1162204
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
-----	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
----	**SPUR, O-RINGS**	**----**	**----**	**----**	**----**
17 & 19	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	E0005536	E0005536	E0005536	E0005536
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
----	**ROLLER SET-3RC-30D-SPUR**				
20/01	ROLLER,ITR 3-3/8"BF PRBG **NO AXLE**	1143249	1143249	1143249	1143249
20/02	ROLLER,ITR 5-1/8"BF PRBG **NO AXLE**	1130836	1130836	1130836	1130836
20/03	ROLLER,6-27/32BF ITR 1.9 PLTD PRBG	1131620	1131620	1131620	1131620
20/04	ROLLER,8-9/16BF ITR 1.9 PLTD PRBG	1131621	1131621	1131621	1131621
20/05	ROLLER,10-5/16BF ITR 1.9 PLTD PRBG	1143250	1143250	1143250	1143250
20/06	ROLLER,12-1/32BF ITR 1.9 PLTD PRBG	1131622	1131622	1131622	1131622
20/07	ROLLER,13-25/32BF ITR 1.9 PLTD PRBG	1131623	1131623	1131623	1131623
20/08	ROLLER,15-1/2BF ITR 1.9 PLTD PRBG	-----	1131624	1131624	1131624
20/09	ROLLER,17-1/4BF ITR 1.9 PLTD PRBG	-----	1143251	1143251	1143251
20/10	ROLLER,18-31/32BF ITR 1.9 PLTD PRBG	-----	1131625	1131625	1131625
20/11	ROLLER,20-11/16BF ITR 1.9 PLTD PRBG	-----	1143252	1143252	1143252
20/12	ROLLER,22-7/16BF ITR 1.9 PLTD PRBG	-----	-----	1131627	1131627
20/13	ROLLER,24-5/32BF ITR 1.9 PLTD PRBG	-----	-----	1131628	1131628
20/14	ROLLER,25-29/32BF ITR 1.9 PLTD PRBG	-----	-----	1131629	1131629
20/15	ROLLER,27-5/8BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140043
20/16	ROLLER,29-3/8BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140044
20/17	ROLLER,31-3/32BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140045
20/18	ROLLER,32-13/16BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140046
21	ROLLER,_ _ITR 1.9" DIA PLTD (_ _)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR _ _BF 2G ITOH PM 486 FE-60 **(600MM MOTOR CABLE W/10 PIN CONN)**	1163471	1163472	1165293	1165293
23	ROLLER,ITR SPUR 2G ITOH PM 486 FE-60 **(3" GROOVE SPACING)**	1165292	1165292	1165292	1165292
					Reference Dwg: 130A344

19.4.10: Replacement Parts - ITR Spur Divert IB-E 30° 2RC

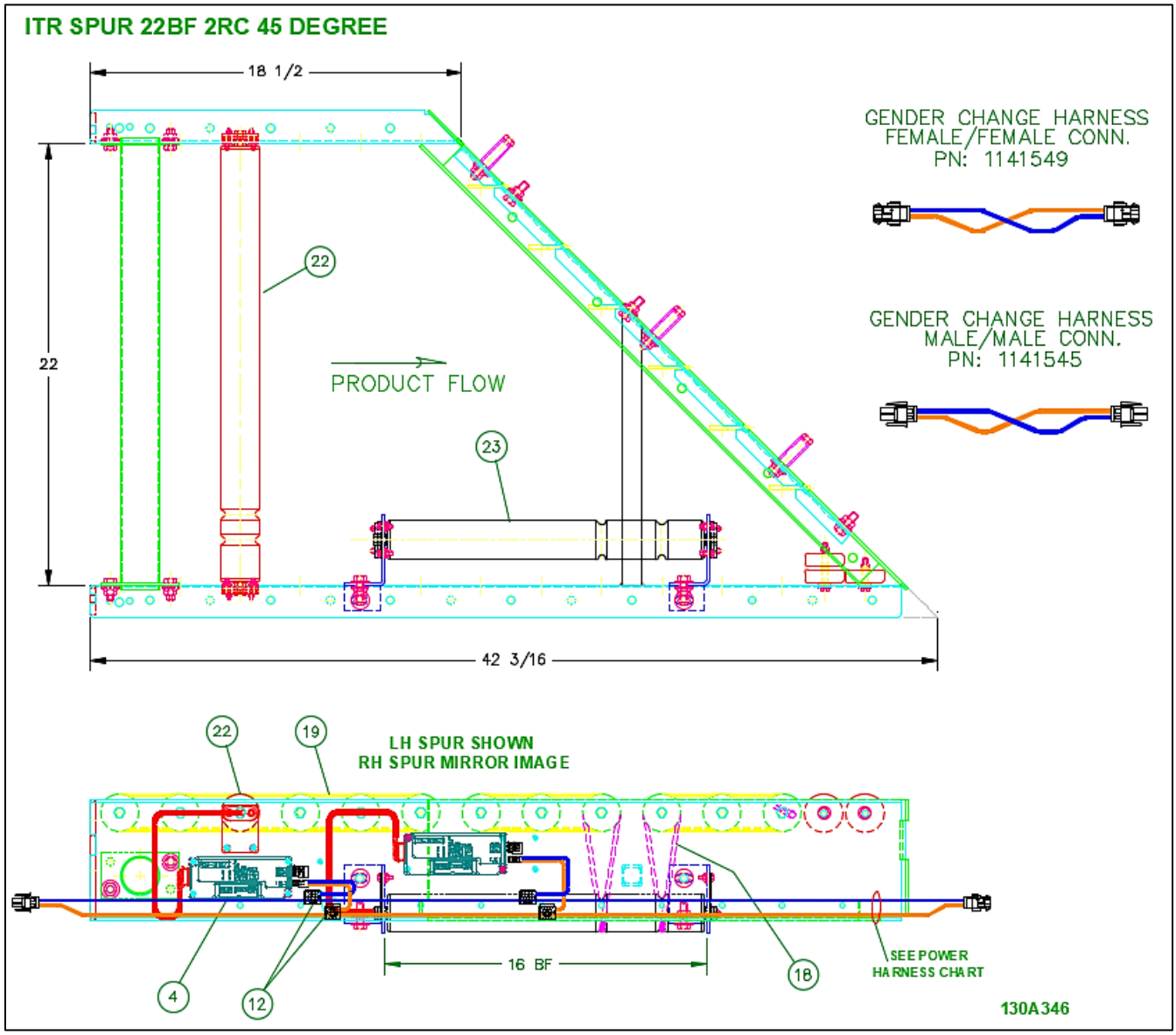
REPLACEMENT PARTS - ITR SPUR, DIVERT, IBE, 2RC, 30 DEGREE					
SPUR,ITR-_ _BF-IBE-C6-2RC-30D-DIVERT-LH/RH-FE60-_MR		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
----	**ELECTRICAL COMPONENTS**	----	----	----	----
-----	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CONN,WAGO 231-302/026-000	1162204	1162204	1162204	1162204
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
---	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
----	**SPUR, O-RINGS**	----	----	----	----
17	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	-----	-----	E0005536	E0005536
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
19	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
----	**ROLLER SET-2RC-30D-SPUR**	----	----	----	----
20/01	ROLLER,ITR 3-11/16" BF PRBG **(NO AXLE) 1 GROOVE**	1152360	1152360	1152360	1152360
20/02	ROLLER,ITR 4-3/4"BF PRBG **NO AXLE**	E0003268	E0003268	E0003268	E0003268
20/03	ROLLER,6BF ITR 1.9 PLTD PRBG	1152260	1152260	1152260	1152260
20/04	ROLLER,7-1/8BF ITR 1.9 PLTD PRBG	1152261	1152261	1152261	1152261
20/05	ROLLER,8-5/16BF ITR 1.9 PLTD PRBG	1152262	1152262	1152262	1152262
20/06	ROLLER,9-7/16BF ITR 1.9 PLTD PRBG	1152263	1152263	1152263	1152263
20/07	ROLLER,10-5/8BF ITR 1.9 PLTD PRBG	1152264	1152264	1152264	1152264
20/08	ROLLER,11-3/4BF ITR 1.9 PLTD PRBG	1152265	1152265	1152265	1152265
20/09	ROLLER,12-15/16BF ITR 1.9 PLTD PRBG	1152266	1152266	1152266	1152266
20/10	ROLLER,14-1/16BF ITR 1.9 PLTD PRBG	1152268	1152268	1152268	1152268
20/11	ROLLER,15-3/16BF ITR 1.9 PLTD PRBG	1152269	1152269	1152269	1152269
20/12	ROLLER,16-3/8BF ITR 1.9 PLTD PRBG	-----	1155254	1155254	1155254
20/13	ROLLER,ITR 17-1/2"BF 1.9 PLTD PRBG	-----	1133722	1133722	1133722
20/14	ROLLER,18-3/4BF ITR 1.9 PLTD PRBG	-----	1154742	1154742	1154742
20/15	ROLLER,19-3/4BF ITR 1.9 PLTD PRBG	-----	1144374	1144374	1144374
20/16	ROLLER,ITR 21"BF 1.9 PLTD PRBG	-----	1133723	1133723	1133723
20/17	ROLLER,22-3/16BF ITR 1.9 PLTD PRBG	-----	-----	1155255	1155255
20/18	ROLLER,ITR 23-1/4"BF PRBG	-----	-----	1131992	1131992
20/19	ROLLER,ITR 24-7/16"BF PRBG1.9 PLTD	-----	-----	1133724	1133724
20/20	ROLLER,25-5/8BF ITR 1.9 PLTD PRBG	-----	-----	1155256	1155256
20/21	ROLLER,26-3/4BF ITR 1.9 PLTD PRBG	-----	-----	1154745	1154745
20/22	ROLLER,ITR 27-15/16"BF PRBG1.9 PLTD	-----	-----	-----	1133726
20/23	ROLLER,29-1/16BF ITR 1.9 PLTD PRBG	-----	-----	-----	1155257
20/24	ROLLER,30-1/4BF ITR 1.9 PLTD PRBG	-----	-----	-----	1155258
20/25	ROLLER,ITR 31-3/8"BF PRBG1.9 PLTD	-----	-----	-----	1133728
20/26	ROLLER,32-1/2BF ITR 1.9 PLTD PRBG	-----	-----	-----	1155259
21	ROLLER,_ _ITR 1.9" DIA PLTD (_ _BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR _ _BF 2G ITOH PM 486 FE-60 **(600MM MOTOR CABLE W/10 PIN CONN)**	1163471	1163472	1165292	1165293
23	ROLLER,ITR SPUR 2G ITOH 2 CPM 486 FE-60 **(2" GROOVE SPACING)**	1171592	1171592	1171592	1171592
					Reference Dwg: 130A352

