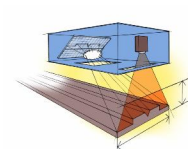




Feature Tracker SL Profile Sensor Technology For Automatic Guiding

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Introduction

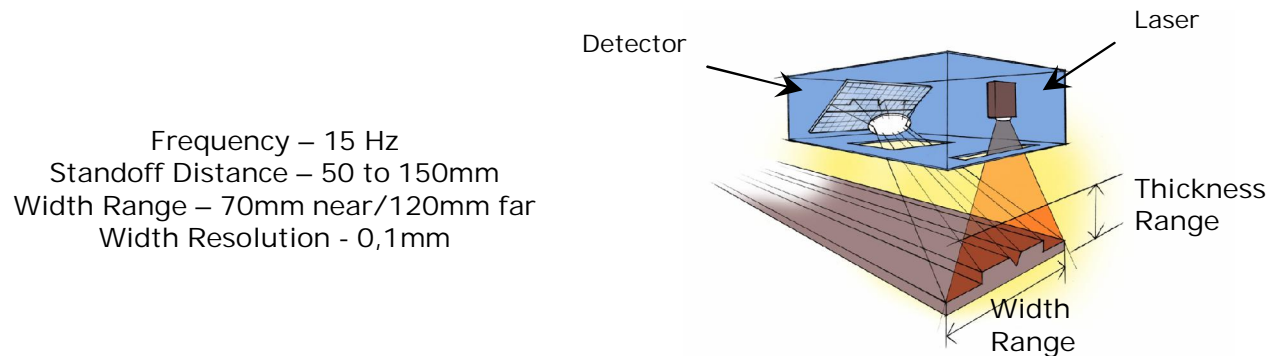
The Bytewise Feature Tracker (FT) is a modular system that can be easily configured to automatically sense the center die groove or bump and output an analog signal to a guiding system. FT can also find the center of treads without grooves or bumps by finding the center point of symmetry along the tread's top profile. The system continuously monitors the profile in real time, providing key profile measurements to the guiding control system. FT Systems utilize Bytewise Profile Sensors to digitize the tread profile.

Two Profile Sensors can be combined to find the outside edges of the tread (or other component) and interpolate the center position for guiding. This configuration is known as the Dual Feature Tracker (DFTSL) system.

FT Systems can also be configured to measure width of extruded or calendered components.

Profile Sensors

Profile sensors are manufactured by Bytewise. The Profile Sensor utilizes a laser light source to project a laser light line across the surface of the profile. The laser light line reflects from the surface, through a lens, and onto a high-resolution 2-dimensional digital detector. These detectors and light sources are assembled into complete sensor assemblies.



Bytewise Profile Sensor SL5100



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Laser triangulation provides for true geometrical measurement of the area of interest. This is far different from traditional front-lit machine vision technology:

- The Profile Sensor works from a data set of 1,024 two dimensional (xy) geometrical coordinates (numbers) whereas machine vision works from a data set of one-dimensional gray-scale images.
- The Profile Sensor is calibrated in two dimensions via a method traceable to NIST Standards.
- The Profile Sensor is not influenced by variations in surface color, texture, and ambient lighting; and does not require back lighting or a special conveyor material. It is a self-contained sensor.

