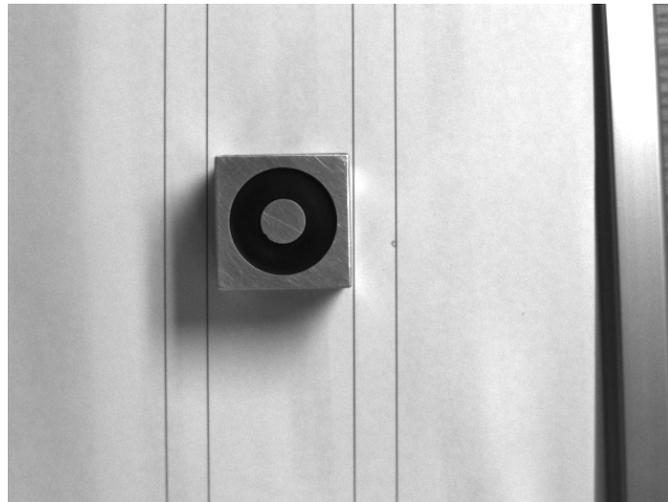
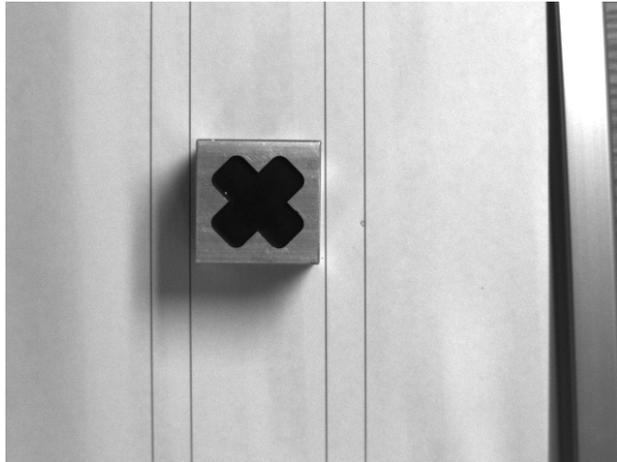


## Project Scope:

This project uses the Cognex Insight Micro 1050 series camera, 12MM lens and natural lighting. It is part of the Q Point Robotic Solutions Q-CIM Automation Training cell which will teach students to integrate a robot and vision system for both part ID and part location. The vision system is inspecting a 1.5" X 1.5" square block with either an "X" or "O" milled on the side of the block. The block is milled on all 6 sides with either an X or O. Below are sample images of the part



The camera is programmed to identify if the block is displaying an "X" or the "O" and the angle variance from the taught position. The data is then transferred via Ethernet from the camera to the Denso controller. The Denso Controller will act as a client, requesting information from the server which is the Cognex Micro. The Denso sends a "Native Mode command, "GV" or Get Value and the cell address of the Insight program stored in the camera.

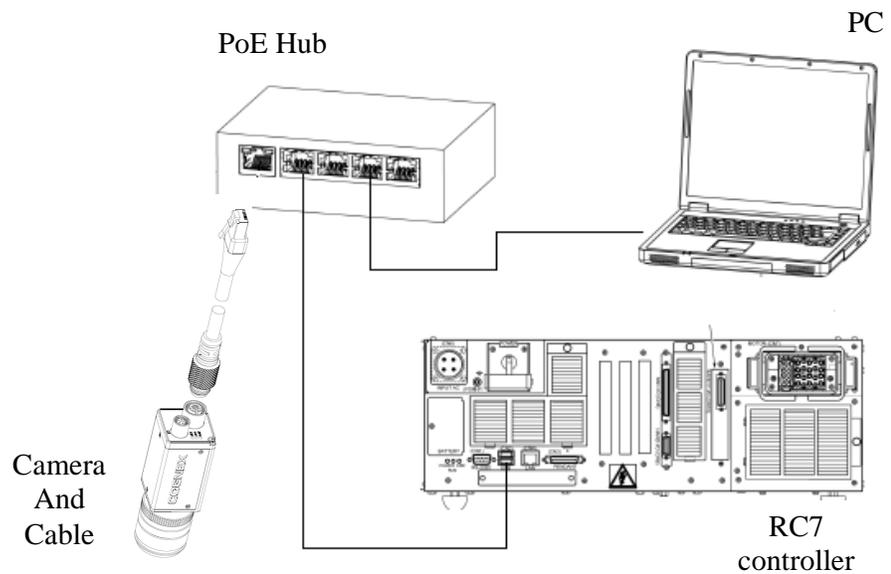
This document will cover how to setup the Denso RC7 controller and Cognex camera to send data between the 2 devices via an Ethernet hub connection.