19.5: ITR Spur Transportation 45 Degrees

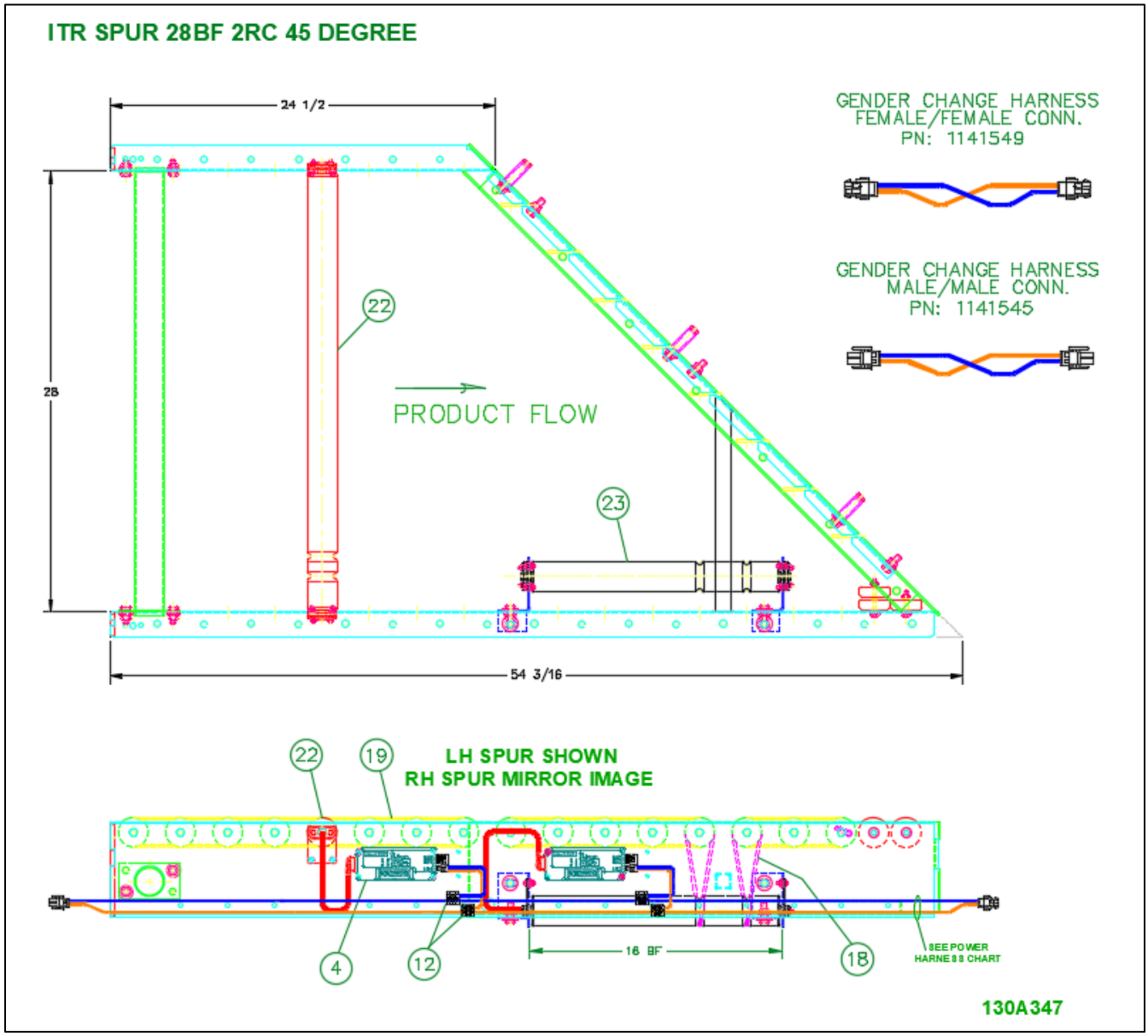
19.5.1: ITR Spur 45 Degree 16BF



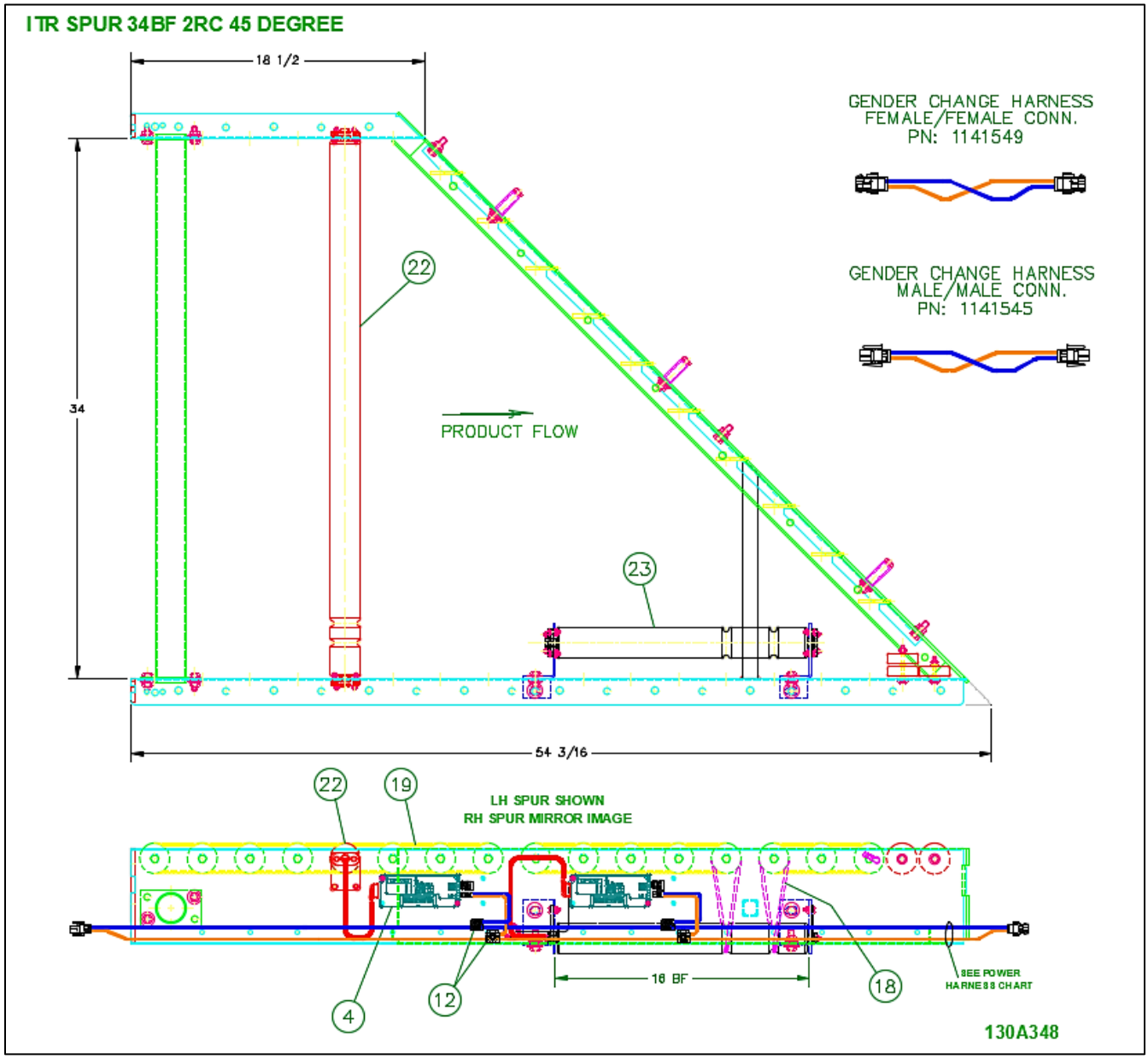
19.5.2: ITR Spur 45 Degree 22BF



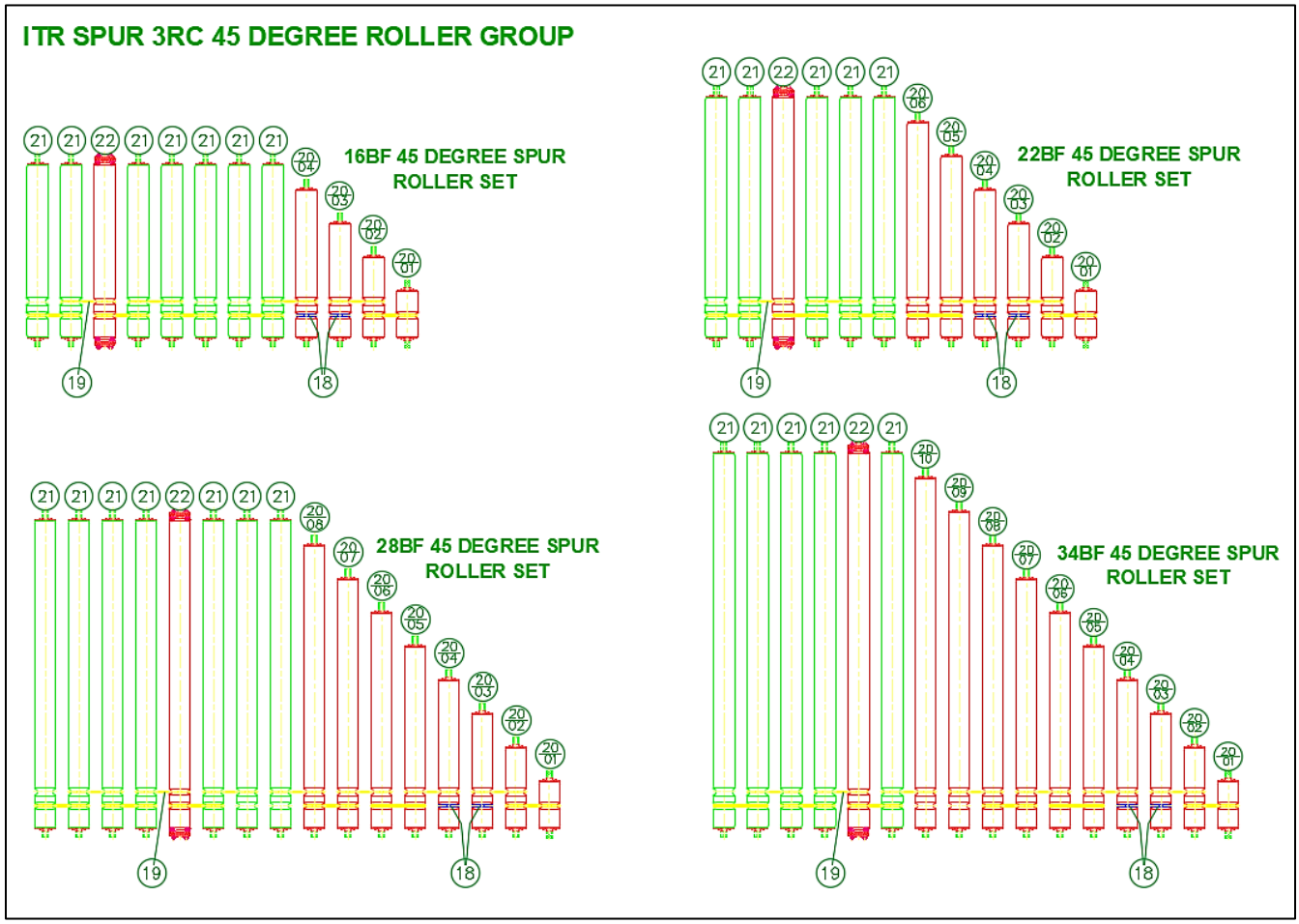
19.5.3: ITR Spur 45 Degree 28BF



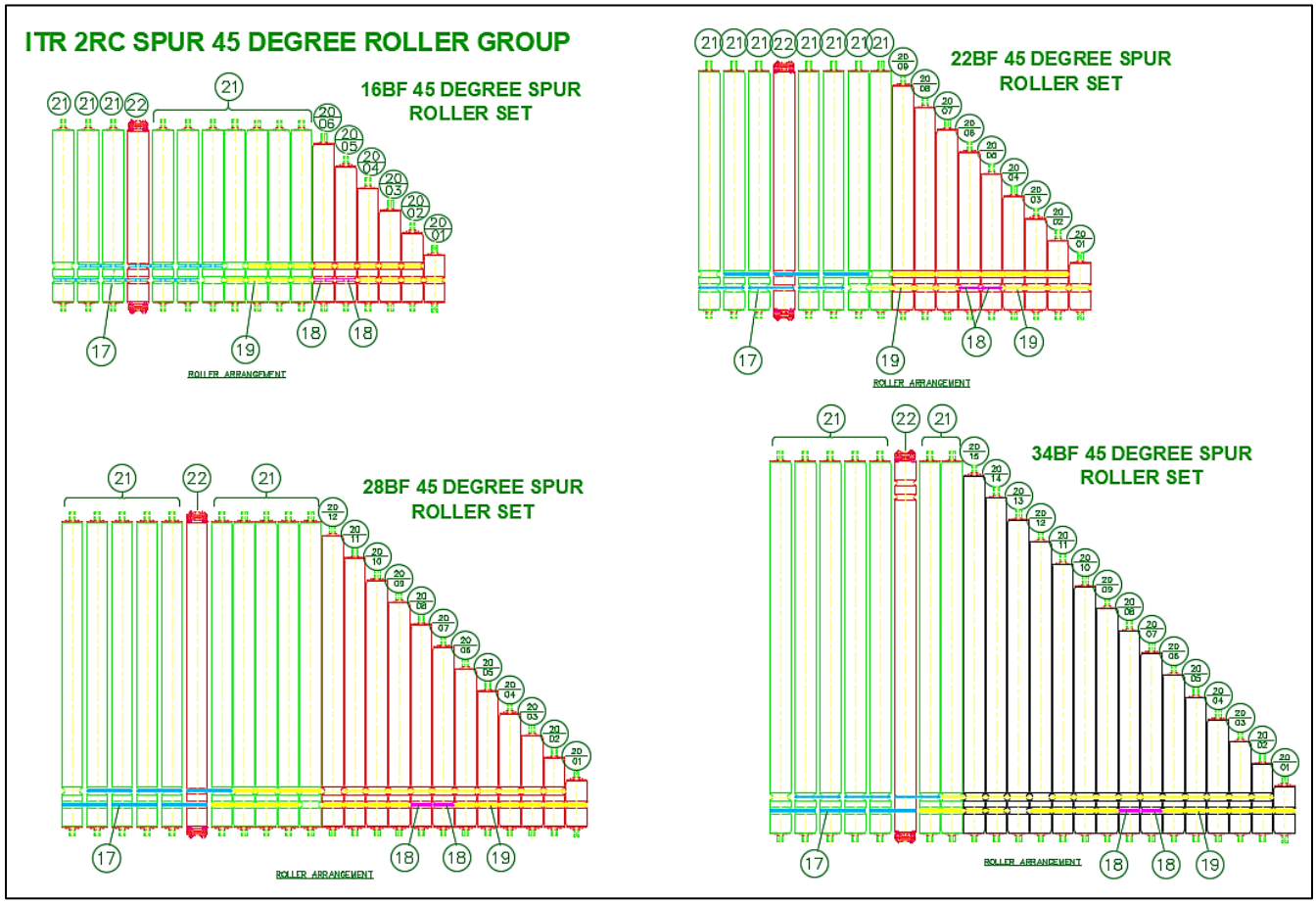
19.5.4: ITR Spur 45 Degree 34BF



19.5.5: ITR Spur 3RC 45 Degree Roller Group



19.5.6: ITR Spur 2RC 45 Degree Roller Group



19.5.7: Replacement Parts - ITR Spur CB 45° 3RC Merge

REPLACEMENT PARTS - ITR SPUR, CB, 3RC, 45 DEGREE MERGE					
SPUR,ITR-_ _BF-CB-C6-3RC-45D-LH/RH-FE60-_MR		Width & Item #			
BALLOON	Description	16 BF	22 BF	28 BF	34 BF
----	**ELECTRICAL COMPONENTS**	----	----	----	----
04	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
-----	CONNECTOR,IDC SCOTCHLOK 558-16-22AWG RUN,16-22AWG-RED	1120174	1120174	1120174	1120174
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
---	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
----	**SPUR, O-RINGS**	----	----	----	----
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
19	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	E0005536	E0005536	E0005536	E0005536
----	**ROLLER SET-3RC-45D-SPUR**	----	----	----	----
20-01	ROLLER,ITR 4-3/4" BF PRBG **(NO AXLE)**	E0003268	E0003268	E0003268	E0003268
20-02	ROLLER,7-3/4" BF ITR 1.9" DIA PLTD PRBG	1144370	114370	114370	1114370
20-03	ROLLER,10-3/4" BF ITR 1.9" DIA PLTD PRBG	1144371	1144371	1144371	1144371
20-04	ROLLER,13-3/4" BF ITR 1.9" DIA PLTD PRBG	1144372	1144372	1144372	1144372
20-05	ROLLER,16-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1144373	1144373	1144373
20-06	ROLLER,19-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1144374	1144374	1144374
20-07	ROLLER,22-3/4" BF ITR 1.9" DIA PLTD PRBG	------	------	1144375	1144375
20-08	ROLLER,25-3/4" BF ITR 1.9" DIA PLTD PRBG	------	------	1144376	1144376
20-09	ROLLER,28-3/4" BF ITR 1.9" DIA PLTD PRBG	------	------	------	1144377
20-10	ROLLER,31-3/4" BF ITR 1.9" DIA PLTD PRBG	------	------	------	1144378
21	ROLLER, ITR 1.9" DIA PLTD (BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
23	ROLLER,ITR SPUR 2G ITOH PM 486 FE-60-393-D-24-P2-OS-KF	1126586	1126586	1126586	1126586
		Reference Dwg: Roller Arrangement & 130A345-348			

19.5.8: Replacement Parts - ITR Spur CB 45° 2RC Merge

REPLACEMENT PARTS - ITR SPUR, CB, 2RC, 45 DEGREE MERGE					
SPUR,ITR-_ _BF-CB-C6-2RC-45D-LH/RH-FE60-_MR		**Width & Item #**			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
----	**ELECTRICAL COMPONENTS**	**----**	**----**	**----**	**----**
04	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
-----	CONNECTOR,IDC SCOTCHLOK 558-16-22AWG RUN,16-22AWG-RED	1120174	1120174	1120174	1120174
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
---	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
----	**SPUR, O-RINGS**	**----**	**----**	**----**	**----**
17	ORING,3/16" DIA X 8-1/4" HT BLUE	E0034023	E0034023	E0034023	E0034023
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
19	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
----	**ROLLER SET, 2RC-45D-SPUR**	**----**	**----**	**----**	**----**
20-01	ROLLER,ITR 4-3/4" BF PRBG **(NO AXLE)**	E0003268	E0003268	E0003268	E0003268
20-02	ROLLER,6-3/4" BF ITR 1.9" DIA PLTD PRBG	1154738	1154738	1154738	1154738
20-03	ROLLER,8-3/4" BF ITR 1.9" DIA PLTD PRBG	1154739	1154739	1154739	1154739
20-04	ROLLER,10-3/4" BF ITR 1.9" DIA PLTD PRBG	1144371	1144371	1144371	1144371
20-05	ROLLER,12-3/4" BF ITR 1.9" DIA PLTD PRBG	1154740	1154740	1154740	1154740
20-06	ROLLER,14-3/4" BF ITR 1.9" DIA PLTD PRBG	1154741	1154741	1154741	1154741
20-07	ROLLER,16-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1144373	1144373	1144373
20-08	ROLLER,18-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1154742	1154742	1154742
20-09	ROLLER,20-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1154743	1154743	1154743
20-10	ROLLER,22-3/4" BF ITR 1.9" DIA PLTD PRBG	------	-----	1144375	1144375
20-11	ROLLER,24-3/4" BF ITR 1.9" DIA PLTD PRBG	------	-----	1154744	1154744
20-12	ROLLER,26-3/4" BF ITR 1.9" DIA PLTD PRBG	------	-----	1154745	1154745
20-13	ROLLER,28-3/4BF ITR 1.9" DIA PLTD PRBG	------	-----	-----	1144377
20-14	ROLLER,30-3/4BF ITR 1.9" DIA PLTD PRBG	------	-----	-----	1155572
20-15	ROLLER,32-3/4BF ITR 1.9" DIA PLTD PRBG	------	-----	-----	1155573
21	ROLLER,__ITR 1.9" DIA PLTD (__BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR__BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
23	ROLLER,ITR SPUR 2G ITOH,2C-PM 486 **FE-60**-366-D-24-P2-OS-KF	1152362	1152362	1152362	1152362
		Reference Dwg: Roller Arrangement & 130A345-348			

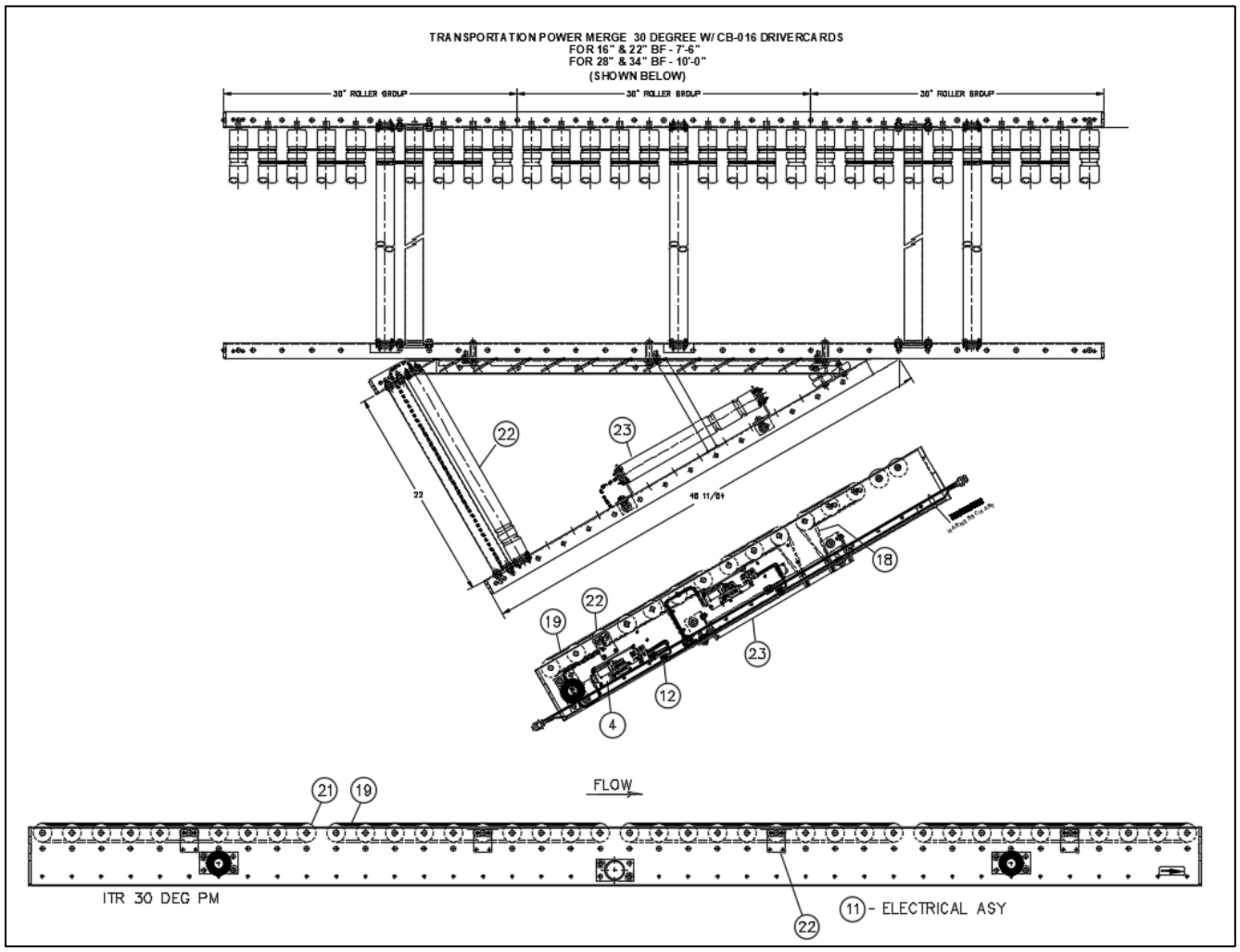
19.5.9: Replacement Parts - ITR Spur IB-E 45° 3RC Merge

REPLACEMENT PARTS - ITR SPUR, IB-E, 3RC, 45 DEGREE, MERGE					
SPUR,ITR-_ _BF-IBE-C6-3RC-45D-LH/RH-FE60-_MR		Width & Item #			
----	Description	16 BF	22 BF	28 BF	34 BF
----	**ELECTRICAL COMPONENTS**	----	----	----	----
-----	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
-----	CABLE,CTRLS-CAT5E-5'-GRAY	E0034026	E0034026	----	----
-----	CABLE,CTRLS-CAT5E-10'-GRAY	-----	-----	E0030796	E0030796
----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
-----	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
----	**SPUR, O-RINGS**	----	----	----	----
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
19	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	E0005536	E0005536	E0005536	E0005536
----	**ROLLER SET-3RC-45D-SPUR**	----	----	----	----
20-01	ROLLER,ITR 4-3/4" BF PRBG **(NO AXLE)**	E0003268	E0003268	E0003268	E0003268
20-02	ROLLER,7-3/4" BF ITR 1.9" DIA PLTD PRBG	1144370	114370	114370	1114370
20-03	ROLLER,10-3/4" BF ITR 1.9" DIA PLTD PRBG	1144371	1144371	1144371	1144371
20-04	ROLLER,13-3/4" BF ITR 1.9" DIA PLTD PRBG	1144372	1144372	1144372	1144372
20-05	ROLLER,16-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1144373	1144373	1144373
20-06	ROLLER,19-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1144374	1144374	1144374
20-07	ROLLER,22-3/4" BF ITR 1.9" DIA PLTD PRBG	------	------	1144375	1144375
20-08	ROLLER,25-3/4" BF ITR 1.9" DIA PLTD PRBG	------	------	1144376	1144376
20-09	ROLLER,28-3/4" BF ITR 1.9" DIA PLTD PRBG	------	------	------	1144377
20-10	ROLLER,31-3/4" BF ITR 1.9" DIA PLTD PRBG	------	------	------	1144378
21	ROLLER, ITR 1.9" DIA PLTD (BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR _ _BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
23	ROLLER,ITR SPUR 2G ITOH PM 486 FE-60-393-D-24-P2-OS-KF	1126586	1126586	1126586	1126586
		Reference Dwg: Roller Arrangement & 130A345-348			

19.5.10: Replacement Parts - ITR Spur IB-E 45° 2RC Merge

REPLACEMENT PARTS - ITR SPUR IB-E, 2RC, 45 DEGREE, MERGE					
SPUR,ITR-_ _BF-IBE-C6-2RC-45D-LH/RH-FE60-_MR		Width & Item #			
----	Description	16 BF	22 BF	28 BF	34 BF
----	**ELECTRICAL COMPONENTS**	----	----	----	----
-----	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
---	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
----	**SPUR, O-RINGS**	----	----	----	----
17	ORING,3/16" DIA X 8-1/4" HT BLUE	E0034023	E0034023	E0034023	E0034023
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
19	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
----	**ROLLER SET-2RC-45D-SPUR**	----	----	----	----
20-01	ROLLER,ITR 4-3/4" BF PRBG (NO AXLE)	E0003268	E0003268	E0003268	E0003268
20-02	ROLLER,6-3/4" BF ITR 1.9" DIA PLTD PRBG	1154738	1154738	1154738	1154738
20-03	ROLLER,8-3/4" BF ITR 1.9" DIA PLTD PRBG	1154739	1154739	1154739	1154739
20-04	ROLLER,10-3/4" BF ITR 1.9" DIA PLTD PRBG	1144371	1144371	1144371	1144371
20-05	ROLLER,12-3/4" BF ITR 1.9" DIA PLTD PRBG	1154740	1154740	1154740	1154740
20-06	ROLLER,14-3/4" BF ITR 1.9" DIA PLTD PRBG	1154741	1154741	1154741	1154741
20-07	ROLLER,16-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1144373	1144373	1144373
20-08	ROLLER,18-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1154742	1154742	1154742
20-09	ROLLER,20-3/4" BF ITR 1.9" DIA PLTD PRBG	------	1154743	1154743	1154743
20-10	ROLLER,22-3/4" BF ITR 1.9" DIA PLTD PRBG	------	-----	1144375	1144375
20-11	ROLLER,24-3/4" BF ITR 1.9" DIA PLTD PRBG	------	-----	1154744	1154744
20-12	ROLLER,26-3/4" BF ITR 1.9" DIA PLTD PRBG	------	-----	1154745	1154745
20-13	ROLLER,28-3/4BF ITR 1.9" DIA PLTD PRBG	------	-----	-----	1144377
20-14	ROLLER,30-3/4BF ITR 1.9" DIA PLTD PRBG	------	-----	-----	1155572
20-15	ROLLER,32-3/4BF ITR 1.9" DIA PLTD PRBG	------	-----	-----	1155573
21	ROLLER,_ _ITR 1.9" DIA PLTD (_ _BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR _ _BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
23	ROLLER,ITR SPUR 2G ITOH,2C-PM 486 **FE-60**-366-D-24-P2-OS-KF	1152362	1152362	1152362	1152362
		Reference Dwg: Roller Arrangement & 130A345-348			