FT Software

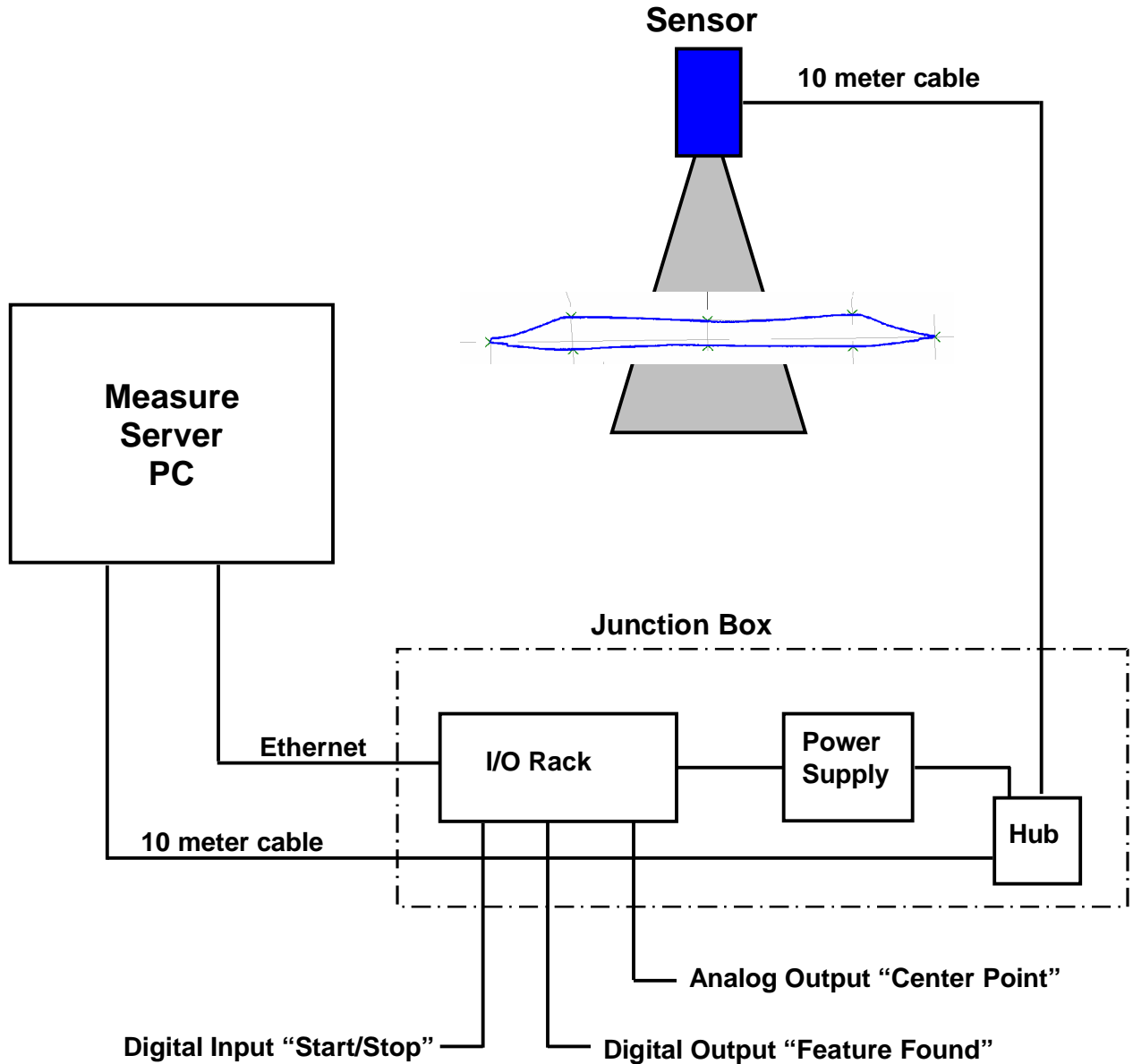
FT software is comprised of several elements:

- Visualization – this displays the visual image of the profile comprised of the 1,024 measurement points.
- Feature Finder Caliper – this caliper finds the center point via any of the following methods, which are selected by the user:
 - First – finds the first feature (bump or groove) the caliper reaches that meets the design criteria.
 - Biggest – this searches the profile for the biggest feature that meets the design criteria – bump or groove.
 - Closest to Size – this permits to user to define the expected bump or groove size while the Feature Finder searches for the feature closest to that size.
 - Symmetry – this compares the left and right-side profile shape to find a center point that exhibits maximum symmetry.
 - Center Point between two outside edges – Dual Feature Tracker (two-sensors) permit recognition of the outside edges and interpolation of the center point location.

Compound reference points can be defined, i.e., the distance between two measure points, such as tread shoulders. The Feature Finder Caliper looks for features within user-defined design criteria – a filter window set by height and width.

