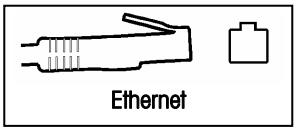
Application Notes

X-Series Option

Weight Data Interface - Ethernet

Description: Ethernet is a networking technology for local networks. The X-Series utilizes Ethernet TCP/IP (10/100 Base-T) for transmitting individual weights to a customer provided peripheral device according to HI-SPEED transmission protocol Weight Data.



If the HI-SPEED XE or XS checkweigher control has the Ethernet option, the weighing terminal is equipped with a physical interface and Ethernet is enabled during the control set up procedure in manufacturing. This interface is an extension of the Ethernet connection on the IPC with the connection usually located in the control cabinet floor in the vicinity of the gland plate. The location will vary with enclosure type. The physical layer is an RJ45 connection which is accessible without opening the control cabinet door and in case of non-use protected by an IP65 rated cover.
A viable link is indicated by a yellow LED (located on the right hand side of the connector), data transmission (active) by a green blinking LED (located on the left hand side of the connector).

Data Communication via the X-Series Control Ethernet Interface

With the connection of the checkweigher to an intranet, several possibilities are now available for transmitting data to the checkweigher or requesting data from the checkweigher via the Intranet. Along with the transmission of Weight Data, there are other pre-defined HI-SPEED applications that use the Ethernet connection including: Freeweigh.Net, HI-SPEED LogInServer and GARECO.net. ReAct II software for remote monitoring and control of information captured by HI-SPEED checkweighers uses an Ethernet interface exclusively for connecting between a checkweigher and PC.

For any of these applications, an IP address must be entered at the checkweigher only once. For applications requiring the delivered data be further processed, for example Weight Data or GARECO.Net, the general operation principle of data transmission by means of Ethernet and TCP/IP must be understood. These applications require additional processing by the customer of the raw weight data provided by the checkweigher. Customers can either create an application to collect and organize the data in a manner that suits their needs or utilize a third party to do this for them.

Basics of TCP/IP

In the 1960s, the American military initiated an order to create a protocol that would allow for a standardized communication, regardless of the hardware and software used, between any number of different networks. From this need of standardized communication arose the TCP/IP protocol in the mid 1970's. Even though TCP and IP are always used together, they are actually two separate protocols one of which works on top of the other. The *Internet Protocol* (IP) ensures the correct addressing technique and delivery of the data packets while the *Transport Control Protocol* (TCP), which runs over the top of IP, is responsible for the transfer and protection of the data.

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Weight Data Interface – Ethernet (Continued)

IP addresses

Under IP each network subscriber has a unique internet address, which is often referred to as an "IP address". This internet address is a 32-bit value that is always transmitted by four decimal numbers separated by decimal points (8-bit values) for better legibility (dot notation). The internet address consists of Net ID and Host ID. The Net ID serves for addressing the network and the Host ID serves the addressing of the network subscriber within a network. The network administrator is free to choose the assignment of the Host ID to the network subscriber and thus the resulting IP address.

TCP – Transport Control Protocol

IP is an unsecured, connectionless protocol, it normally works together with the TCP on top of it with TCP ensuring the protection and handling of the useful data. TCP establishes a connection between two network subscribers for the duration of the data transmission. When a connection is established conditions such as the size of the data packets will be determined. These conditions will remain until the connection is terminated. One can compare TCP with a telephone connection. Subscriber A dials to subscriber B; subscriber B accepts the connection by picking up the phone, the connection then remains until one of the two subscribers ends it by hanging up.

TCP/IP Ethernet

TCP/IP is a purely logical protocol and always requires a physical basis. Today, Ethernet has the biggest popularity among the physical network topologies, and so one finds Ethernet as physical basis in most TCP/IP networks.

TCP works according to the client-server principle:

The network subscriber who builds a connection (i.e. the subscriber who takes the initiative) is called "the client". The client makes use of a service offered by the server, with – depending on the service – one server being capable of serving several clients simultaneously. The network subscriber to which the connection is made is called "the server". A server does nothing actively but waits for a client to establish a connection to it. In TCP context, these two are referred to as TCP client and TCP server. For our purpose the X-Series control would be the server and the client would be the pc connected to the X-Series control using the plant wide Ethernet network.

Configuration of the X-Series Control

In order to set up an X-Series control as a subscriber in the network, the entry of the IP address at the control is necessary. The IP address must, as described above, be unambiguous within the intranet. Also the sub-net entry screen must be set to that value which is valid for the local plant network. These two values are of extreme importance for the correct function of the checkweigher in the network. The values should always be determined by the network administrator. If the IP address is provided to HI-SPEED prior to shipment it can be entered in the control prior to shipment. Otherwise the IP address must be entered during installation.

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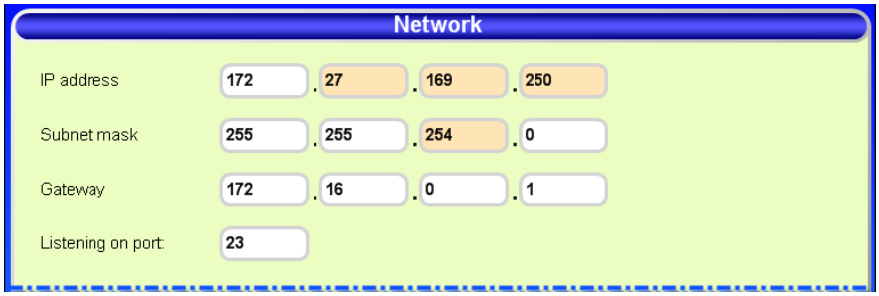
Weight Data Interface – Ethernet (Continued)

The settings shown in the figure below (X-Series) are only an example.



If the optional Ethernet connection or GARECO program has been purchased, the X-Series control has the capability to send the weight data of the weighed products and to answer instructions from the remote control protocol GARECO. Only if one of these two options is active on the checkweigher, a TCP/IP connection can be made from a TCP client to the checkweigher. If none of these two options is active, the TCP-server is not started on the checkweigher and the network services are not available. The checkweigher cannot send weight data or receive GARECO commands.

When Ethernet is the method of communication and Weight Data or GARECO are the protocols the Ethernet connection is enabled in the control in manufacturing and the control can connect to the plant network give the proper IP address is assigned at the control. This holds true for all subsequent checkweighers that will be connected to a customers plant network.

If an X-Series Control Interface Option such as Login Server, ReAct II, or Freeweigh.net is purchased, the purchase price includes enabling the Ethernet connection at the checkweigher along with the software program. The software program resides on the customers host computer. For subsequent checkweighers that will be connected to the same plant network and provide data to the host computer, only the communication option Ethernet must be purchased. It is not necessary to purchase any additional software.

For example if a customer orders 4 checkweighers and wants ReAct II to collect and analyze data they must purchase one complete ReAct II package consisting of the ReAct II software program and one Ethernet interface for one checkweigher. Since they have already purchased the ReAct II program, for the other 3 checkweighers they will only have to purchase the Ethernet communication option for each.

If you have any questions please contact me at HI-SPEED Marketing 607-257-6000.

Best regards,

Mark Feher
Business Development Manager
Checkweighers