19.6: ITR POWER MERGE W/30° SPUR



19.6.1: Replacement Parts - ITR Power Merge 3RC W/30° Spur

REPLACEMENT PARTS - ITR POWER MERGE, SPUR, 3RC, 30 DEGREE					
PM,ITR-_ _BF-CB OR IBE-C6-3RC-30D-LH/RH-FE60-_MR		**Width & Item #**			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
----	**ELECTRICAL COMPONENTS**	**----**	**----**	**----**	**----**
04	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
04	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
-----	CONNECTOR,IDC SCOTCHLOK 558-16-22AWG RUN,16-22AWG-RED	1120174	1120174	1120174	1120174
-----	CONNECTOR,IDC SCOTCHLOK 562-10-12AWG RUN,10-12AWG-YELLOW	3M562	3M562	3M562	3M562
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
-----	CABLE,POWER **CB-016/HB-510** 14GA ITR	1139543	1139543	1139543	1139543
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
---	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
----	HARNESS,ITR-POWER-10AWG _ _L-MALE-PIGTAIL	3' L 1145664	4' L 1146344	7' L 1145663	10' L 1143291
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
17 & 19	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	E0005536	E0005536	E0005536	E0005536
----	**ROLLER SET ITR-30D-3RC-SPUR**	**----**	**----**	**----**	**----**
20/1	ROLLER,ITR 3-3/8"BF PRBG **NO AXLE**	1143249	1143249	1143249	1143249
20/2	ROLLER,ITR 5-1/8"BF PRBG **NO AXLE**	1130836	1130836	1130836	1130836
20/3	ROLLER,6-27/32BF ITR 1.9PLTD,PRBG	1131620	1131620	1131620	1131620
20/4	ROLLER,8-9/16BF ITR 1.9PLTD,PRBG	1131621	1131621	1131621	1131621
20/5	ROLLER,10-5/16BF ITR 1.9PLTD,PRBG	1143250	1143250	1143250	1143250
20/6	ROLLER,12-1/32BF ITR 1.9PLTD,PRBG	1131622	1131622	1131622	1131622
20/7	ROLLER,13-25/32BF ITR 1.9PLTD,PRBG	1131623	1131623	1131623	1131623
20/8	ROLLER,15-1/2BF ITR 1.9PLTD,PRBG	-----	1131624	1131624	1131624
20/9	ROLLER,17-1/4BF ITR 1.9PLTD,PRBG	-----	1143251	1143251	1143251
20/10	ROLLER,18-31/32BF ITR 1.9PLTD,PRBG	-----	1131625	1131625	1131625
20/11	ROLLER,20-11/16BF ITR 1.9PLTD,PRBG	-----	1143252	1143252	1143252
20/12	ROLLER,22-7/16BF ITR 1.9PLTD,PRBG	-----	-----	1131627	1131627
20/13	ROLLER,24-5/32BF ITR 1.9PLTD,PRBG	-----	-----	1131628	1131628
20/14	ROLLER,25-29/32BF ITR 1.9PLTD,PRBG	-----	-----	1131629	1131629
20/15	ROLLER,27-5/8BF ITR 1.9PLTD,PRBG	-----	-----	-----	1140043
20/16	ROLLER,29-3/8BF ITR 1.9PLTD,PRBG	-----	-----	-----	1140044
20/17	ROLLER,31-3/32BF ITR 1.9PLTD,PRBG	-----	-----	-----	1140045
20/18	ROLLER,32-13/16BF ITR 1.9PLTD,PRBG	-----	-----	-----	1140046
21	ROLLER,__ITR 1.9" DIA PLTD (__BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR __BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
23	ROLLER,ITR SPUR 2G ITOH PM 486 FE-60-393-D-24-P2-OS-KF	1126586	1126586	1126586	1126586
22	ROLLER,ITR 13.25BF 2G ITOH-PM 486 FE-60-322-D-24-P2-KF	----	----	1139545	1139545
23	ROLLER,ITR 13.25BF 2G ITOH PM 486 **FE-60**-322-D-24-Z060-P2-KF 600MM MOTOR CABLE W/ 10 PIN CONN **(USED W/IBE)**	1165293	1165293	1165293	1165293
22	ROLLER,ITR _ _BF 2G ITOH PM 486 **FE-60** 600MM MOTOR CABLE W/10 PIN CONN **(USED W/ IBE)**	1163471	1163472	1163473	1163474
23	ROLLER,ITR SPUR 2G ITOH PM 486 **FE-60 (USED W/ IBE)**	1165292	1165292	1165292	1165292
					Reference Dwg: 130A404

19.6.2: Replacement Parts - ITR Power Merge 2RC W/30° Spur

REPLACEMENT PARTS - ITR POWER MERGE SPUR, 2RC, 30 DEGREE					
PM,ITR-_ _BF-CB OR IBE-C6-2RC-30D-LH/RH-FE60-_MR		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
----	**ELECTRICAL COMPONENTS**	----	----	----	----
04	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
04	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
-----	CONNECTOR,IDC SCOTCHLOK 558-16-22AWG RUN,16-22AWG-RED	1120174	1120174	1120174	1120174
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CONNECTOR,IDC SCOTCHLOK 562-10-12AWG RUN,10-12AWG-YELLOW	3M562	3M562	3M562	3M562
-----	CONN,3 COND,W/LEVERS 28 - 12 AWG	1102816	1102816	1102816	1102816
-----	CONNECTOR,IDC SCOTCH LOK 558,16-22AWG RUN,16-22AWG,RED	1120174	1120174	1120174	1120174
-----	CONN,3 COND,W/LEVERS,28 - 12 AWG,	1102816	1102816	1102816	1102816
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
---	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
----	HARNESS,ITR-POWER-10AWG _ _L-MALE-PIGTAIL	3' L 1145664	4' L 1146344	7' L 1145663	10' L 1143291
----	**SPUR, O-RINGS**	----	----	----	----
17	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	E0005536	E0005536	E0005536	E0005536
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
19	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
----	**ROLLER SET ITR-30D-2RC-SPUR**	----	----	----	----
20/1	ROLLER,ITR 3-11/16" BF PRBG **(NO AXLE) 1 GROOVE**	1152360	1152360	1152360	1152360
20/2	ROLLER,ITR 4-3/4" BF PRBG **(NO AXLE)**	E0003268	E0003268	E0003268	E0003268
20/3	ROLLER,6BF ITR 1.9 PLTD PRBG	1152260	1152260	1152260	1152260
20/4	ROLLER,7-1/8BF ITR 1.9 PLTD PRBG	1152261	1152261	1152261	1152261
20/5	ROLLER,8-5/16BF ITR 1.9 PLTD PRBG	1152262	1152262	1152262	1152262
20/6	ROLLER,9-7/16BF ITR 1.9 PLTD PRBG	1152263	1152263	1152263	1152263
20/7	ROLLER,10-5/8BF ITR 1.9 PLTD PRBG	1152264	1152264	1152264	1152264
20/8	ROLLER,11-3/4BF ITR 1.9 PLTD PRBG	1152265	1152265	1152265	1152265
20/9	ROLLER,12-15/16BF ITR 1.9 PLTD PRBG	1152266	1152266	1152266	1152266
20/10	ROLLER,14-1/16BF ITR 1.9 PLTD PRBG	1152268	1152268	1152268	1152268
20/11	ROLLER,15-3/16BF ITR 1.9 PLTD PRBG	1152269	1152269	1152269	1152269
20/12	ROLLER,16-3/8BF ITR 1.9 PLTD PRBG	-----	1155254	1155254	1155254
20/13	ROLLER,ITR 17-1/2"BF 1.9 PLTD PRBG	-----	1133722	1133722	1133722
20/14	ROLLER,18-3/4BF ITR 1.9 PLTD PRBG	-----	1154742	1154742	1154742
20/15	ROLLER,19-3/4BF ITR 1.9 PLTD PRBG	-----	1144374	1144374	1144374
20/16	ROLLER,ITR 21"BF 1.9 PLTD PRBG	-----	1133723	1133723	1133723
20/17	ROLLER,22-3/16BF ITR 1.9 PLTD PRBG	-----	-----	1155255	1155255
20/18	ROLLER,ITR 23-1/4"BF PRBG	-----	-----	1131992	1131992
20/19	ROLLER,ITR 24-7/16"BF PRBG 1.9 PLTD	-----	-----	1133724	1133724
20/20	ROLLER,25-5/8BF ITR 1.9 PLTD PRBG	-----	-----	1155256	1155256
20/21	ROLLER,26-3/4BF ITR 1.9 PLTD PRBG	-----	-----	1154745	1154745
20/22	ROLLER,ITR 27-15/16"BF PRBG 1.9 PLTD	-----	-----	-----	1133726
20/23	ROLLER,29-1/16BF ITR 1.9 PLTD PRBG	-----	-----	-----	1155257
20/24	ROLLER,30-1/4BF ITR 1.9 PLTD PRBG	-----	-----	-----	1155258
20/25	ROLLER,ITR 31-3/8"BF PRBG 1.9 PLTD	-----	-----	-----	1133728
20/26	ROLLER,32-1/2BF ITR 1.9 PLTD PRBG	-----	-----	-----	1155259
21	ROLLER,___ITR 1.9" DIA PLTD (___BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR___BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
22	ROLLER,ITR 13.25BF 2G ITOH-PM 486 FE-60-322-D-24-P2-KF	----	----	1139545	1139545
23	ROLLER,ITR SPUR 2G ITOH,2C,PM 486 **FE-60 (2"GROOVE SPACING)**	1152362	1152362	1152362	1152362
23	ROLLER,ITR SPUR 2G ITOH,2C, PM 486 **FE-60 (USED W/ IBE)**	1171592	1171592	1171592	1171592
22	ROLLER,ITR 22BF 2G ITOH PM 486 **FE-60-(USED W/ IBE)**	1163471	1163472	1163473	1163474
23	ROLLER,ITR SPUR 2G ITOH,2C PM 486 **FE (USED W/ IBE)**	1152363	1152363	1152363	1152363
					Reference Dwg: 130A412

19.6.3: Replacement Parts - ITR Power Merge 3RC W/45° Spur

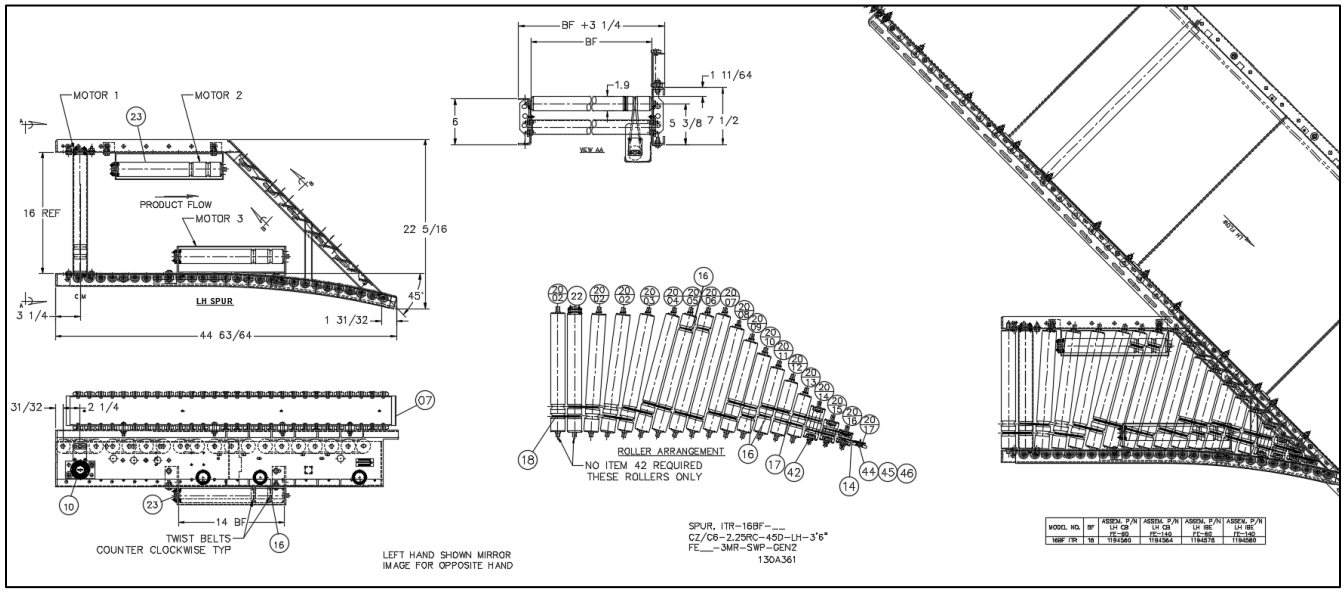
REPLACEMENT PARTS - ITR POWER MERGE SPUR, 3RC, 45 DEGREE					
PM,ITR-_ _BF-CB OR IBE-C6-3RC-45D-LH/RH-FE60-_MR		**Width & Item #**			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
----	**ELECTRICAL COMPONENTS**	**----**	**----**	**----**	**----**
04	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
04	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
-----	CONNECTOR,IDC SCOTCHLOK 558-16-22AWG RUN,16-22AWG-RED	1120174	1120174	1120174	1120174
-----	CONNECTOR,IDC SCOTCHLOK 562-10-12AWG RUN,10-12AWG-YELLOW	3M562	3M562	3M562	3M562
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CONN,3 COND,W/LEVERS 28 - 12 AWG	1102816	1102816	1102816	1102816
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
-----	CABLE,POWER **CB-016/HB-510** 14GA ITR	1139543	1139543	1139543	1139543
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
---	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
----	HARNESS,ITR-POWER-10AWG _ _L-MALE-PIGTAIL	3' L 1145664	4' L 1146344	7' L 1145663	10' L 1143291
----	**SPUR, O-RINGS**	**----**	**----**	**----**	**----**
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
17 & 19	ORING,3/16 DIA X 9.5" HT BLUE,ITR **3"CTR**	E0005536	E0005536	E0005536	E0005536
----	**ROLLER SET ITR-45D-3RC-SPUR**	**----**	**----**	**----**	**----**
20/1	ROLLER,ITR 3-3/8"BF PRBG **NO AXLE**	1143249	1143249	1143249	1143249
20/2	ROLLER,ITR 5-1/8"BF PRBG **NO AXLE**	1130836	1130836	1130836	1130836
20/3	ROLLER,6-27/32BF ITR 1.9PLTD,PRBG	1131620	1131620	1131620	1131620
20/4	ROLLER,8-9/16BF ITR 1.9PLTD,PRBG	1131621	1131621	1131621	1131621
20/5	ROLLER,10-5/16BF ITR 1.9PLTD,PRBG	1143250	1143250	1143250	1143250
20/6	ROLLER,12-1/32BF ITR 1.9PLTD,PRBG	1131622	1131622	1131622	1131622
20/7	ROLLER,13-25/32BF ITR 1.9PLTD,PRBG	1131623	1131623	1131623	1131623
20/8	ROLLER,15-1/2BF ITR 1.9PLTD,PRBG	-----	1131624	1131624	1131624
20/9	ROLLER,17-1/4BF ITR 1.9PLTD,PRBG	-----	1143251	1143251	1143251
20/10	ROLLER,18-31/32BF ITR 1.9PLTD,PRBG	-----	1131625	1131625	1131625
20/11	ROLLER,20-11/16BF ITR 1.9PLTD,PRBG	-----	1143252	1143252	1143252
20/12	ROLLER,22-7/16BF ITR 1.9PLTD,PRBG	-----	-----	1131627	1131627
20/13	ROLLER,24-5/32BF ITR 1.9PLTD,PRBG	-----	-----	1131628	1131628
20/14	ROLLER,25-29/32BF ITR 1.9PLTD,PRBG	-----	-----	1131629	1131629
20/15	ROLLER,27-5/8BF ITR 1.9PLTD,PRBG	-----	-----	-----	1140043
20/16	ROLLER,29-3/8BF ITR 1.9PLTD,PRBG	-----	-----	-----	1140044
20/17	ROLLER,31-3/32BF ITR 1.9PLTD,PRBG	-----	-----	-----	1140045
20/18	ROLLER,32-13/16BF ITR 1.9PLTD,PRBG	-----	-----	-----	1140046
21	ROLLER,__ITR 1.9 PLTD PRBG (__BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR __BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
23	ROLLER,ITR SPUR 2G ITOH PM 486 FE-60-393-D-24-P2-OS-KF	1126586	1126586	1126586	1126586
23	ROLLER,ITR 13.25BF 2G ITOH-PM 486 FE-60-322-D-24-P2-KF	----	----	1139545	1139545
23	ROLLER,ITR 13.25BF 2G ITOH PM 486 **FE-60** **(600MM MOTOR CABLE W/ 10 PIN CONN) (USED W/ IBE)**	1165293	1165293	1165293	1165293
22	ROLLER,ITR _ _BF 2G ITOH PM 486 **FE-60** 600MM MOTOR CABLE W/10 PIN CONN **(USED W/ IBE)**	1163471	1163472	1163473	1163474
23	ROLLER,ITR SPUR 2G ITOH PM 486 **FE-60 (USED W/ IBE)**	1165292	1165292	1165292	1165292
					Reference Dwg: 130A404

19.6.4: Replacement Parts - ITR Power Merge 2RC W/45° Spur

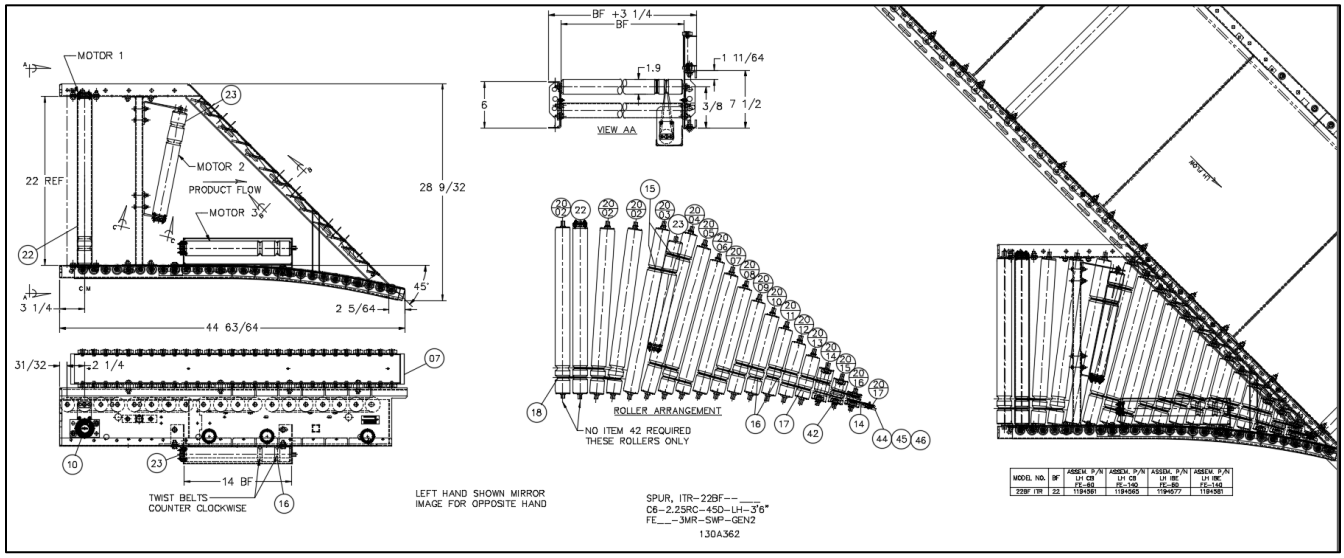
REPLACEMENT PARTS - ITR POWER MERGE SPUR, 2RC, 45 DEGREE					
PM,ITR-_ _BF-CB-C6-2RC-45D-LH/RH-FE60-_MR		**Width & Item #**			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
----	**ELECTRICAL COMPONENTS**	**----**	**----**	**----**	**----**
4	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CONNECTOR,IDC SCOTCHLOK 558-16-22AWG RUN,16-22AWG-RED	1120174	1120174	1120174	1120174
-----	CONN,3 COND,W/LEVERS 28 - 12 AWG	1102816	1102816	1102816	1102816
-----	CONNECTOR,IDC SCOTCHLOK 562-10-12AWG RUN,10-12AWG-YELLOW	3M562	3M562	3M562	3M562
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
----	**SPUR O-RINGS**	**----**	**----**	**----**	**----**
17	ORING,3/16" DIA X 8-1/4" HT BLUE	E0034023	E0034023	E0034023	E0034023
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
19	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
----	**ROLLER SET ITR-45D-2RC-SPUR**	**----**	**----**	**----**	**----**
20-01	ROLLER,ITR 4-3/4" BF PRBG **(NO AXLE)**	E0003268	E0003268	E0003268	E0003268
20-02	ROLLER, 8-3/4BF ITR 1.9PLTD	1154738	1154738	1154738	1154738
20-03	ROLLER, 6-3/4BF ITR 1.9PLTD	1154739	1154739	1174539	1174539
20-04	ROLLER, 12-3/4BF ITR 1.9PLTD	1144371	1144371	1144371	1144371
20-05	ROLLER, 14-3/4BF ITR 1.9PLTD	1154740	1154740	1154740	1154740
20-06	ROLLER,16-3/4BF ITR 1.9PLTD	1154741	1154741	1154741	1154741
20-07	ROLLER, 18-3/4BF ITR 1.9PLTD	------	1144373	1144373	1144373
20-08	ROLLER, 20-3/4BF ITR 1.9PLTD	------	1154742	1154742	1154742
20-09	ROLLER,22-3/4BF ITR 1.9PLTD	------	1154743	1154743	1154743
20-10	ROLLER, 24-3/4BF ITR 1.9PLTD	------	-----	1144375	1144375
20-11	ROLLER, 26-3/4BF ITR 1.9PLTD	------	-----	1154744	1154744
20-12	ROLLER, 30ITR 1.9PLTD PRBG	------	-----	1154745	1154745
21	ROLLER, ITR 1.9" DIA PLTD (BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR __BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
23	ROLLER,ITR SPUR 2G ITOH PM 486 FE-60-393-D-24-P2-OS-KF	1126586	1126586	1152362	1126586
					Reference Dwg: 130A415 & 130A345-348