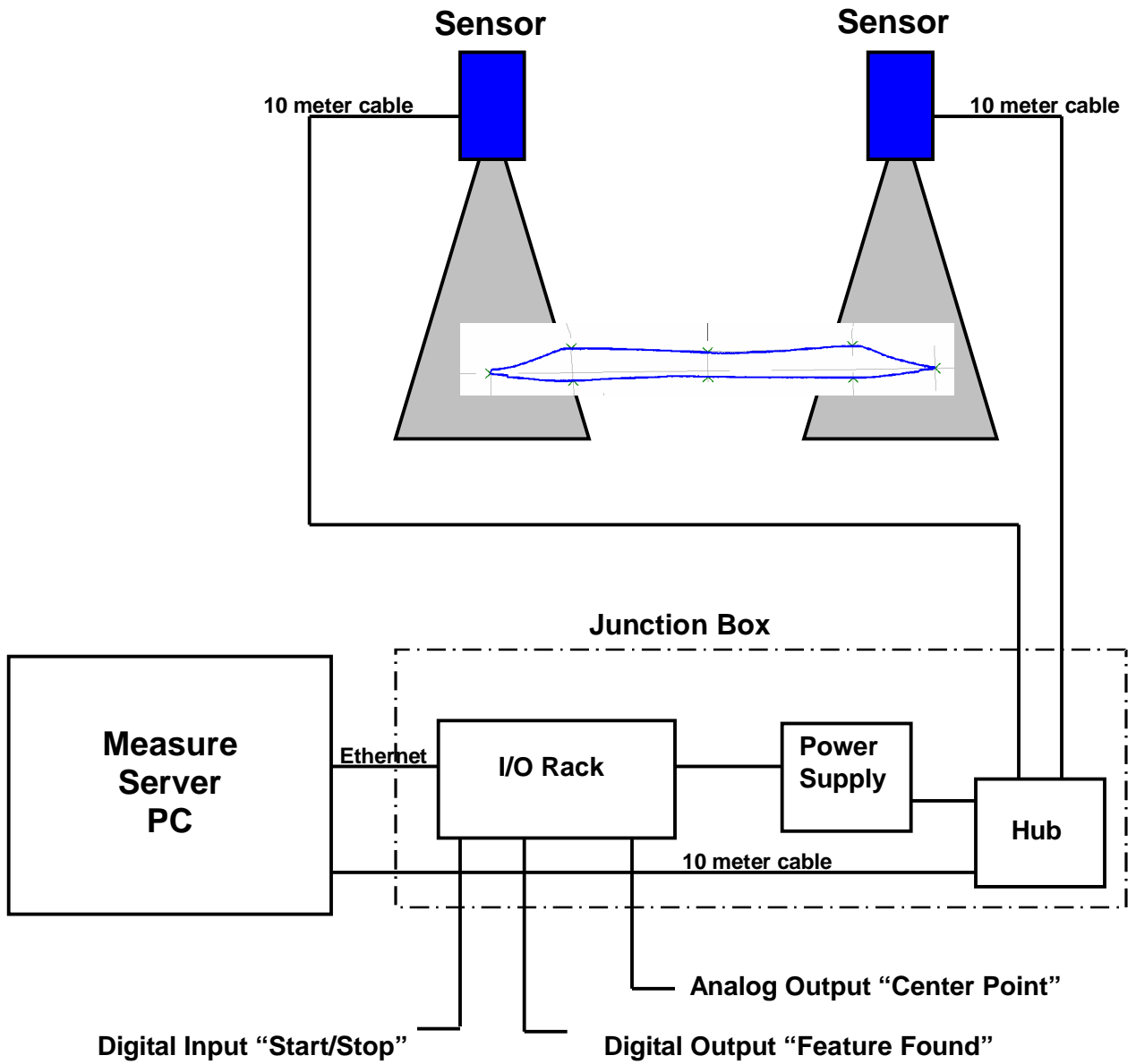
- Output Definition – the output channel can be configured to continuously output the real-time center point location, to output the average of a user-defined number of measures, or to output based on a user-defined measurement interval.
- Trend Graph – the center point location over time can be visualized in a graph.
- Data Log File – all measures can be stored to a data log file that can be exported to external applications such as EXCEL or Mini-Tab.
- Width Calipers - In addition to Center Point Measurement, FT software provides calipers for measuring general purpose width for components such as body plies and belts.