## Connecting the different devices

The three devices we want to connect to the Ethernet hub are:

1. Computer (IP address = 192.168.0.250 subnet = 255.255.255.0)
2. Camera (IP address = 192.168.0.102, subnet = 255.255.255.0, Port 5001)
3. Denso (IP address = 192.168.0.100 subnet = 255.255.255.0)

Note the IP address and subnet mask. Try to use these IP addresses and subnet masks if possible.

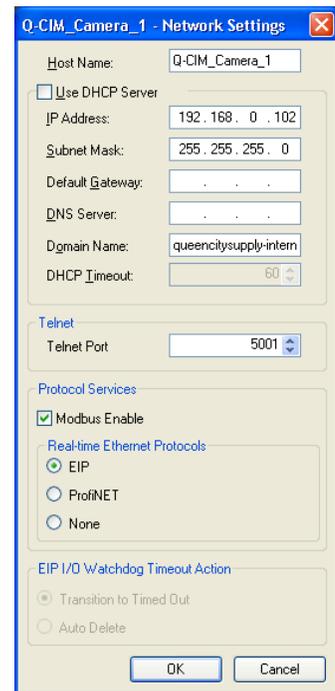


1. Attach the M12 connector of the PoE cable to the sensor's PoE connector.
2. Attach the RJ45 end of the PoE cable to the PoE Hub
3. Connect the Ethernet cable from the Denso controller's Ethernet port to the PoE Hub
4. Connect the Ethernet cable from the PC to the PoE Hub
5. Connect the power supply from the PoE hub to 110VAC

# Setting up the Cognex Micro Series Camera

You will need to connect to the camera via Ethernet thru the Insight Explorer.

- You can use the System > Add Sensor/Device to Network menu item
- Wait for Insight to find the camera.
- Modify the IP address and subnet mask to match the above camera values
- Make note of the values. You will need to change the Denso controller "Client" address to match the camera values.
- Be sure to change the Telnet port to 5001. This matches the Denso Client port.
- You will want to use the "Concatenate" function in Insight to create a string of X, Y and Angle offsets with comma delimiters. This is what will be sent to the Denso.
- The Denso controller will then separate each value and store them in global string variables.



Sample Insight Concatenate function

Concatenate(U156,"",V156,"",W156,"",F33)

X , Y , Angle , Block Type

In-Sight Explorer - admin - [Q-CIM\_Camera\_1 - Spreadsheet View]

Concatenate(U156,"",V156,"",W156,"",F33)

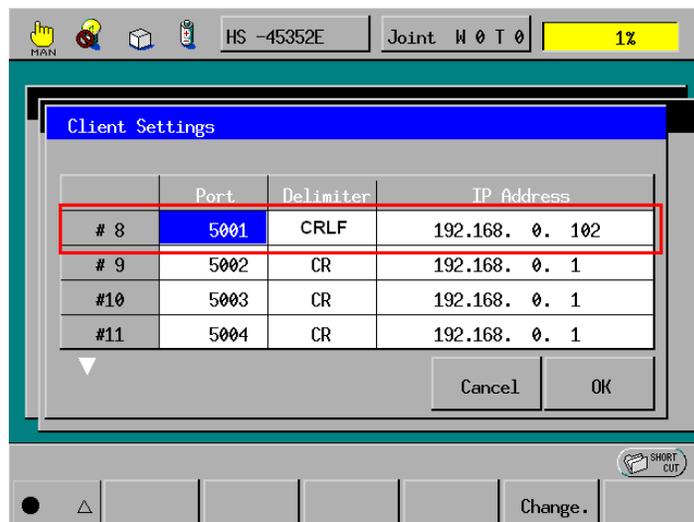
Row	Col	Angle
239.223	330.047	-0.199
2.664	4.319	179.836
2.743	179.80	
2.664392,4.316799,179.635907,X_Block		