19.7: ITR Sweep Spur 45 Degree

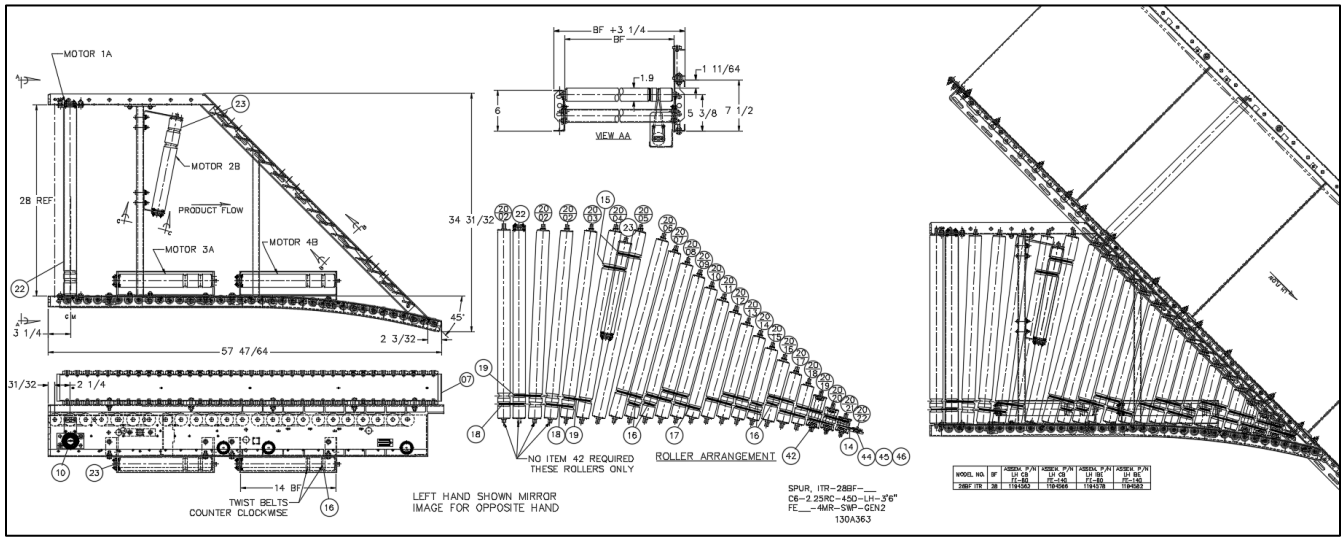
19.7.1: ITR Sweep Spur 16BF



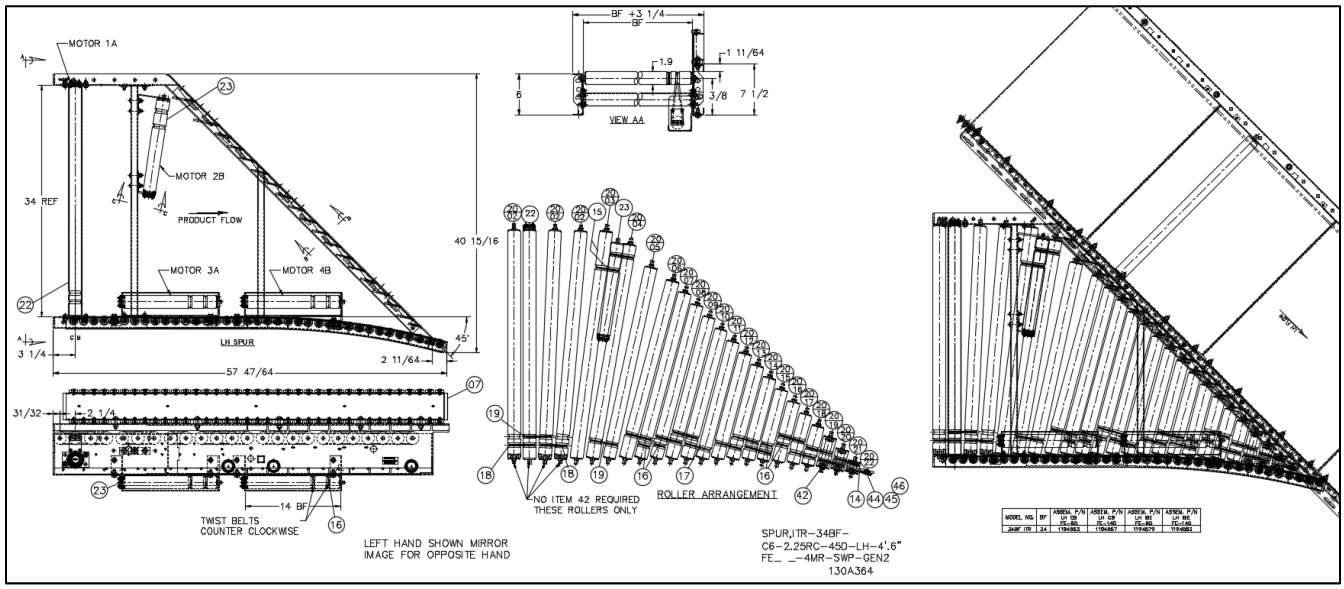
19.7.2: ITR Sweep Spur 22BF



19.7.3: ITR Sweep Spur 28BF



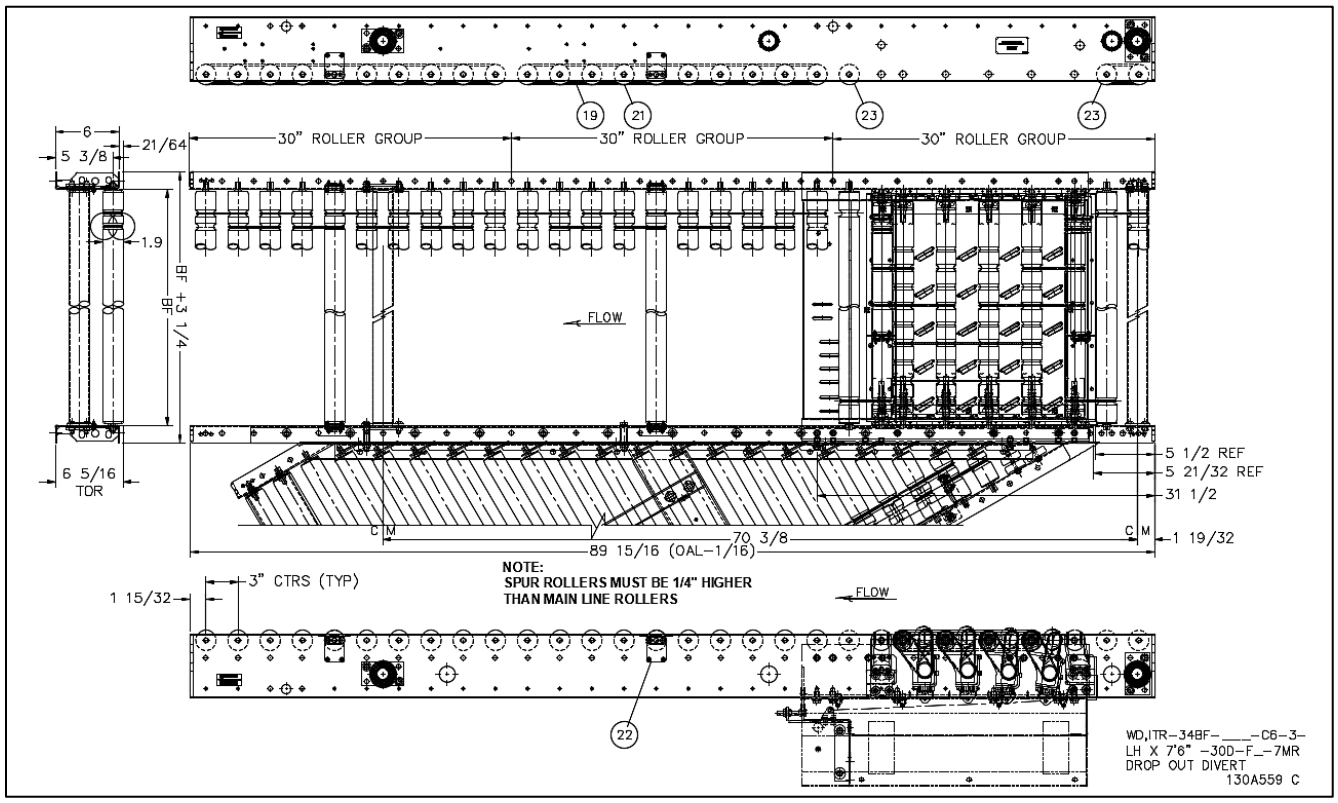
19.7.4: ITR Sweep Spur 34BF



19.7.5: Replacement Parts – ITR Sweep Spur 2.25RC 45°

REPLACEMENT PARTS - ITR SWEEP SPUR, 2.25RC, 45 DEGREE					
SPUR,ITR-_ _BF-CB16 OR IBE-C6-2.25RC-45D-LH-FE140-_MR-SWP-GEN2		Width & Item #			
Balloon	Description 1	16 BF	22 BF	28 BF	34 BF
----	**ELECTRICAL COMPONENTS**	----	----	----	----
04	DRIVERCARD,ITOH **CB-016P7**	1116036	1116036	1116036	1116036
04	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
----	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	CONNECTOR,IDC SCOTCHLOK 558-16-22AWG RUN,16-22AWG-RED	1120174	1120174	1120174	1120174
----	CONN, 3 COND, W/LEVERS 28 - 12 AWG	1102816	1102816	1102816	1102816
----	CONN, WAGO 231-302/026-000	1162204	1162204	1162204	1162204
----	SKATEWHEEL,ASY 6002 W/ADAPTER	1138618	1138618	1138618	1138618
----	**SPUR, O-RINGS**	----	----	----	----
14	ORING,83A 1/8 X 8" CLEAR,16-22AWG RUN,16-22AWG	E0001238	E0001238	E0001238	E0001238
15	ORING,3/16 DIA X 13" HT BLUE,10-12AWG RUN,14-18AWG	----	----	1103665	1103665
16	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
17	ORING,3/16 DIA X 8" HT BLUE,28 - 12 AWG	1142395	1142395	1142395	1142395
18	ORING,3/16 DIA X 8-1/4" HT BLUE	E0034023	E0034023	E0034023	E0034023
19	ORING,3/16 DIA X 8.688 HT BLUE	----	----	1137420	1137420
42	ORING,1/2"ID (3/32 WALL)	90530050	90530050	90530050	90530050
----	**ROLLER SET ITR SWEEP SPUR**	----	----	----	----
20/02	ROLLER,_ _ITR 1.9" DIA PLTD (_ _BF)	E0002412	E0002413	E0002414	E0006220
20/03	ROLLER,ITR SWEEP SPUR,_ _BF	1195553	1195564	1195575	1195591
20/04	ROLLER,ITR SWEEP SPUR,_ _BF	1195554	1195565	1195576	1195592
20/05	ROLLER,ITR SWEEP SPUR,_ _BF	1195555	1195566	1195577	1195593
20/06	ROLLER,ITR SWEEP SPUR,_ _BF	1195556	1195567	1195578	1195594
20/07	ROLLER,ITR SWEEP SPUR,_ _BF	1195557	1195568	1195579	1195595
20/08	ROLLER,ITR SWEEP SPUR,_ _BF	1195558	1195569	1195580	1195596
20/09	ROLLER,ITR SWEEP SPUR,_ _BF	1195559	1195570	1195581	1195597
20/10	ROLLER,ITR SWEEP SPUR,_ _BF	1195560	1195571	1195582	1195598
20/11	ROLLER,ITR SWEEP SPUR,_ _BF	1195561	1195572	1195583	1195599
20/12	ROLLER,ITR SWEEP SPUR,_ _BF	1195562	1195573	1195584	1195600
20/13	ROLLER,ITR SWEEP SPUR,_ _BF	1195563	1195574	1195585	1195601
20/14	ROLLER,ITR SWEEP SPUR,_ _BF	1205985	1205985	1195586	1195602
20/15	ROLLER,ITR SWEEP SPUR,_ _BF	1205984	1205987	1195587	1195603
20/16	ROLLER,ITR SWEEP SPUR,_ _BF	1205986	1205986	1195588	1195604
20/17	ROLLER,ITR SWEEP SPUR,_ _BF	1160266	1160266	1195589	1195605
20/18	ROLLER,ITR SWEEP SPUR,_ _BF	----	----	1195590	1195606
20/19	ROLLER,ITR SWEEP SPUR,_ _BF	----	----	1205988	1205990
20/20	ROLLER,ITR SWEEP SPUR,_ _BF	----	----	1205989	1205991
20/21	ROLLER,ITR SWEEP SPUR,_ _BF	----	----	1205990	1205992
20/22	WHEEL,ASY NBS30 ALUM. SMOOTH	----	----	1160266	1160266
----	BRG,6002ZZC3SRI2-Q	1179675	1179675	1179675	1179675
----	WHEEL,ASY NBS30 ALUM. SMOOTH TYPE III "HARD COAT	1160266	1160266	1160266	1160266
22	ROLLER,ITR _ _BF 2G ITOH FE-140 **(USED W/CB-016)**	1168560	1134452	1142856	1155281
23	ROLLER,ITR 14BF 2G ITOH - FE-140 **(USED W/CB-016)**	1168164	1168164	1168164	1168164
22	ROLLER,ITR _ _BF 2G ITOH PM 486 **FE-60** 600MM MOTOR CABLE W/10 PIN CONN **(USED W/ IBE)**	1163471	1163472	1163473	1163474
23	ROLLER,ITR 14BF 2G ITOH PM 486 **FE-60**,GROOVES AT 41/57 (2-1/4 CTRS) 600MM MOTOR CABLE W/ 10 PIN CONN **(USED W/ IBE)**	1175543	1175543	1175543	1175543
Reference Dwg: 130A361 thru 130A364					

19.8: ITR WHEEL DIVERT (PNEUMATIC)



19.8.1: Replacement Parts – ITR Wheel Divert CBM-105 3RC (Pneumatic)

REPLACEMENT PARTS - ITR WHEEL DIVERT PNEUMATIC, 3RC, 30 DEGREES, CBM-105					
WD,ITR-_ _BF-CB-C6-3RC-30D-LH/RH-FE60-_MR-_SOL-W/DROPOUT		**Width & Item #**			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
-----	**ELECTRICAL COMPONENTS**	**-----**	**-----**	**-----**	**-----**
----	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
-----	CONNECTOR,IDC SCOTCH LOK 55816-22AWG RUN,16-22AWG	1120174	1120174	1120174	1120174
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CONN,3 COND,W/LEVERS 28 - 12 AWG	1102816	1102816	1102816	1102816
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
-----	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
----	**ROLLER SET ITR-30D-3RC-SPUR**	**-----**	**-----**	**-----**	**-----**
20/1	ROLLER,ITR 3-3/8"BF PRBG **NO AXLE**	1143249	1143249	1143249	1143249
20/2	ROLLER,ITR 5-1/8"BF PRBG **NO AXLE**	1130836	1130836	1130836	1130836
20/3	ROLLER,6-27/32BF ITR 1.9 PLTD PRBG	1131620	1131620	1131620	1131620
20/4	ROLLER,8-9/16BF ITR 1.9 PLTD PRBG	1131621	1131621	1131621	1131621
20/5	ROLLER,10-5/16BF ITR 1.9 PLTD PRBG	1143250	1143250	1143250	1143250
20/6	ROLLER,12-1/32BF ITR 1.9 PLTD PRBG	1131622	1131622	1131622	1131622
20/7	ROLLER,13-25/32BF ITR 1.9 PLTD PRBG	1131623	1131623	1131623	1131623
20/8	ROLLER,15-1/2BF ITR 1.9 PLTD PRBG	----	1131624	1131624	1131624
20/9	ROLLER,17-1/4BF ITR 1.9 PLTD PRBG	----	1143251	1143251	1143251
20/10	ROLLER,18-31/32BF ITR 1.9 PLTD PRBG	----	1131625	1131625	1131625
20/11	ROLLER,20-11/16BF ITR 1.9 PLTD PRBG	----	1143252	1143252	1143252
20/12	ROLLER,22-7/16BF ITR 1.9 PLTD PRBG	----	----	1131627	1131627
20/13	ROLLER,24-5/32BF ITR 1.9 PLTD PRBG	----	----	1131628	1131628
20/14	ROLLER,25-29/32BF ITR 1.9 PLTD PRBG	----	----	1131629	1131629
20/15	ROLLER,27-5/8BF ITR 1.9 PLTD PRBG	----	----	----	1140043
20/16	ROLLER,29-3/8BF ITR 1.9 PLTD PRBG	----	----	----	1140044
20/17	ROLLER,31-3/32BF ITR 1.9 PLTD PRBG	----	----	----	1140045
20/18	ROLLER,32-13/16BF ITR 1.9 PLTD PRBG	----	----	----	1140046
20	ROLLER,_ _ITR 1.9PLTD PRBG 1D1S (_ _BF)	E0002422	E0002423	E0002424	1198370
21	ROLLER,_ _ITR 1.9" DIA PLTD (_ _BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR 13.25BF 2G ITOH-PM 486 FE-60-322-D-24-P2-KF	----	----	1139545	1139545
23	ROLLER,ITR SPUR 2G ITOH PM 486 FE-60-393-D-24-P2-OS-KF	1126586	1126586	1126586	1126586
3	ROLLER,ITR _ _BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
					Ref Dwg# 130A559

19.8.2: Replacement Parts – ITR Wheel Divert CBM-105 2RC (Pneumatic)