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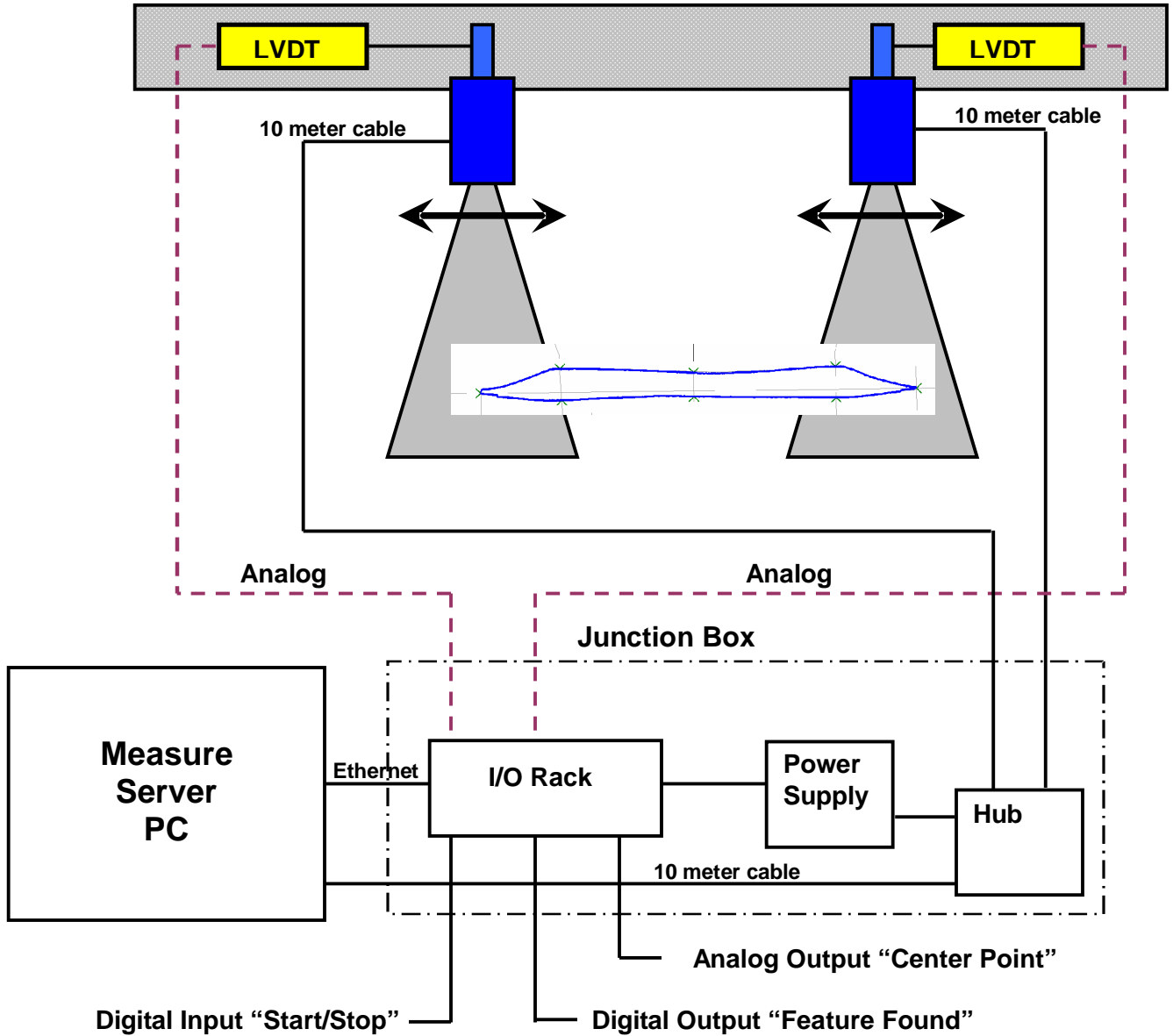
Feature Tracker Configuration for Tread Guiding

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Dual Feature Tracker Configuration for Guiding

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Dual Feature Tracker Configuration Manual or Automatic Width Adjustment for Guiding or Width Measurement



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Measure Server PC

The sensors are wired to the Measure Server PC. This is a desktop PC dedicated to the real-time measurement process. The User should provide a cabinet to protect the PC from the environment. The User should also provide a CRT or LCD Display to view the measurement results and configure the system.

I/O Rack

The I/O rack is configured by ByteWise according to the overall system requirements. The following I/O are available:

- Analog Output "Center Point Location" – This output may be specified as +/- 10 VDC, 0 – 10 VDC, or 4-20 mA.
- Digital Output "Feature Found" - This is ON as long as the FT is finding valid center points, and goes OFF if the center point feature cannot be found. If the center point feature is not found, the system will maintain the Analog Output for the last valid measurement.
- Analog Inputs LVDT – This supports input of the sensor position for systems that provide manual or automatic re-positioning of sensors for edge guiding or width measurement.

