1.0 Application

All LCI and RTC LA-306 and LA-309 infrared furnaces with LCI Discrete Digital Control (DDC) Systems with PLC with data logging option enabled. Requires Click C0-11DRE-D Ethernet PLC CPU.

2.0 Scope

To provide instructions for accessing data from the Click programmable logic controller (PLC) central processing unit (CPU) via Ethernet connection.

3.0 Procedure

3.1   Disconnect power.

3.2   Using owner supplied network, user connects to furnace Ethernet Port (labelled "PORT1") on the PLC CPU (Fig 4-1). This connection can be maintained indefinitely.

3.3   Replace cover.

3.4   Reconnect power.

4.0 Data Logging

4.1   While the expected log interval is 1 minute, the furnace program will update the data more frequently.

Figure 3-1 PLC CPU ports

4.2   Owner must use their existing KEPware software or other software to retrieve data from the furnace CPU and to format such data for their own use.

4.3   Users can retrieve any, or all of the following:

4.3.1   Zones 1, 2 and 3 measured process temps (PV), up to 1005 C.

4.3.2   Zones 1, 2 and 3 setpoint temps (SP), up to 1000 C.

4.3.3   Zones 1, 2 and 3 output voltages to lamp controllers (OUT1), as % of 10 Vdc.

4.3.4   Measured belt speed in PPS (shaft encoder pulses/second).

4.3.5   Setpoint belt speed in PPS (shaft encoder pulses/second).

4.3.6   Data access register value showing when CPU memory is available for data retrieval.

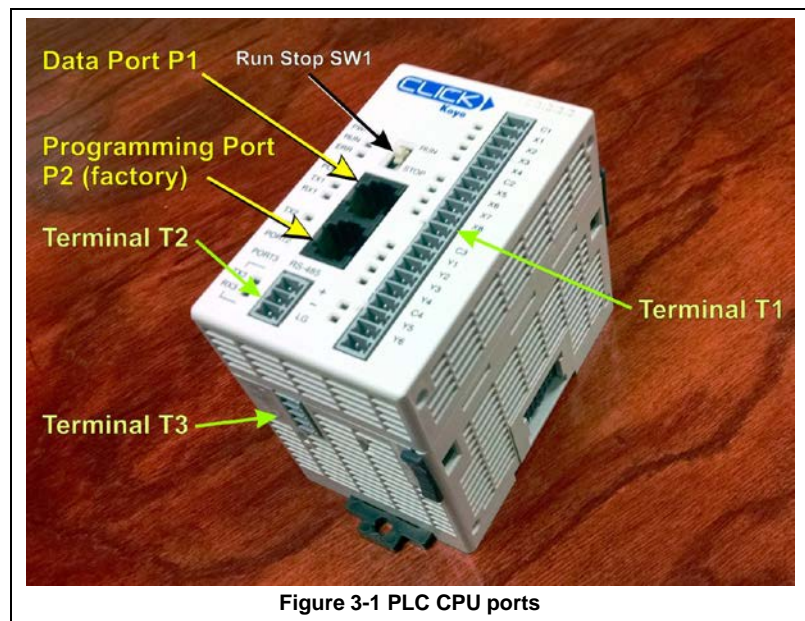4.4   User shall provide date and time information from user's network, not from furnace PLC.

4.5 User shall extract data from CPU memory using MODBUS 984 ADDRESSES (as used in Automation Direct CLICK CPU) and MODBUS FUNCTION CODE 03 (extracts data from holding registers).

Data Item	MODBUS 984 Address	Function Code	Data Type
ZN1 PV TEMP	400062	03	INTEGER
ZN1 SP TEMP	400063	03	INTEGER
ZN2 PV TEMP	400064	03	INTEGER
ZN2 SP TEMP	400065	03	INTEGER
ZN3 PV TEMP	400066	03	INTEGER
ZN3 SP TEMP	400067	03	INTEGER
ZN1 OUT 1 LVL	400068	03	INTEGER
ZN2 OUT 1 LVL	400069	03	INTEGER
ZN3 OUT 1 LVL	400070	03	INTEGER
BELT PV PPS	428753, 428754	03	FLOATING POINT
BELT SP PPS	428751, 428752	03	FLOATING POINT
ACCESS DATA FLAG	400024	03	INTEGER

4.6 Zone temperatures (PV and SP) are in degrees Centigrade and are stored as ####, to be read as ###.# C (or as #### C above 999.9 C).

4.7 Output levels (OUT1) are in % of 10 Vdc and are stored as ####, to be read as ###.# % of 10 Vdc over a range of 0-100.0%.

4.8 Belt PPS readings are in pulses per second. To convert these readings to, say, inches/minute, the user should determine how fast the furnace belt travels at full speed. Crank the belt speed to maximum and measure the time an object on the belt takes to travel the length of the furnace chamber (i.e. from the time the object just enters the chamber until it just emerges at the exit). Divide the furnace chamber length by the travel time (say 105.5"/7.3 minutes) and you get a maximum speed of 14.45 ipm. If your measured belt PPS readings were 967 PPS at that maximum 14.45 ipm belt speed, you now know that 14.45/967 gives you a linear scaling factor to calculate the belt speed in inches/minute as a function of belt encoder pulses/second, or in this case: 0.01494 ipm/PPS. So, a belt speed of 300 PPS, is a belt speed of 300 * 0.015 (rounded off) = 4.5 ipm.
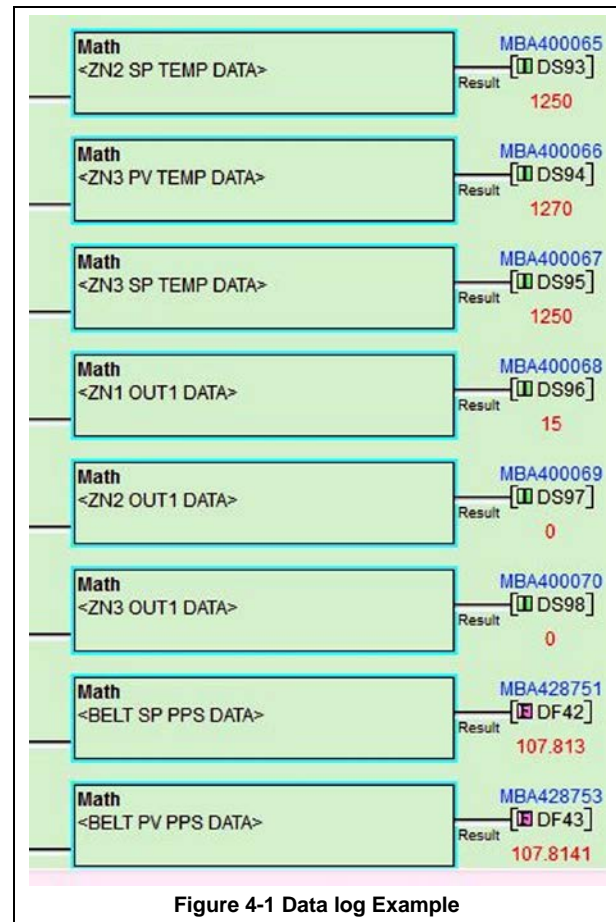

Figure 4-1 Data log Example

4.9 Data acquisition in the furnace occurs over a 2-second cycle. The ACCESS DATA FLAG values are either:

1000, which means data is available for retrieval (usually over 99% of that cycle), or

1111, which means data is being transferred to the data logging memory area (about 1%).

So, the opportunity for conflict is low, but it is recommended that you transfer data from the data logging memory area only when the ACCESS DATA FLAG is set to **1000**.