REPLACEMENT PARTS - ITR WHEEL DIVERT PNEUMATIC, 2RC, 30 DEGREES, CBM-105					
WD,ITR-_ _BF-CB-C6-2RC-30D-LH/RH-FE60-_MR-_SOL-W/DROPOUT		Width & Item #			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
----	**ELECTRICAL COMPONENTS**	**-----**	**-----**	**-----**	**-----**
04	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
-----	CONN,3-COND W/LEVERS (28 - 14 AWG)	1102816	1102816	1102816	1102816
-----	CONNECTOR,IDC SCOTCH LOK 55816-22AWG RUN,16-22 AWG RED	1120174	1120174	1120174	1120174
----	**ROLLER SET-2RC-30D-SPUR**	**-----**	**-----**	**-----**	**-----**
20/1	ROLLER,ITR 3-11/16" BF PRBG **(NO AXLE) 1 GROOVE**	1152360	1152360	1152360	1152360
20/2	ROLLER,ITR 4-3/4"BF PRBG **NO AXLE**	E0003268	E0003268	E0003268	E0003268
20/3	ROLLER,6BF ITR 1.9 PLTD PRBG	1152260	1152260	1152260	1152260
20/4	ROLLER,7-1/8BF ITR 1.9 PLTD PRBG	1152261	1152261	1152261	1152261
20/5	ROLLER,8-5/16BF ITR 1.9 PLTD PRBG	1152262	1152262	1152262	1152262
20/6	ROLLER,9-7/16BF ITR 1.9 PLTD PRBG	1152263	1152263	1152263	1152263
20/7	ROLLER,10-5/8BF ITR 1.9 PLTD PRBG	1152264	1152264	1152264	1152264
20/8	ROLLER,11-3/4BF ITR 1.9 PLTD PRBG	1152265	1152265	1152265	1152265
20/9	ROLLER,12-15/16BF ITR 1.9 PLTD PRBG	1152266	1152266	1152266	1152266
20/10	ROLLER,14-1/16BF ITR 1.9 PLTD PRBG	1152268	1152268	1152268	1152268
20/11	ROLLER,15-3/16BF ITR 1.9 PLTD PRBG	1152269	1152269	1152269	1152269
20/12	ROLLER,16-3/8BF ITR 1.9 PLTD PRBG	----	1155254	1155254	1155254
20/13	ROLLER,ITR 17-1/2"BF 1.9 PLTD PRBG	----	1133722	1133722	1133722
20/14	ROLLER,18-3/4BF ITR 1.9 PLTD PRBG	----	1154742	1154742	1154742
20/15	ROLLER,19-3/4BF ITR 1.9 PLTD PRBG	----	1144374	1144374	1144374
20/16	ROLLER,ITR 21"BF 1.9 PLTD PRBG	----	1133723	1133723	1133723
20/17	ROLLER,22-3/16BF ITR 1.9 PLTD PRBG	----	----	1155255	1155255
20/18	ROLLER,ITR 23-1/4"BF PRBG	----	----	1131992	1131992
20/19	ROLLER,ITR 24-7/16"BF PRBG1.9 PLTD	----	----	1133724	1133724
20/20	ROLLER,25-5/8BF ITR 1.9 PLTD PRBG	----	----	1155256	1155256
20/21	ROLLER,26-3/4BF ITR 1.9 PLTD PRBG	----	----	1154745	1154745
20/22	ROLLER,ITR 27-15/16"BF PRBG1.9 PLTD	----	----	----	1133726
20/23	ROLLER,29-1/16BF ITR 1.9 PLTD PRBG	----	----	----	1155257
20/24	ROLLER,30-1/4BF ITR 1.9 PLTD PRBG	----	----	----	1155258
20/25	ROLLER,ITR 31-3/8"BF PRBG1.9 PLTD	----	----	----	1133728
20/26	ROLLER,32-1/2BF ITR 1.9 PLTD PRBG	----	----	----	1155259
20	ROLLER,_ _ITR 1.9 PLTD PRBG 1D1S (_ _BF)	E0002422	E0002423	E0002424	1198370
21	ROLLER,_ _ITR 1.9" DIA PLTD (_ _BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR _ _BF 2G ITOH FE-60	1138722	1138723	1138724	1138725
					Ref Dwg# 130A567

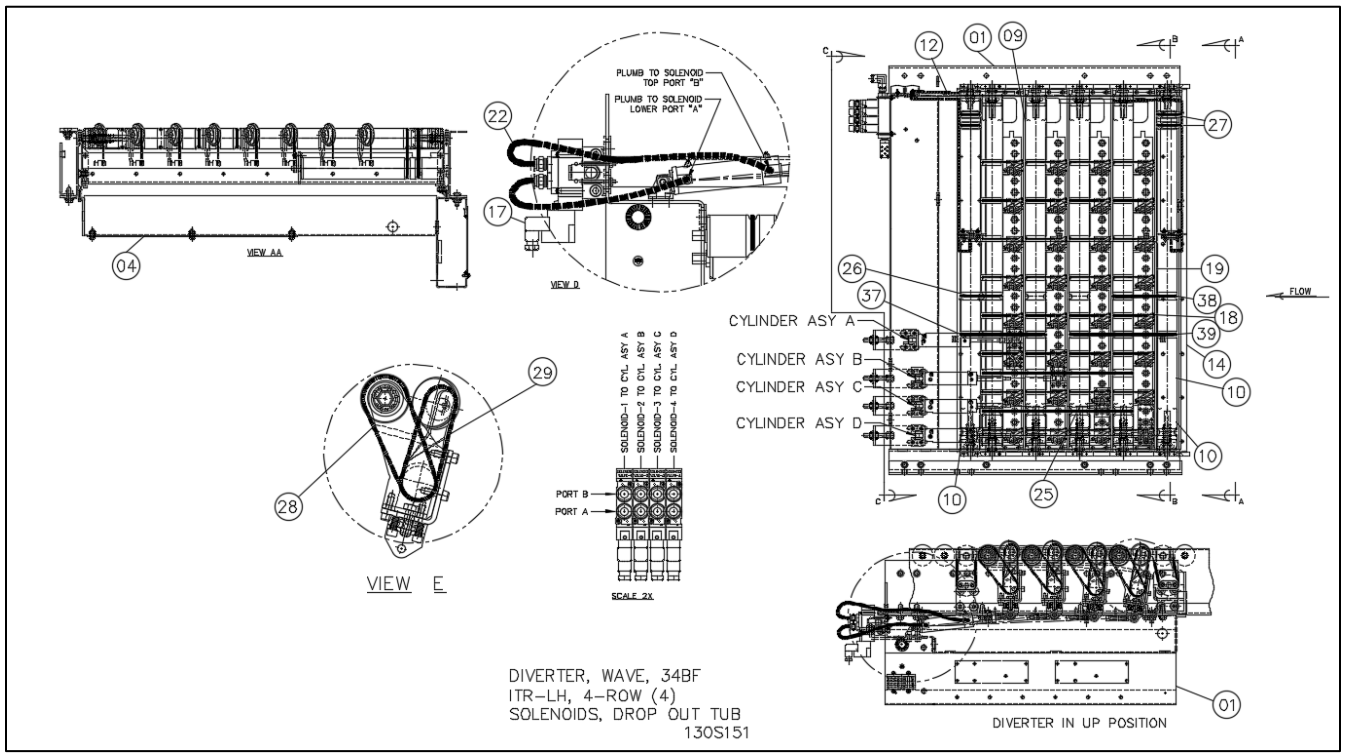
19.8.3: Replacement Parts – ITR Wheel Divert 3RC IB-E (Pneumatic)

REPLACEMENT PARTS - ITR WHEEL DIVERT PNEUMATIC, 3RC, 30 DEGREES, IB-E03					
WD,ITR-_ _BF-IBE-C6-3RC-30D-LH/RH-FE60-_MR-_SOL-W/DROPOUT		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
-----	**ELECTRICAL COMPONENTS**	-----	-----	-----	-----
04	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
12	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	CONN,WAGO 231-302/026-000	1162204	1162204	1162204	1162204
----	CONNECTOR,IDC SCOTCHLOK 562-10-12AWG RUN,10-12AWG-YELLOW	3M562	3M562	3M562	3M562
----	CONNECTOR,IDC SCOTCH LOK 564 14-18AWG RUN,14-18AWG TAP,3M WHITE	-----	-----	3M564	3M564
-----	CYL,AIR,1" BORE,2" STROKE	1109080	1109080	1109080	1109080
-----	ROLLER,WD _ _BF ITR PRBGDROP OUT TUBPRBG 6203 BRG	1195066	1191359	1194883	1198388
-----	ROLLER,WD _ _BF ITR PRBG,5 GRV DROP OUT TUB PRBG 6203 BRG	1195067	1191372	1194884	1198402
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
-----	**SPUR, O-RINGS**	-----	-----	-----	-----
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
19	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	E0005536	E0005536	E0005536	E0005536
-----	**ROLLER SET ITR-3RC-30D**	-----	-----	-----	-----
20/1	ROLLER,ITR 3-3/8"BF PRBG **NO AXLE**	1143249	1143249	1143249	1143249
20/2	ROLLER,ITR 5-1/8"BF PRBG **NO AXLE**	1130836	1130836	1130836	1130836
20/3	ROLLER,6-27/32BF ITR 1.9 PLTD PRBG	1131620	1131620	1131620	1131620
20/4	ROLLER,8-9/16BF ITR 1.9 PLTD PRBG	1131621	1131621	1131621	1131621
20/5	ROLLER,10-5/16BF ITR 1.9 PLTD PRBG	1143250	1143250	1143250	1143250
20/6	ROLLER,12-1/32BF ITR 1.9 PLTD PRBG	1131622	1131622	1131622	1131622
20/7	ROLLER,13-25/32BF ITR 1.9 PLTD PRBG	1131623	1131623	1131623	1131623
20/8	ROLLER,15-1/2BF ITR 1.9 PLTD PRBG	----	1131624	1131624	1131624
20/9	ROLLER,17-1/4BF ITR 1.9 PLTD PRBG	----	1143251	1143251	1143251
20/10	ROLLER,18-31/32BF ITR 1.9 PLTD PRBG	----	1131625	1131625	1131625
20/11	ROLLER,20-11/16BF ITR 1.9 PLTD PRBG	----	1143252	1143252	1143252
20/12	ROLLER,22-7/16BF ITR 1.9 PLTD PRBG	----	----	1131627	1131627
20/13	ROLLER,24-5/32BF ITR 1.9 PLTD PRBG	----	----	1131628	1131628
20/14	ROLLER,25-29/32BF ITR 1.9 PLTD PRBG	----	----	1131629	1131629
20/15	ROLLER,27-5/8BF ITR 1.9 PLTD PRBG	----	----	----	1140043
20/16	ROLLER,29-3/8BF ITR 1.9 PLTD PRBG	----	----	----	1140044
20/17	ROLLER,31-3/32BF ITR 1.9 PLTD PRBG	----	----	----	1140045
20/18	ROLLER,32-13/16BF ITR 1.9 PLTD PRBG	----	----	----	1140046
21	ROLLER,_ _ITR 1.9" DIA PLTD (_ _BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR _ _BF 2G ITOH PM 486 **FE-60** 600MM MOTOR CABLE W/10 PIN CONN **(USED W/ IBE)**	1163471	1163472	1163473	1163474
20	ROLLER,_ _ITR 1.9PLTD PRBG 1D1S (_ _BF)	E0002422	E0002423	E0002424	1198370
23	ROLLER,ITR 13.25BF 2G ITOH PM 486 **FE-60** **(600MM MOTOR CABLE W/ 10 PIN CONN)**	----	----	1165293	1165293
23	ROLLER,ITR SPUR 2G ITOH PM 486 **FE-60 (3" GROOVE SPACING)**	1165292	1165292	1165292	1165292
					REF DWG# 130A559

19.8.4: Replacement Parts – ITR Wheel Divert 2RC IB-E (Pneumatic)

REPLACEMENT PARTS - ITR WHEEL DIVERT PNEUMATIC, 2RC, 30 DEGREES, IB-E03					
WD,ITR-_ _BF-IBE-C6-2RC-30D-LH/RH-_MR-FE60-_SOL-W/DROPOUT		**Width & Item #**			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
-----	**ELECTRICAL COMPONENTS**	-----	-----	-----	-----
----	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
----	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	CONN,WAGO 231-302/026-000	1162204	1162204	1162204	1162204
----	CONNECTOR,IDC SCOTCHLOK 562-10-12AWG RUN,10-12AWG-YELLOW	3M562	3M562	3M562	3M562
----	CONNECTOR,IDC SCOTCH LOK 564 14-18AWG RUN,14-18AWG TAP,3M WHITE	3M564	3M564	3M564	3M564
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
-----	**SPUR, O-RINGS**	-----	-----	-----	-----
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
19	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
----	**ROLLER SET-2RC-30D-SPUR**	-----	-----	-----	-----
20/1	ROLLER,ITR 3-11/16" BF PRBG **(NO AXLE) 1 GROOVE**	1152360	1152360	1152360	1152360
20/2	ROLLER,ITR 4-3/4"BF PRBG NO AXLE	E0003268	E0003268	E0003268	E0003268
20/3	ROLLER,6BF ITR 1.9 PLTD PRBG	1152260	1152260	1152260	1152260
20/4	ROLLER,7-1/8BF ITR 1.9 PLTD PRBG	1152261	1152261	1152261	1152261
20/5	ROLLER,8-5/16BF ITR 1.9 PLTD PRBG	1152262	1152262	1152262	1152262
20/6	ROLLER,9-7/16BF ITR 1.9 PLTD PRBG	1152263	1152263	1152263	1152263
20/7	ROLLER,10-5/8BF ITR 1.9 PLTD PRBG	1152264	1152264	1152264	1152264
20/8	ROLLER,11-3/4BF ITR 1.9 PLTD PRBG	1152265	1152265	1152265	1152265
20/9	ROLLER,12-15/16BF ITR 1.9 PLTD PRBG	1152266	1152266	1152266	1152266
20/10	ROLLER,14-1/16BF ITR 1.9 PLTD PRBG	1152268	1152268	1152268	1152268
20/11	ROLLER,15-3/16BF ITR 1.9 PLTD PRBG	1152269	1152269	1152269	1152269
20/12	ROLLER,16-3/8BF ITR 1.9 PLTD PRBG	----	1155254	1155254	1155254
20/13	ROLLER,ITR 17-1/2"BF 1.9 PLTD PRBG	----	1133722	1133722	1133722
20/14	ROLLER,18-3/4BF ITR 1.9 PLTD PRBG	----	1154742	1154742	1154742
20/15	ROLLER,19-3/4BF ITR 1.9 PLTD PRBG	----	1144374	1144374	1144374
20/16	ROLLER,ITR 21"BF 1.9 PLTD PRBG	----	1133723	1133723	1133723
20/17	ROLLER,22-3/16BF ITR 1.9 PLTD PRBG	----	----	1155255	1155255
20/18	ROLLER,ITR 23-1/4"BF PRBG	----	----	1131992	1131992
20/19	ROLLER,ITR 24-7/16"BF PRBG1.9 PLTD	----	----	1133724	1133724
20/20	ROLLER,25-5/8BF ITR 1.9 PLTD PRBG	----	----	1155256	1155256
20/21	ROLLER,26-3/4BF ITR 1.9 PLTD PRBG	----	----	1154745	1154745
20/22	ROLLER,ITR 27-15/16"BF PRBG1.9 PLTD	----	----	----	1133726
20/23	ROLLER,29-1/16BF ITR 1.9 PLTD PRBG	----	----	----	1155257
20/24	ROLLER,30-1/4BF ITR 1.9 PLTD PRBG	----	----	----	1155258
20/25	ROLLER,ITR 31-3/8"BF PRBG1.9 PLTD	----	----	----	1133728
20/26	ROLLER,32-1/2BF ITR 1.9 PLTD PRBG	----	----	----	1155259
20	ROLLER,__ITR 1.9PLTD PRBG 1D1S (__BF)	E0002422	E0002423	E0002424	E0002424
21	ROLLER,__ITR 1.9" DIA PLTD (__BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR _ _BF 2G ITOH PM 486 **FE-60** 600MM MOTOR CABLE W/10 PIN CONN **(USED W/ IBE)**	1163471	1163472	1163473	1163474
22	ROLLER,ITR SPUR 2G ITOH **(2" GROOVE SPACING)**	1171592	1171592	1171592	1171592
23	ROLLER,ITR 13.25BF 2G ITOH PM 486 **FE-60** **(600MM MOTOR CABLE W/ 10 PIN CONN)**	----	----	1165293	1165293
23	ROLLER,36ITR 1.9PLTD PRBG1D1S (__BF)	----	----	1198370	1198370
					Ref Dwg# 130A567

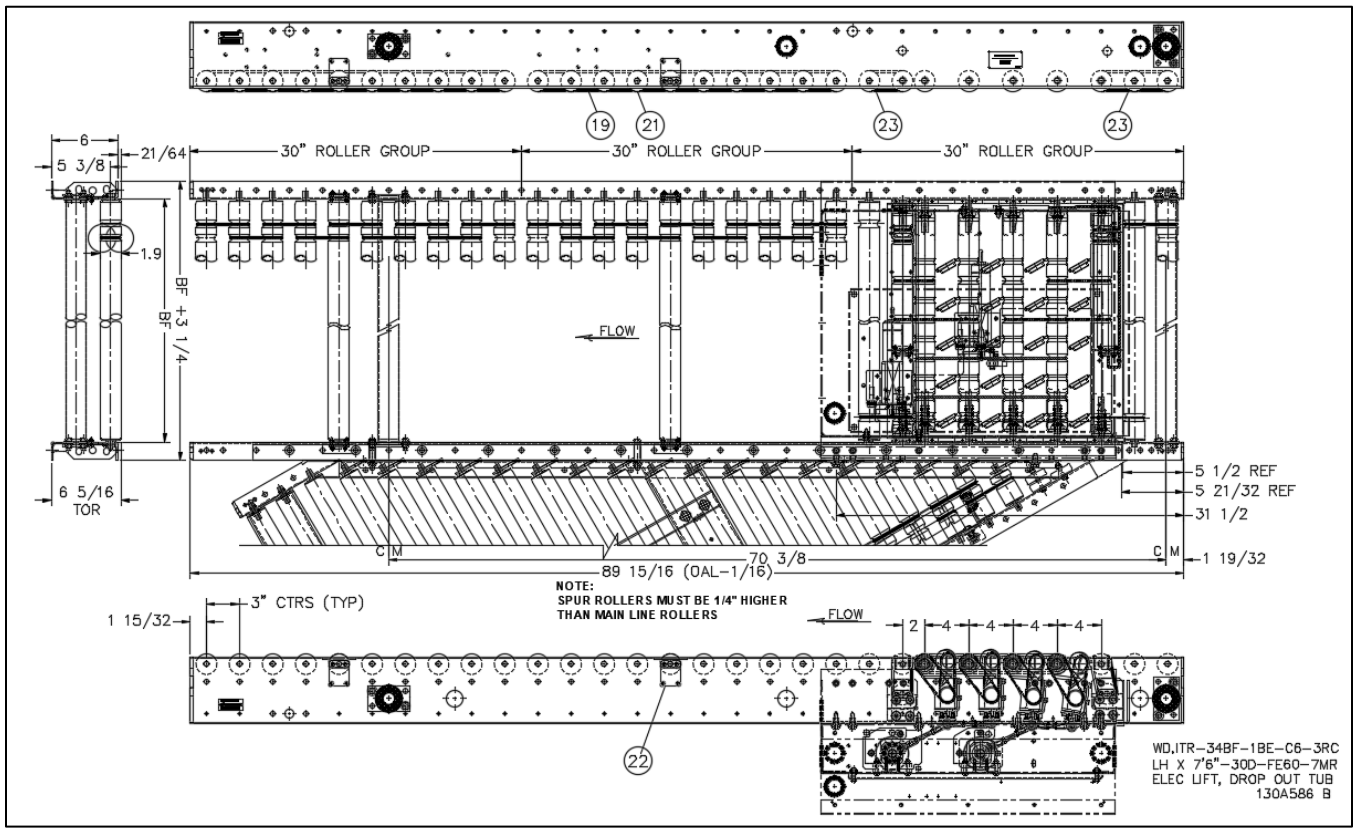
19.9: ITR WHEEL DIVERTER (PNEUMATIC LIFT)



19.9.1: Replacement Parts - ITR Wheel Diverter (Pneumatic Lift)