Junction Box

A small junction box is provided to house the I/O rack, Sensor hub, power supply(ies), and wiring terminations.

Center Point Reference

All Center Point measurements are referenced to the measurement system centerline, which shall be aligned to the tire building drum centerline by the user.

Limits of Measurement

Measurement of steep angles is limited by the laser reflection back to the sensors. The maximum measurable angle is 60 degrees at the outer edges of the field of view. The maximum measurable angle is 75 degrees at the center of the field of view.

Calibration and Registration

Sensors are factory calibrated. Dual sensor systems require a Registration Fixture to register the sensors into a common coordinate system.



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Pricing and Commercial Terms

Pricing

• <u>Single FT Kit – FTSL5100</u>	<u>\$ 14,450</u>
§ One SL5100 Profile Sensor	
§ Junction Box with power supplies and I/O	
§ Cables	
§ PC	
§ Software	
• <u>Dual FT Kit – DFTSL5100</u>	<u>\$ 21,500</u>
• Two SL5100 Profile Sensors	
• Junction Box with power supplies and I/O	
• Cables	
• PC	
• Software	
• <u>Registration Fixture (one per location, DFT only)</u>	<u>\$ 1,880</u>
• <u>Boxing</u>	<u>\$ 125</u>
• <u>Training and Installation Supervision (estimated)</u>	<u>\$ 3,880</u>
• <u>Spare Sensors</u>	<u>\$ 6,850 each</u>

Service Rates

Bytewise will provide a technician on site to assist in the installation and training for the first system. We have estimated this at one visit, 2 days in the plant, plus 2-days travel. Our service rate is \$950 per day, plus travel and accommodations at cost. Service is invoiced at the actual time plus expenses amount.

• Days in Plant (2)	\$ 1,900
• Days Travel (1)	\$ 950
• Airfare	\$ 900
• Food and Lodging (2)	\$ 220
• <u>Ground Transportation</u>	<u>\$ 60</u>
Total Estimated Amount	\$ 4,030



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Repairs

not to exceed \$3,600 per unit

- Repairs to the SL5 sensors will be done by ByteWise, in our Columbus, Georgia shop, at a time plus materials basis.
- Average turn-around time is 3 weeks.
- Repair does not include PC repair.
- Buyer to pay for shipping expenses each way.

Delivery

- 8 weeks ARO, subject to backlog

Payment Terms (Domestic)

- 100% invoiced at shipping, payable within 30 days.

Payment Terms (International)

- Prices are EXW, Columbus, Georgia, per INCOTERMS 2003
- 100% sight draft L/C opened 60 days prior to shipping, confirmed by a US bank

Warranty

- One-year parts and labor only. Travel expenses, if required, will be invoiced without markup.
- Warranty period begins upon startup or placing into production, but in no case later than 4 months after shipping from ByteWise.

Quote Expiration

- This proposal is valid for 90 days from date of issue.



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TERMS AND CONDITIONS OF SALE

1. **Prices** - All prices are "F.O.B Shipping Point" unless otherwise specified on the quotation. Quotations are firm for 90 days unless otherwise specified on the quotation, and thereafter are subject to review and revision. All excise, sales, use and other similar taxes applicable to this order and required to be collected by the Seller shall be added to the invoice unless appropriate exemption certificate is received. All customs expenses, value added taxes and importing duties required of the Seller when delivering the product shall be added to the invoice unless otherwise specified on the quotation.
2. **Acceptance/Cancellation of Orders** - No contract between Seller and Buyer shall come into existence until Buyer's order had been accepted. Acceptance of Buyer's order is expressly conditioned on Buyer's agreement to these Terms and Conditions of Sale; these Terms and Conditions shall supersede and control any terms and/or conditions, whether oral or on purchase order forms or otherwise, submitted by Buyer, and are subject to modification only by written agreement signed by Buyer and Seller. Orders placed may be canceled, and shipment of goods produced or in process extended beyond the original delivery date, only with Seller's written consent, and upon terms that will equitably compensate Seller.
3. **Terms of Payment** - The standard terms of payment are net cash 30 days from date of invoice. Seller's responsibility under the warranty term below is not lessened by payment of invoice. Interest on all past due amounts will be charged at 18% annual percentage rate or 1.5% monthly percentage rate.
4. **Title/Risk of Loss** - Title to all products and parts ordered and risk of loss shall pass to Buyer upon their delivery to a carrier for shipment. Any claims for shortages or damages suffered in transit shall be submitted by the Buyer directly to the carrier.
5. **Force Majeure** - Seller shall not be liable for any defaults, damages, or delays in filling any order caused by conditions beyond Seller's control, including but not limited to Acts of God, strike, lock-out, boycott or other labor troubles, war, riot, flood, government regulations, or delays of Seller's subcontractors or suppliers in furnishing materials or supplies due to one or more of the foregoing or like causes.
6. **Limited Warranty** - ByteWise warrants that the software and the hardware system will perform substantially in accordance with the accompanying written materials and will be free from defects in material and workmanship under normal use and service for a period of one year from the date of installation.