REPLACEMENT PARTS - ITR WHEEL DIVERT (PNEUMATIC) CB or IBE, 2RC & 3RC, 30 DEGREES					
WD,ITR-_ _BF-CB or IBE-C6-2RC or 3RC-30D-LH/RH-FE60-_MR-_SOL-W/DROPOUT		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
----	**DIVERTER,WAVE**	-----	-----	-----	-----
1	CYL,AIR,1" BORE, 2" STROKE ADJ AIR CUSHIONS BOTH ENDS HIGH SPEED MOD.; XC37 (1/8 NPT PORTS)	1109080	1109080	1109080	1109080
2	WHEEL,ASY NBS30 (MOLDED TIRE) STEEL	E0005801	E0005801	E0005801	E0005801
4	WHEEL,ASY IDLER NBS30 STEEL	E0001233	E0001233	E0001233	E0001233
9	ROLLER,WD__BF ITR PRBG DROP OUT TUB PRBG 6203 BRG	1195066	1191359	1194883	1198388
10	ROLLER,WD__BF ITR PRBG,5 GRV DROP OUT TUB PRBG 6203 BRG	1195067	1191372	1194884	1198402
22	TUBING,1/4"POLYU-95DURO.160ID	E0001391	E0001391	E0001391	E0001391
25	ORING,83A WD 3/16 X 25-3/8"	1141505	1141505	1141505	1141505
26	ORING,3/16DIA X 7-3/4" HT BLUE ITR 2"CTR	1142656	1142656	1142656	1142656
27	ORING,.210 DIA X 9.1" HT RED ITR 2.75"CTR	1172694	1172694	1172694	1172694
28	ORING,83A 1/8" X 10"	1141229	1141229	1141229	1141229
29	ORING,83A 1/8 X 9-1/4" BLACK	E0001239	E0001239	E0001239	E0001239
37	ORING,3/16DIA X 14.5" HT BLUE 6" CTR	1172695	1172695	1172695	1172695
38	ORING,3/16DIA X 11" HT BLUE ITR 4"CTR	1127703	1127703	1127703	1127703
39	ORING,3/16DIA X 17.95" HT BLUE 8" CTR	1172696	1172696	1172696	1172696
3	ROLLER,ITR 13.25BF 2G ITOH GROOVES AT 55/25 (1.0" GROOVE SPACING) **USED W/IBE**	1198348	1198348	1198348	1198348
12	CABLE,MOTOR EXTENSION,600MM ITOH M-F-EXT-10PIN-600 **USE W/IB-E**	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
3	ROLLER,ITR 13.25BF 2G ITOH GROOVES AT 55/25 (1.0" GROOVE SPACING) **USE W/ CB-016 OR HB-510**	1191381	1191381	1191381	1191381
12	CABLE,MOTOR EXTENSION,600MM ITOH M-F-EXT-9PIN-600 **USE W/CB-016 OR HB-510**	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
					Ref Dwg# 130S151

19.10: ITR WHEEL DIVERT (ELECTRIC LIFT)



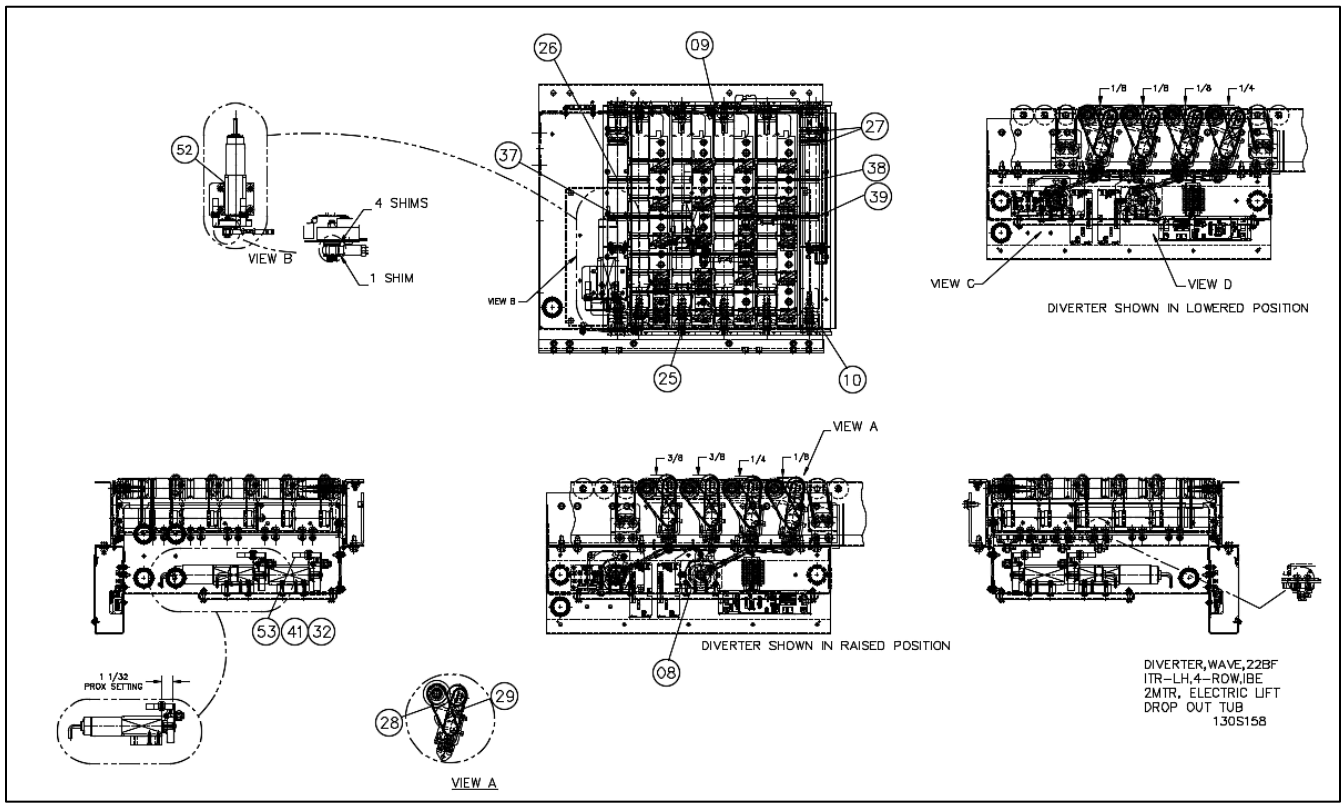
19.10.1: Replacement Parts – ITR Wheel Divert 3RC IB-E (Electric Lift)

REPLACEMENT PARTS - ITR WHEEL DIVERT ELECTRIC LIFT, 3RC,30 DEGREES, IB-E03					
WD,ITR-_ _BF-IBE-C6-3RC-30D-LH/RH-FE60-_MR-ELIFT-W/DROPOUT		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
-----	**ELECTRICAL COMPONENTS**	-----	-----	-----	-----
04	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
----	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	CONN,WAGO 231-302/026-000	1162204	1162204	1162204	1162204
----	CONNECTOR,IDC SCOTCHLOK 562-10-12AWG RUN,10-12AWG-YELLOW	3M562	3M562	3M562	3M562
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
------	**DIVERTER,WAVE**	-----	-----	-----	-----
-----	CAM,DRIVE,WD ELEC LIFT	1200657	1200657	1200657	1200657
-----	ROLLER,WD__BF ITR PRBG DROP OUT TUB PRBG 6203 BRG	1195066	1191359	1194883	1198388
10	ROLLER,WD__BF ITR PRBG,5 GRV DROP OUT TUB PRBG 6203 BRG	1195067	1191372	1194884	1198402
25	ORING,83A WD 3/16 X 25-3/8"	1141505	1141505	1141505	1141505
27	ORING,.210 DIA X 9.1" HT REDITR 2.75"CTR	1172694	1172694	1172694	1172694
28	ORING,83A 1/8" X 10"	1141229	1141229	1141229	1141229
29	ORING,83A 1/8 X 9-1/4" BLACK	E0001239	E0001239	E0001239	E0001239
37	ORING,3/16 DIA X 14.5" HT BLUE **6" CTR**	1172695	1172695	1172695	1172695
38	ORING,3/16 DIA X 11" HT BLUE ITR **4"CTR**	1127703	1127703	1127703	1127703
39	ORING,3/16 DIA X 17.95" HT BLUE **8" CTR**	1172696	1172696	1172696	1172696
46	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
17 & 19	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	-----	-----	E0005536	E0005536
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
3	CONN,2 COND,W/LEVERS 24 - 12 AWG	1185928	1185928	1185928	1185928
6	PCB,DB,PE,4A8 STATION	1138197	1138197	1138197	1138197
21	FUSE,4A,125V CARTRIDGE	1102221	1102221	1102221	1102221
22	FUSE,HOLDER IN-LINE,CARTRIDGE	1102222	1102222	1102222	1102222
47	TERM,BLOCK,2-COND,20-10AWG600V,30A,GRAY,6.2mm	1145413	1145413	1145413	1145413
48	TERM,SEPARATOR,ORANGE,2mm	1180509	1180509	1180509	1180509
49	TERM,END BARRIER,GRAY,1mm	1145415	1145415	1145415	1145415
54	DRIVERCARD,INSIGHT EZ24 HTBS HIGH TORQUE PULSE ROLLER	1173108	1173108	1173108	1173108
3	ROLLER,ITR 13.25BF 2G ITOH-PM 486 FE-60 (1.0" GROOVE SPACING) 600MM CABLE, W/10 PIN CONN	1198348	1198348	1198348	1198348
2	WHEEL,ASY NBS30 (MOLDED TIRE)STEEL	E0005801	E0005801	E0005801	E0005801
4	WHEEL,ASY IDLER NBS30 STEEL	E0001233	E0001233	E0001233	E0001233
32	SWITCH,PROX,12MM DIA,FLUSH MT4MM RANGE,M12 4-PIN CONN PNP	1184770	1184770	1184770	1184770
41	CABLE,M12 TO WAGO 733-103,3M FEMALE M12 PIN 4 SIGNAL	1198538	1198538	1198538	1198538
52	DRIVE,KYOWA 24VDC PULSE GEAR PULSE ROLLER	1177986	1177986	1177986	1177986
-----	**ROLLER SET-3RC-30D-SPUR**	-----	-----	-----	-----
20/1	ROLLER,ITR 3-3/8"BF PRBG **NO AXLE**	1143249	1143249	1143249	1143249
20/1	ROLLER,ITR 5-1/8"BF PRBG **NO AXLE**	1130836	1130836	1130836	1130836
20/1	ROLLER,6-27/32BF ITR 1.9 PLTD PRBG	1131620	1131620	1131620	1131620
20/1	ROLLER,8-9/16BF ITR 1.9 PLTD PRBG	1131621	1131621	1131621	1131621
20/1	ROLLER,10-5/16BF ITR 1.9 PLTD PRBG	1143250	1143250	1143250	1143250
20/1	ROLLER,12-1/32BF ITR 1.9 PLTD PRBG	1131622	1131622	1131622	1131622
20/1	ROLLER,13-25/32BF ITR 1.9 PLTD PRBG	1131623	1131623	1131623	1131623
20/1	ROLLER,15-1/2BF ITR 1.9 PLTD PRBG	-----	1131624	1131624	1131624
20/1	ROLLER,17-1/4BF ITR 1.9 PLTD PRBG	-----	1143251	1143251	1143251
20/1	ROLLER,18-31/32BF ITR 1.9 PLTD PRBG	-----	1131625	1131625	1131625
20/1	ROLLER,20-11/16BF ITR 1.9 PLTD PRBG	-----	1143252	1143252	1143252
20/1	ROLLER,22-7/16BF ITR 1.9 PLTD PRBG	-----	-----	1131627	1131627
20/1	ROLLER,24-5/32BF ITR 1.9 PLTD PRBG	-----	-----	1131628	1131628
20/1	ROLLER,25-29/32BF ITR 1.9 PLTD PRBG	-----	-----	1131629	1131629
20/1	ROLLER,27-5/8BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140043
20/1	ROLLER,29-3/8BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140044
20/1	ROLLER,31-3/32BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140045
20/1	ROLLER,32-13/16BF ITR 1.9 PLTD PRBG	-----	-----	-----	1140046
21	ROLLER,__ITR 1.9" DIA PLTD (__BF)	E0002422	E0002413	E0002414	E0006220
22	ROLLER,ITR __BF 2G ITOH PM 486 **FE-60** 600MM MOTOR CABLE W/10 PIN CONN	1163471	1163472	1163473	1163474
23	ROLLER,__ITR 1.9PLTD PRBG 1D1S (__BF)	E0002412	E0002423	E0002424	1198370
23	ROLLER,ITR SPUR 2G ITOH PM 486 **FE-60 (3" GROOVE SPACING)**	1165292	1165292	1165292	1165292
23	ROLLER,ITR 13.25BF 2G ITOH PM 486 **FE-60** (600MM MOTOR CABLE W/ 10 PIN CONN)	-----	-----	1165293	1165293
					REF DWG# 130A586

19.10.2: Replacement Parts – ITR Wheel Divert 2RC IB-E (Electric Lift)

REPLACEMENT PARTS - ITR WHEEL DIVERT ELECTRIC LIFT, 2RC,30 DEGREES, IB-E03					
WD,ITR-_ _BF-IBE-C6-2RC-30D-LH/RH-FE60-_MR-ELIFT-W/DROPOUT		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
-----	**ELECTRICAL COMPONENTS**	-----	-----	-----	-----
04	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
-----	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
-----	CONN,WAGO 231-302/026-000	1162204	1162204	1162204	1162204
-----	CONNECTOR,IDC SCOTCHLOK 562-10-12AWG RUN,10-12AWG-YELLOW	3M562	3M562	3M562	3M562
-----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
-----	HARNESS,POWER BROWN & BLUE 10AWG WITH MALE/FEMALE CONN **(NOT BF SPECIFIC)**	3'-0" L 1102289	5'-5" L 1102288	8'-0" L 1102287	10'-6" L 1102286
-----	**DIVERTER,WAVE**	-----	-----	-----	-----
-----	CAM,DRIVE,WD ELEC LIFT	1200657	1200657	1200657	1200657
-----	ROLLER,WD _ _BF ITR PRBG DROP OUT TUB PRBG 6203 BRG	1195066	1191359	1194883	1198388
10	ROLLER,WD _ _BF ITR PRBG,5 GRV DROP OUT TUB PRBG 6203 BRG	1195067	1191372	1194884	1198402
25	ORING,83A WD 3/16 X 25-3/8"	1141505	1141505	1141505	1141505
27	ORING,.210 DIA X 9.1" HT REDITR 2.75"CTR	1172694	1172694	1172694	1172694
28	ORING,83A 1/8" X 10"	1141229	1141229	1141229	1141229
29	ORING,83A 1/8 X 9-1/4" BLACK	E0001239	E0001239	E0001239	E0001239
37	ORING,3/16 DIA X 14.5" HT BLUE **6" CTR**	1172695	1172695	1172695	1172695
38	ORING,3/16 DIA X 11" HT BLUE ITR **4"CTR**	1127703	1127703	1127703	1127703
39	ORING,3/16 DIA X 17.95" HT BLUE **8" CTR**	1172696	1172696	1172696	1172696
46	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
17	ORING,3/16 DIA X 9.5" HT BLUE ITR **3"CTR**	-----	-----	E0005536	E0005536
18	ORING,3/16" DIA X 15.312" HT BLUE FOR ITR 6.5" CTRS (20% STRETCH)	1167247	1167247	1167247	1167247
3	CONN,2 COND,W/LEVERS 24 - 12 AWG	1185928	1185928	1185928	1185928
6	PCB,DB,PE,4A8 STATION	1138197	1138197	1138197	1138197
21	FUSE,4A,125V CARTRIDGE	1102221	1102221	1102221	1102221
22	FUSE,HOLDER IN-LINE,CARTRIDGE	1102222	1102222	1102222	1102222
47	TERM,BLOCK,2-COND,20-10AWG600V,30A,GRAY,6.2mm	1145413	1145413	1145413	1145413
48	TERM,SEPARATOR,ORANGE,2mm	1180509	1180509	1180509	1180509
49	TERM,END BARRIER,GRAY,1mm	1145415	1145415	1145415	1145415
54	DRIVERCARD,INSIGHT EZ24HTBS HIGH TORQUE PULSE ROLLER	1173108	1173108	1173108	1173108
3	ROLLER,ITR 13.25BF 2G ITOH-PM 486 FE-60 (1.0" GROOVE SPACING) 600MM CABLE, W/10 PIN CONN	1198348	1198348	1198348	1198348
2	WHEEL,ASY NBS30 (MOLDED TIRE)STEEL	E0005801	E0005801	E0005801	E0005801
4	WHEEL,ASY IDLER NBS30 STEEL	E0001233	E0001233	E0001233	E0001233
32	SWITCH,PROX,12MM DIA,FLUSH MT4MM RANGE,M12 4-PIN CONN PNP	1184770	1184770	1184770	1184770
41	CABLE,M12 TO WAGO 733-103,3M FEMALE M12 PIN 4 SIGNAL	1198538	1198538	1198538	1198538
52	DRIVE,KYOWA 24VDC PULSE GEAR PULSE ROLLER	1177986	1177986	1177986	1177986
18	ORING,3/16 DIA X 8-1/4" HT BLUE	E0034023	E0034023	E0034023	E0034023
19	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
-----	ROLLER,7-1/8BF ITR 1.9 PLTD PRBG 30D-DIVERT-LH-6'0"-FE60-3MR	-----	-----	-----	-----
03	ROLLER,ITR SPUR 2G ITOH,2 CPM 486 **FE-60 (2" GROOVE SPACING)**	1171592	1171592	1171592	1171592
-----	**ROLLER SET-2RC-30D-SPUR**	-----	-----	-----	-----
20/1	ROLLER,ITR 3-11/16" BF PRBG **(NO AXLE) 1 GROOVE**	1152360	1152360	1152360	1152360
20/2	ROLLER,ITR 4-3/4"BF PRBG **NO AXLE**	E0003268	E0003268	E0003268	E0003268
20/3	ROLLER,6BF ITR 1.9 PLTD PRBG	1152260	1152260	1152260	1152260
20/4	ROLLER,7-1/8BF ITR 1.9 PLTD PRBG	1152261	1152261	1152261	1152261
20/5	ROLLER,8-5/16BF ITR 1.9 PLTD PRBG	1152262	1152262	1152262	1152262
20/6	ROLLER,9-7/16BF ITR 1.9 PLTD PRBG	1152263	1152263	1152263	1152263
20/7	ROLLER,10-5/8BF ITR 1.9 PLTD PRBG	1152264	1152264	1152264	1152264
20/8	ROLLER,11-3/4BF ITR 1.9 PLTD PRBG	1152265	1152265	1152265	1152265
20/9	ROLLER,12-15/16BF ITR 1.9 PLTD PRBG	1152266	1152266	1152266	1152266
20/10	ROLLER,14-1/16BF ITR 1.9 PLTD PRBG	1152268	1152268	1152268	1152268
20/11	ROLLER,15-3/16BF ITR 1.9 PLTD PRBG	1152269	1152269	1152269	1152269
20/12	ROLLER,16-3/8BF ITR 1.9 PLTD PRBG	-----	1155254	1155254	1155254
20/13	ROLLER,ITR 17-1/2"BF 1.9 PLTD PRBG	-----	1133722	1133722	1133722
20/14	ROLLER,18-3/4BF ITR 1.9 PLTD PRBG	-----	1154742	1154742	1154742
20/15	ROLLER,19-3/4BF ITR 1.9 PLTD PRBG	-----	1144374	1144374	1144374
20/16	ROLLER,ITR 21"BF 1.9 PLTD PRBG	-----	1133723	1133723	1133723
20/17	ROLLER,22-3/16BF ITR 1.9 PLTD PRBG	-----	-----	1155255	1155255
20/18	ROLLER,ITR 23-1/4"BF PRBG	-----	-----	1131992	1131992
20/19	ROLLER,ITR 24-7/16"BF PRBG1.9 PLTD	-----	-----	1133724	1133724
20/20	ROLLER,25-5/8BF ITR 1.9 PLTD PRBG	-----	-----	1155256	1155256
20/21	ROLLER,26-3/4BF ITR 1.9 PLTD PRBG	-----	-----	1154745	1154745
20/22	ROLLER,ITR 27-15/16"BF PRBG1.9 PLTD	-----	-----	-----	1133726
20/23	ROLLER,29-1/16BF ITR 1.9 PLTD PRBG	-----	-----	-----	1155257
20/24	ROLLER,30-1/4BF ITR 1.9 PLTD PRBG	-----	-----	-----	1155258
20/25	ROLLER,ITR 31-3/8"BF PRBG 1.9 PLTD	-----	-----	-----	1133728
20/26	ROLLER,32-1/2BF ITR 1.9 PLTDPRBG	-----	-----	-----	1155259
21	ROLLER,_ _ITR 1.9" DIA PLTD (_ _BF)	E0002412	E0002413	E0002414	E0006220
22	ROLLER,ITR _ _BF 2G ITOH PM 486 **FE-60** 600MM MOTOR CABLE W/10 PIN CONN **(USED W/ IBE)**	1163471	1163472	1163473	1163474
23	ROLLER,ITR 13.25BF 2G ITOH PM 486 **FE-60** **(600MM MOTOR CABLE W/ 10 PIN CONN)**	-----	-----	1165293	1165293
23	ROLLER,_ _ITR 1.9PLTD PRBG 1D1S (_ _BF)	E0002422	E0002423	E0002424	1198370
					REF DWG# 130A588

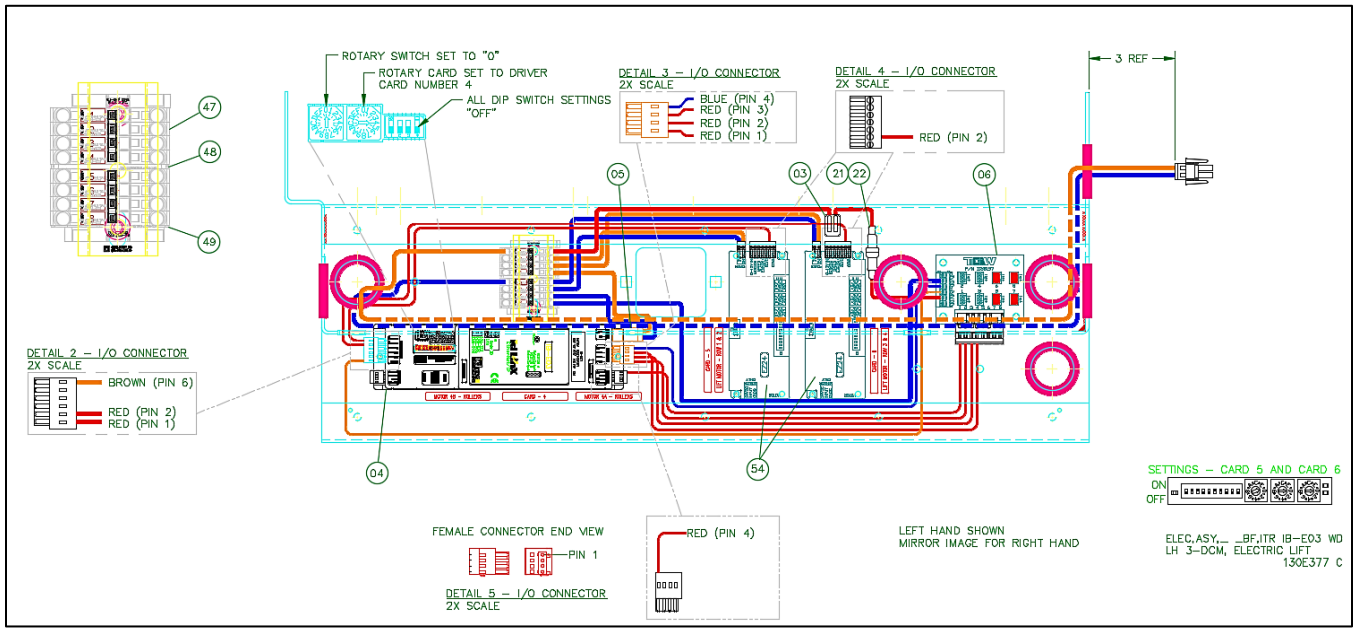
19.11: ITR Wheel Diverter (Electric Lift)



19.11.1: Replacement Parts – ITR Wheel Diverter (Electric Lift) Components

REPLACEMENT PARTS - ITR WHEEL DIVERTER 24V ELECTRIC LIFT COMPONENTS					
		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
-----	WHEEL,ASY NBS30 (MOLDED TIRE)	E0005801	E0005801	E0005801	E0005801
-----	ROLLER,ITR 13.25BF 2G ITOH-PM 486 FE-60 (1.0" GROOVE SPACING) 600MM CABLE, W/10 PIN CONN	1198348	1198348	1198348	1198348
-----	WHEEL,ASY IDLER NBS30 STEEL	E0001233	E0001233	E0001233	E0001233
08	CAM,DRIVE,WD	1200657	1200657	1200657	1200657
09	ROLLER,WD __BF ITR PRBG PRBG 6203 BRG	1198388	1198388	1198388	1198388
10	ROLLER,WD __BF ITR PRBG,5 GRV PRBG 6203 BRG	1198402	1198402	1198402	1198402
25	ORING,83A WD 3/16 X 25-3/8"	1141505	1141505	1141505	1141505
26	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
27	ORING,.210 DIA X 9.1" HT RED	1172694	1172694	1172694	1172694
28	ORING,83A 1/8" X 10"	1141229	1141229	1141229	1141229
29	ORING,83A 1/8 X 9-1/4" BLACK	E0001239	E0001239	E0001239	E0001239
32	SWITCH,PROX,12MM DIA,FLUSH MT PNP	1184770	1184770	1184770	1184770
37	ORING,3/16 DIA X 14.5" HT BLUE	1172695	1172695	1172695	1172695
38	ORING,3/16 DIA X 11" HT BLUE	1127703	1127703	1127703	1127703
39	ORING,3/16 DIA X 17.95" HT BLUE	1172696	1172696	1172696	1172696
41	CABLE,M12 TO WAGO 733-103,3M FEMALE M12 PIN 4 SIGNAL	1198538	1198538	1198538	1198538
52	DRIVE,KYOWA 24VDC PULSE GEAR PULSE ROLLER	1177986	1177986	1177986	1177986
					Ref Dwg# 130S158

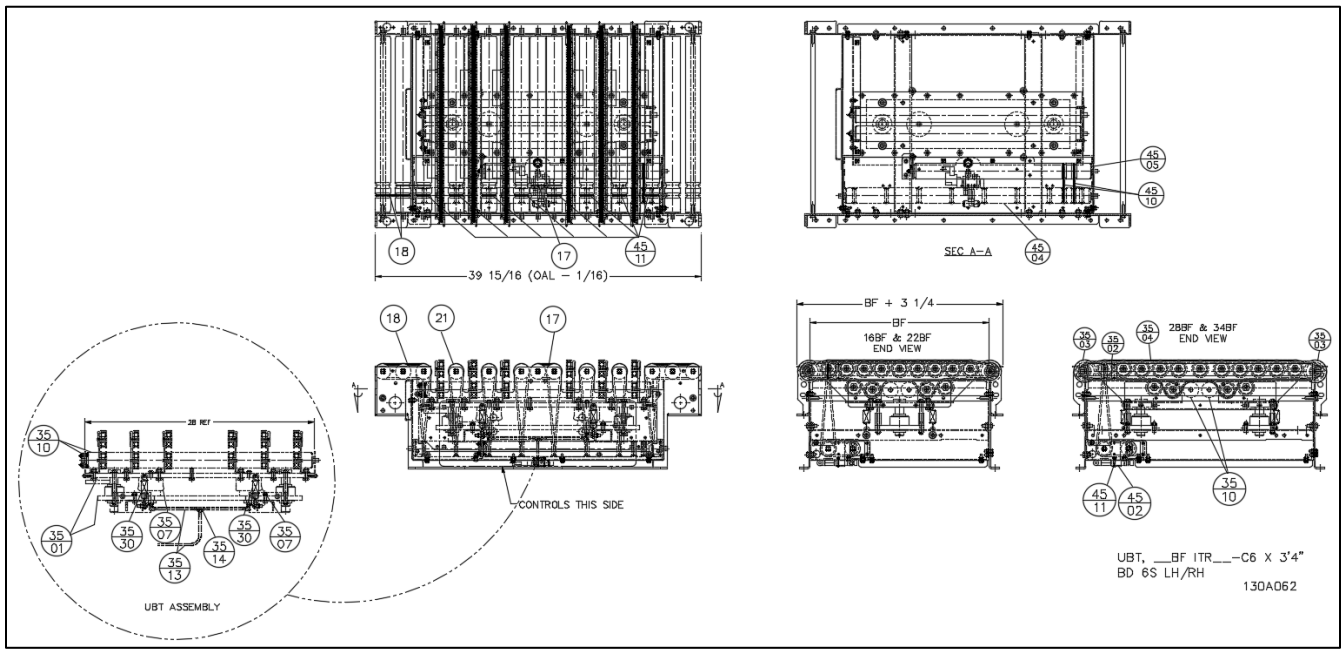
19.12: ITR Wheel Diverter (Electric Lift) Electrical Components



19.12.1: Replacement Parts – ITR Wheel Diverter (Electric Lift) – Electrical Components

REPLACEMENT PARTS - ITR WHEEL DIVERT ELECTRIC LIFT, ELECTRICAL COMPONENTS					
		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
3	CONN,2 COND,W/LEVERS24 - 12 AWG	1185928	1185928	1185928	1185928
4	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
5	CONN,WAGO 231-302/026-000	1162204	1162204	1162204	1162204
6	PCB,DB,PE,4A8 STATION	1138197	1138197	1138197	1138197
21	FUSE,4A,125V CARTRIDGE	1102221	1102221	1102221	1102221
22	FUSE,HOLDER IN-LINE,CARTRIDGE	1102222	1102222	1102222	1102222
47	TERM,BLOCK,2-COND,20-10AWG600V,30A,GRAY,6.2mm	1145413	1145413	1145413	1145413
48	TERM,SEPARATOR,ORANGE,2mm	1180509	1180509	1180509	1180509
49	TERM,END BARRIER,GRAY,1mm	1145415	1145415	1145415	1145415
54	DRIVERCARD,INSIGHT EZ24 HTBS HIGH TORQUE PULSE ROLLER	1173108	1173108	1173108	1173108
					Ref Dwg# 130E377

19.13: ITR UBT (PNEUMATIC) MECHANICAL COMPONENTS 5S & 6S



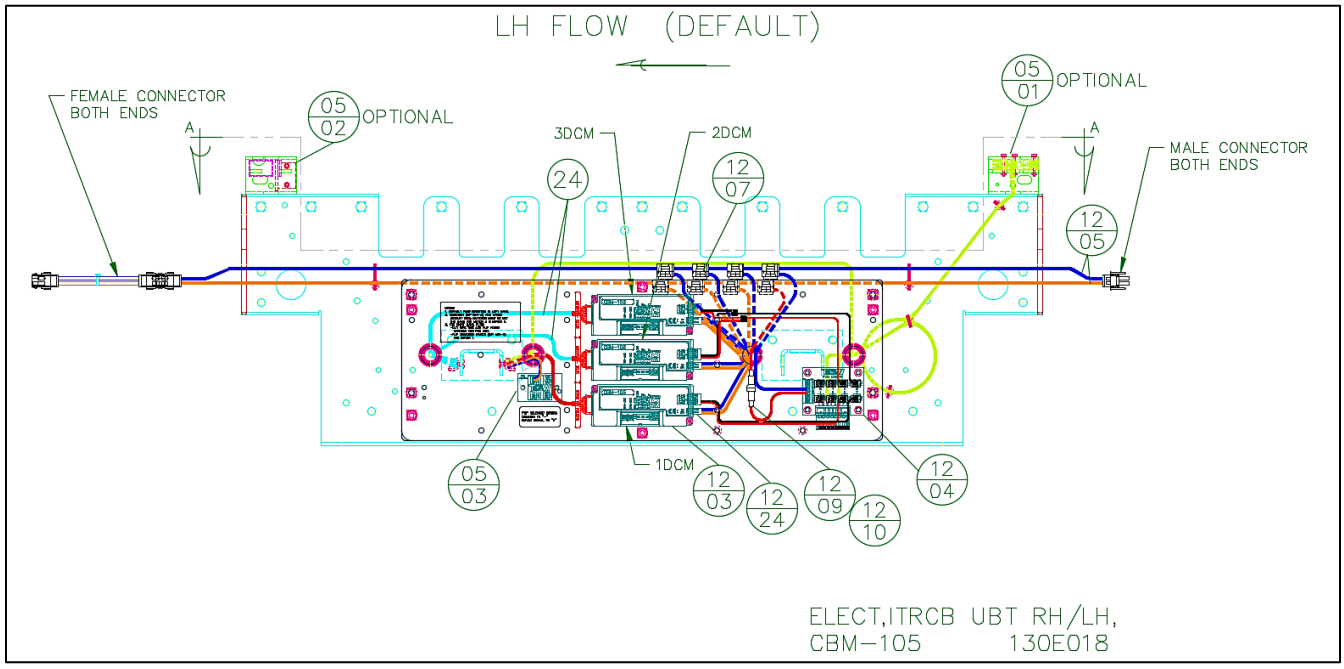
19.13.1: Replacement Parts – ITR UBT (Pneumatic) Mechanical Components 5s & 6s

REPLACEMENT PARTS - ITR UBT PNUEMATIC, BI-DIRECTIONAL (CB, 5s or 6s)					
		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
-----	**UBT,MECH __BF ITR UBT**	-----	-----	-----	-----
17	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
18	ORING,3/16 DIA X 8.688 HT BLUE	1137420	1137420	1137420	1137420
21	ROLLER,__ITR 1.9 PLTD PRBG (__BF)	E0002412	E0002413	E0002414	E0006220
35/01	LIFT TABLE,ASY A&B ITR2 UBT,36"PER PRINT **(5s)**	1154635	1154635	1159922	1159922
35/01	LIFT TABLE,ASY A&B ITR2 UBT,36"PER PRINT **(6s)**	-----	-----	1141051	1141051
35/07	AIRBAG,FIRESTONE	90000025	90000025	90000025	90000025
35/13	TUBING,1/4"POLY U-95 DURO.160ID	E0005539	E0005539	E0005539	E0005539
35/14	TEE,UNION BARBED 1/4" TO 1/4"H	89000520	89000520	89000520	89000520
35/10	ROLLER,ITR 24BF NG ITOHPM486FE-60-595-D-24-KF **(5s)**	1154635	1154635	1154635	1154635
35/10	ROLLER,ITR 24BF NG ITOHPM486FE-60-595-D-24-KF **(6s)**	1138741	1138741	1138741	1138741
35/30	SPRING,EXT 3/4OD X 2" LG .075W,LOOPS MUST BE INLINE +/- 20	90800263	90800263	90800263	90800263
-----	**WHEELBRKT,ASY ITR UBT __BF**	-----	-----	-----	-----
35/02	IDLER,ASY FLAT FACE ITR UBT	1132379	1132379	1132379	1132379
35/03	IDLER,ASY FLANGED ITR UBT	1159961	1159961	1159961	1159961
35/04	BELT,83A .188 X .468 X 66"34BF ITR2 UBT	1132754	1132755	1132756	1132757
-----	**PAN,ASY BOTTOM ITR**	-----	-----	-----	-----
45/02	VALVE,SMC 4WAY 24VDC W/FITT &3M CABLE,ITR UBT/ERS	1139102	1139102	1139102	1139102
45/04	ROLLER,CARRIER DRIVEITR2 UBT 4"C,36" LG UBT **(5s)**	1154791	1154791	1154791	1154791
45/04	ROLLER,CARRIER DRIVEITR2 UBT 4"C,36" LG UBT **(6s)**	1132730	1132730	1132730	1132730
45/05	ROLLER,ITR __BF 2G ITOH FE-60	1138722	1138723	1138729	1138725
45/05	ROLLER,ITR 22BF 2G ITOH PM 486 **FE-60** 600MM MOTOR CABLE W/ 10 PIN CONN **(6s)**	1138723	1138723	1138723	1138723
45/10	ORING,1/4"DIA X 9.5" HT BLUE	1144848	1144848	1144848	1144848
45/11	ORING,83A ST TRNS 3/16X21-3/8	1149850	1149850	1149850	1149850
					Reference Dwg: 130A062

19.13.2: Replacement Parts – ITR UBT (Pneumatic) Mechanical Components 5s & 6s

REPLACEMENT PARTS - ITR UBT Pnuematic - Bi-Directional (IBE, 5s or 6s)					
		Width & Item #			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
-----	**UBT,MECH __BF ITR UBT**	**-----**	**-----**	**-----**	**-----**
17	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
18	ORING,3/16 DIA X 8.688 HT BLUE	1137420	1137420	1137420	1137420
21	ROLLER, ITR 1.9 PLTD PRBG (BF)	E0002412	E0002413	E0002414	E0006220
35/01	LIFT TABLE,ASY A&B ITR2 UBT,36"PER PRINT **(5s)**	1154635	1154635	1159922	1159922
35/01	LIFT TABLE,ASY A&B ITR2 UBT,36"PER PRINT **(6s)**	-----	-----	1141051	1141051
35/07	AIRBAG,FIRESTONE	90000025	90000025	90000025	90000025
35/13	TUBING,1/4"POLY U-95 DURO.160ID	E0005539	E0005539	E0005539	E0005539
35/14	TEE,UNION BARBED 1/4" TO 1/4"H	89000520	89000520	89000520	89000520
35/10	ROLLER,ITR 28BF NG ITOH PM48 6FE-60 600MM MOTOR CABLE W/ 10 PIN CONN **(5s)**	1165116	1165116	1165116	1165116
35/10	ROLLER,ITR 28BF NG ITOH PM48 6FE-60 600MM MOTOR CABLE W/ 10 PIN CONN **(6s)**	1163482	1163482	1163482	1163482
35/30	SPRING,EXT 3/4OD X 2" LG .075W,LOOPS MUST BE INLINE +/- 20	90800263	90800263	90800263	90800263
-----	**WHEELBRKT,ASY ITR UBT __BF**	**-----**	**-----**	**-----**	**-----**
35/02	IDLER,ASY FLAT FACE ITR UBT	1132379	1132379	1132379	1132379
35/03	IDLER,ASY FLANGED ITR UBT	1159961	1159961	1159961	1159961
35/04	BELT,83A .188 X .468 X 66"34BF ITR2 UBT	1132754	1132755	1132756	1132757
-----	**PAN,ASY BOTTOM ITR**	**-----**	**-----**	**-----**	**-----**
45/02	VALVE,SMC 4WAY 24VDC W/FITT &3M CABLE,ITR UBT/ERS	1139102	1139102	1139102	1139102
45/04	ROLLER,CARRIER DRIVEITR2 UBT 4"C,36" LG UBT **(5s)**	1154791	1154791	1154791	1154791
45/04	ROLLER,CARRIER DRIVEITR2 UBT 4"C,36" LG UBT **(6s)**	1132730	1132730	1132730	1132730
45/05	ROLLER,ITR 16BF 2G ITOH PM 486 FE-60 600MM MOTOR CABLE W/ 10 PIN CONN **(5s)**	1163471	1163471	1163471	1163471
45/05	ROLLER,ITR 22BF 2G ITOH PM 486 FE-60 600MM MOTOR CABLE W/ 10 PIN CONN **(6s)**	1163472	1163472	1163472	1163472
45/10	ORING,1/4"DIA X 9.5" HT BLUE	1144848	1144848	1144848	1144848
45/11	ORING,83A ST TRNS 3/16X21-3/8	1149850	1149850	1149850	1149850
					Reference Dwg: 130A062