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CUSTOMER REMEDIES: ByteWise's entire liability and customer's exclusive remedy shall be, at ByteWise's option, either (a) return of the price paid, or (b) repair or replacement of the software or hardware that does not meet this Limited Warranty. Claims of defective material or workmanship must be filed with ByteWise in writing within 30 days of discovery. Repair or replacement of the software or hardware that does not meet this Limited Warranty will be done, at ByteWise's option, either (a) at the offices of ByteWise, or (b) at the site at which the system is installed. **In the event that ByteWise chooses to travel to the system's site, all expenses related to that travel, portal to portal, shall be invoiced to the customer. In the event that ByteWise chooses to ship replacement parts to the system's site, ByteWise shall pay the applicable shipping costs. However, all importation costs associated with the replacement part, including but not limited to, brokerage fees, landing charges, duties, taxes, and storage fees shall be paid by the Buyer. Buyer shall pay for all transportation and export costs for parts returned for repair or exchange.** This Limited Warranty shall not apply to any product or part that has been subject to misuse, negligence, accident, abuse, or misapplication. Warranty period begins upon acceptance at the plant site, but in no case later than 6 months after shipment from ByteWise. Any replacement software or hardware will be warranted for the remainder of the original warranty period or thirty days, whichever is longer. The warranty as set forth is in lieu of all other warranties either expressed or implied. Any alteration or repair made without ByteWise's written approval relieves ByteWise of all responsibility hereunder.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES: To the maximum extent permitted by applicable law, in no event shall ByteWise or its suppliers be liable for any damages whatsoever (including without limitation, special, incidental, consequential, or indirect damages for personal injury, loss of business profits, business interruption, loss of business information, or any other pecuniary loss) arising out of the use of or inability to use this product, even if ByteWise has been advised of the possibility of such damages. In any case, ByteWise and its suppliers' entire liability under any provision of this agreement shall be limited to the amount actually paid by you for the software and hardware system.

- Patent Liability** - Buyer agrees to hold Seller harmless for any liability of Seller for infringement of patents by reason of manufacture according to Buyer's design or by reason of incorporation of a part produced by Seller in a more comprehensive assembly than sold by Seller provided Seller promptly notifies Buyer of any claim or litigation and tenders the defense thereof to Buyer.

Seller agrees to hold Buyer and its customer harmless against only infringement of patents covering the material or part in the form sold by Seller provided Buyer or its customer, as the case may be, promptly notifies Seller of any claim or litigation and tenders the defense thereof to Seller.



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Seller grants no license; expressed or implied, other than the right of Buyer to use the specific material or part in the form delivered by Seller.

8. **Service Calls** - The service of Seller's representatives performed outside Seller's plants are available when specifically covered by a separate service contract.
9. **Inspection** - Buyer will inspect all goods purchased prior to or upon their delivery "F.O.B. Carrier"; Seller will not be responsible for remedying any defects, and Buyer will have no right to reject the goods, if Buyer approves them after such inspection.
10. **Tools, Fixtures** - Tools, fixtures, jigs, dies, etc. needed to provide the goods or services ordered are Seller's property unless specifically purchased by Buyer.
11. **Governing Law** - Our transaction shall be governed by, and all documents shall be interpreted and/or construed under the laws of the state of Georgia, USA.
12. **Indemnification** - Buyer agrees to indemnify Seller for, and hold Seller harmless from, all costs and expenses incurred by Seller, including without limitation, cost of investigation, attorney's fees, and amounts paid in settlement or satisfaction of claims, proceedings, or judgments, in connection with all claims and proceedings against Seller based upon claimed defects in design in any item or items manufactured for Buyer by Seller to Buyer's design and/or specifications.