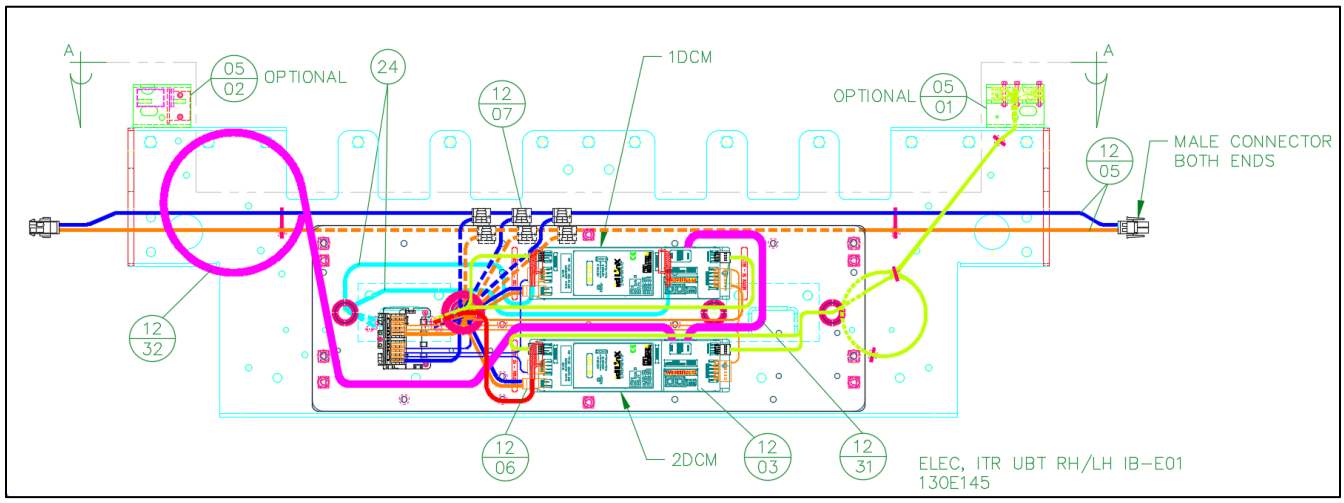
19.14: ITR UBT (PNEUMATIC) ELECTRICAL COMPONENTS 5S & 6S



19.14.1: Replacement Parts – ITR UBT (Pneumatic) Electrical Components 5s & 6s

REPLACEMENT PARTS - ITR UBT PNEUMATIC, ELECTRICAL COMPONENTS, CB, 5s & 6s					
		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
-----	**ELECTRICAL COMPONENTS**	-----	-----	-----	-----
24	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
----	**PE,ASY ITR UBT,PE AND RF**	----	-----	-----	-----
05/01	PE,REFLEX TYPE,LIGHT OP,2M CABLE	1138113	1138113	1138113	1138113
05/02	PE,REFLECTOR 20MM X 30MM ADHESIVE BACKED	1136359	1136359	1136359	1136359
05/03	PCB,DB,PE,EXTENSION (CBM-105FP)	1138198	1138198	1138198	1138198
----	**PL,ASY ITR CB UBT,LH/RH CBM-105**	-----	-----	-----	-----
12/03	DRIVERCARD,ITOH **CBM-105FP**	1153930	1153930	1153930	1153930
12/04	PCB,DB,PE,4A8 STATION	1138197	1138197	1138197	1138197
12/07	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
12/09	FUSE,HOLDER IN-LINE,CARTRIDGE	102222	102222	102222	102222
12/10	FUSE,4A,125V,CARTRIDGE	1102221	1102221	1102221	1102221
12/24	CONNECTOR,IDC SCOTCH LOK 55816-22AWG RUN,16-22AWG	1120174	1120174	1120174	1120174
					Reference Dwg: 130E018

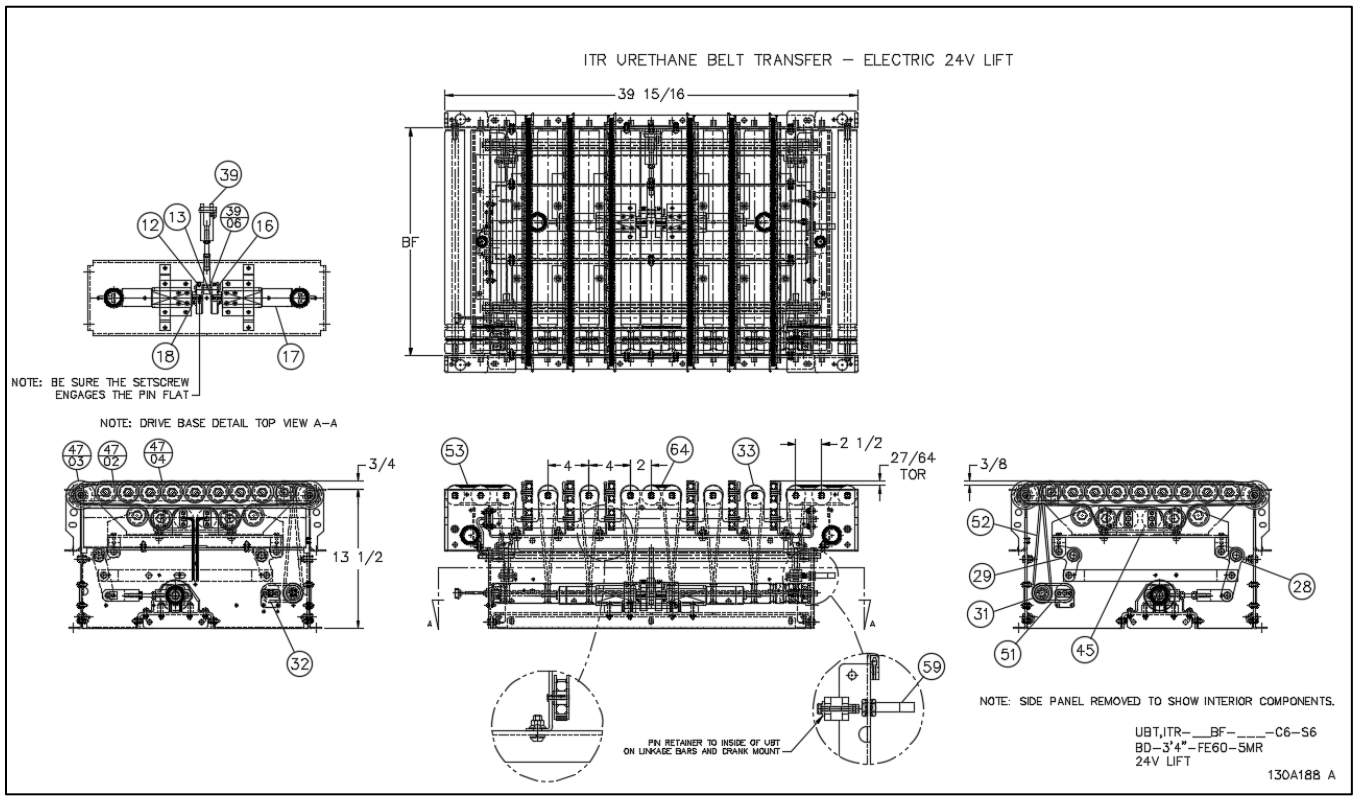
19.15: ITR UBT (PNEUMATIC) ELECTRICAL COMPONENTS 5S &6S



19.15.1: Replacement Parts – ITR UBT (Pneumatic) Electrical Components 5s & 6s

REPLACEMENT PARTS - ITR UBT PNEUMATIC, ELECTRICAL COMPONENTS, IBE, 5s & 6s					
		Width & Item #			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
-----	**ELECTRICAL COMPONENTS**	**-----**	**-----**	**-----**	**-----**
24	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
----	**PE,ASY ITR UBT**		**-----**	**-----**	**-----**
05/01	PE,REFLEX TYPE ,LIGHT OPERATE,2M CABLE W/733-104 CONNECTOR	1163456	1163456	1163456	1163456
05/02	PE,REFLECTOR 20MM X 30MM ADHESIVE BACKED	1136359	1136359	1136359	1136359
----	**PL,ASY ITR CB UBT,LH/RH IB-E03**	**-----**	**-----**	**-----**	**-----**
12/03	DRIVERCARD,ITOH **IB-E03BP**	1166286	1166286	1166286	1166286
12/06	CONN,WAGO 231-302/026-000	1162204	1162204	1162204	1162204
12/07	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
----	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
					Reference Dwg: 130E145

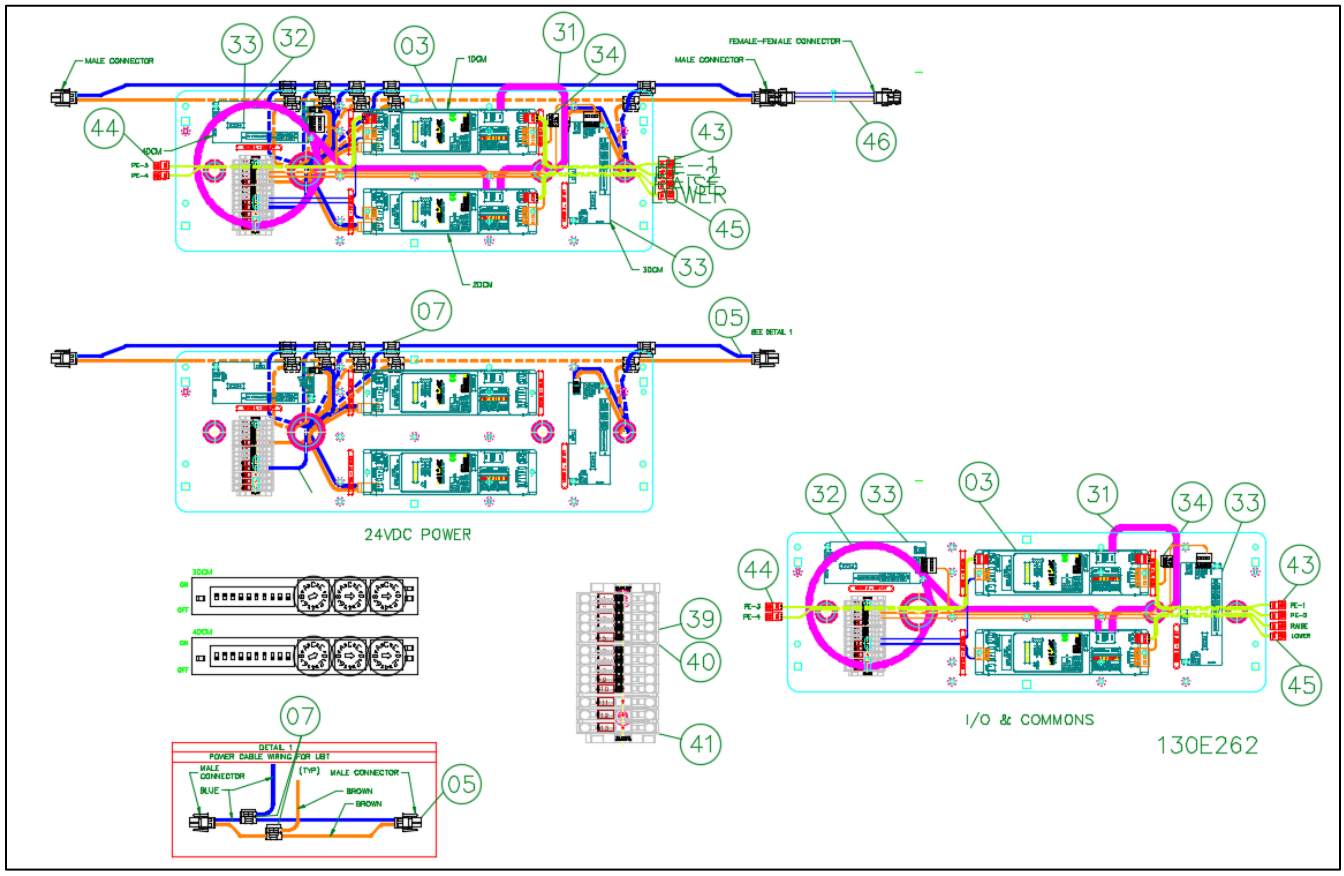
19.16: ITR UBT – (ELECTRIC LIFT) MECHANICAL COMPONENTS 5S & 6S



19.16.1: Replacement Parts – ITR UBT (Electric Lift) Mechanical Components 5s & 6s

REPLACEMENT PARTS - ITR UBT ELECTRIC LIFT, BI-DIRECTIONAL, IBE, 5S or 6S					
		Width & Item #			
Balloon	**Description**	**16 BF**	**22 BF**	**28 BF**	**34 BF**
12	CAM,DRIVE ELECTRIC LIFT UBT,ERS,WING BED	1196464	1196464	1196464	1196464
13	SCREW,#6-32 X 1/4" LG TRUSS HD	1185032	1185032	1185032	1185032
16	PIN,HEAD TYPE,SET SCREW FLAT3/8" DIA PIN,5/8" DIA	1184947	1184947	1184947	1184947
17	DRIVE,KYOWA 24VDC PULSE GEAR PULSE ROLLER	1177986	1177986	1177986	1177986
18	KEY,METRIC MACHINE	1191601	1191601	1191601	1191601
----	**ASY,DRIVE CRANK & ASY,IDLE CRANK**	**-----**	**-----**	**-----**	**-----**
28 & 29	BUSHING,BRONZE,FLANGED3/4 X 1/2 X 1 LG,1/8 FLNG THK	1177970	1177970	1177970	1177970
28 & 29	BUSHING,BRONZE,PLAIN 1/2 X 5/8 X 3/8 LG	1184965	1184965	1184965	1184965
31	ROLLER,CARRIER DRIVE ITR 2 UBT 4"C,5-STRAND ELECTRIC LIFT **(5S)**	1196474	1196474	1196474	1196474
32	ROLLER,ITR 23BF 2G ITOH PM 486 FE-60, 600MM MOTOR CABLE W/ 10 PIN CONN **(5S)**	1191569	1191569	1191569	1191569
31	ROLLER,CARRIER DRIVE ITR,UBT 4"C,6-STRAND ELECTRIC LIFT **(6S)**	1187651	1187651	1187651	1187651
32	ROLLER,ITR 31BF 2G ITOH PM 486 FE-60, 600MM MOTOR CABLE W/ 10 PIN CONN **(6S)**	1191570	1191570	1191570	1191570
33	ROLLER,__ITR 1.9 PLTD PRBG ELECTRIC LIFT UBT	1196522	1196523	1196524	1196525
39	ASY,DRIVE LINKAGE ELECTRIC LIFT	1196442	1196442	1196442	1196442
----	**ASY,DRIVE LINKAGE**	**-----**	**-----**	**-----**	**-----**
39/06	BUSHING,BRONZE,FLANGED3/8 X 1/2 X 3/8 LG1/16 FLNG THK	1184963	1184963	1184963	1184963
----	**ROLLER,ASY ITR __BF NG**	**-----**	**-----**	**-----**	**-----**
45	ROLLER,ITR 23BF NG ITOH PM 486 FE-60, 600MM MOTOR CABLE W/ 10-PIN CONN (5S)	1187620	1187620	1187620	1187620
45	ROLLER,ITR 31BF NG ITOH PM 486 FE-60, 600MM MOTOR CABLE W/ 10-PIN CONN (6S)	1187656	1187656	1187656	1187656
----	**WHEEL BRKT,ASY ITR UBT __"BF**	**-----**	**-----**	**-----**	**-----**
47/02	IDLER,ASY FLAT FACE ITR UBT	1132379	1132379	1132379	1132379
47/03	IDLER,ASY FLANGED ITR UBT	1159961	1159961	1159961	1159961
47/04	BELT,83A .188 X .468 X 66"34BF ITR2 UBT	1132754	1132755	1132756	1132757
51	ORING,3/16 DIA X 8-1/4" HT BLUE	E0034023	E0034023	E0034023	E0034023
52	ORING,83A ST TRNS 3/16X21-3/8	1149850	1149850	1149850	1149850
53	ORING,3/16 DIA X 8.688 HT BLUE	1137420	1137420	1137420	1137420
59	SWITCH,PROX,12MM DIA,FLUSH MT4MM RANGE,M12 4-PIN CONN	1184770	1184770	1184770	1184770
64	ORING,3/16 DIA X 7-3/4" HT BLUE ITR **2"CTR**	1142656	1142656	1142656	1142656
20	CABLE,M12 TO WAGO 733-104,2M5P FEMALE M12 TO 733-104 M12 PIN 4 SIGNAL	1183766	1183766	1183766	1183766
----	CABLE,MOTOR EXTENSION, 600,1200,OR 2700 MM LONG	**REFERENCE MOTOR EXTENSION CABLE TABLE**			
					Reference Dwg: 130A188

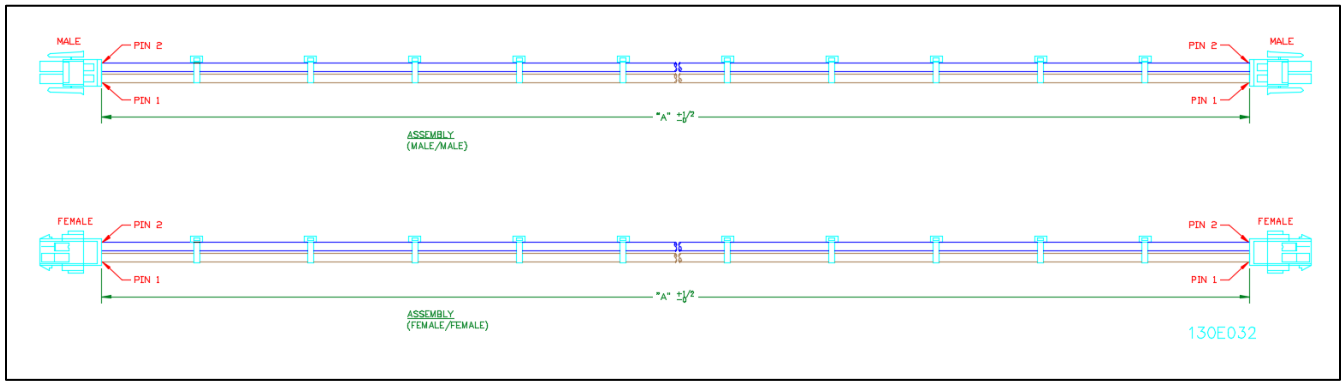
19.17: ITR UBT, (ELECTRIC LIFT) - ELECTRICAL COMPONENTS



19.17.1: Replacement Parts – ITR UBT (Electric Lift) - Electrical Components

REPLACEMENT PARTS - ITR UBT ELECTRIC LIFT, ELECTRICAL COMPONENTS					
		Width & Item #			
Balloon	Description	16 BF	22 BF	28 BF	34 BF
03	DRIVERCARD,**ITOH IB-E03BP**	1166286	1166286	1166286	1166286
-----	PE,REFLEX TYPE ZL-P2465S14 PNP	1163456	1163456	1163456	1163456
-----	PE,REFLECTOR 20MM X 30MM ADHESIVE BACKED	1136359	1136359	1136359	1136359
12/05	HARNESS,POWER,10AWG	**REFERENCE HARNESS TABLES**			
06	CONN,WAGO 231-302/026-000	1162204	1162204	1162204	1162204
07	CONNECTOR,IDC SCOTCH LOK 567 10-12AWG RUN,14-18AWG-BROWN	3M567	3M567	3M567	3M567
31 & 32	CABLE,CTRLS-CAT5E-_'-GRAY	**REFERENCE Cat5E COMMUNICATION CABLE**			
33	DRIVERCARD,INSIGHT EZ24 HTBS HIGH TORQUE PULSE ROLLER	1173108	1173108	1173108	1173108
34	CONNECTOR,IDC SCOTCH LOK 55816-22AWG RUN,16-22AWG	1120174	1120174	1120174	1120174
39	TERM,BLOCK,2-COND,20-10AWG600V,30A,GRAY,6.2mm	1145413	1145413	1145413	1145413
40	TERM,SEPARATOR,ORANGE,2mm	1180509	1180509	1180509	1180509
41	TERM,END BARRIER,GRAY,1mm	1145415	1145415	1145415	1145415
43	HARNESS,ASY IB-E PE1,PE2	1191748	1191748	1191748	1191748
44	HARNESS,ASY IB-E PE3,PE4	1191749	1191749	1191749	1191749
45	HARNESS,ASY IB-E RAISE,LOWER	1191750	1191750	1191750	1191750
					Reference Dwg: 130E262

19.18: HARNESS, GENDER CHANGING



19.18.1: Replacement Parts – Harness, Gender Changing

MALE/MALE POWER HARNESS	
Item No.	**Description**
1141545	HARNESS, POWER, 10AWG, 0' 4"
1134347	HARNESS, POWER, 10AWG, 1'-0"
1134348	HARNESS, POWER, 10AWG, 3'-0"
1134349	HARNESS, POWER, 10AWG, 5'-6"
FEMALE/FEMALE POWER HARNESS	
1141549	HARNESS, POWER, 10AWG, 0' 4"
1134344	HARNESS, POWER, 10AWG, 1'-0"
1134345	HARNESS, POWER, 10AWG, 3'-0"
1134346	HARNESS, POWER, 10AWG, 5'-6"
	130E032

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