End

## Configuring the client of the robot controller

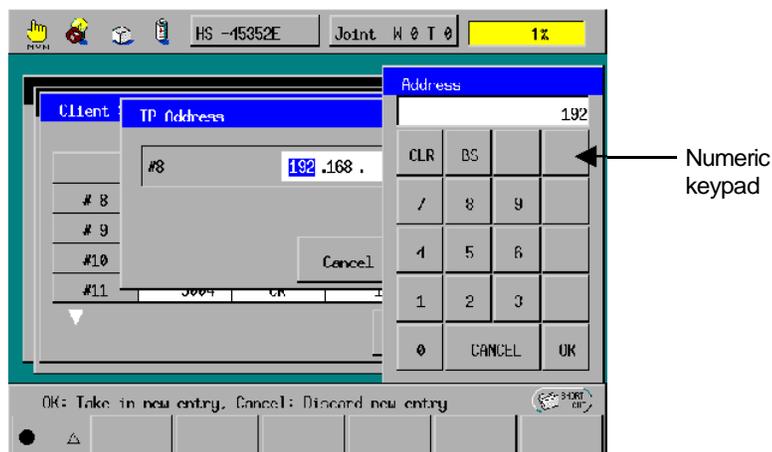
Access: [F6 Set]—[F5 Set Com.]—[F10 Client]

- (1) Press [F10 Client] in the Communications Setting Menu, and the Client Settings window will appear as shown below.



- (2) To set the IP address of the target connection port, (Cognex camera IP address), select the IP Address field to be set and press [F5 Change.] and then [F5 Edit].

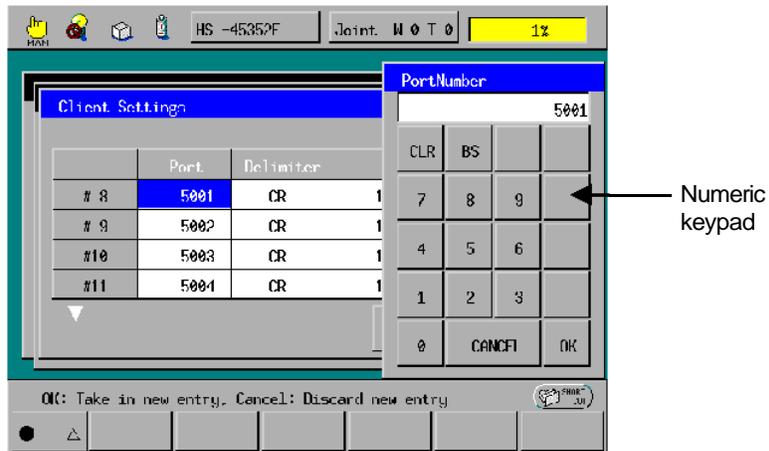
The numeric keypad will appear as shown below.



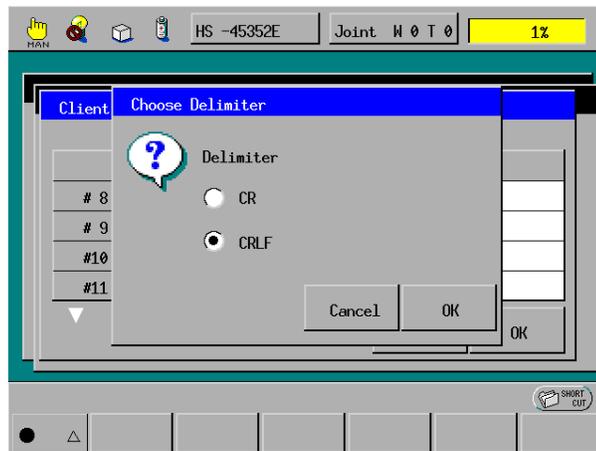
- (3) Enter the desired value with the numerical buttons in the above window, and then press the OK. button The newly entered value will appear on the Client Settings window.

- (4) To set the target connection port number, select the Port field to be set and press [F5 Change].

The numeric keypad will appear as shown below.



- (5) Enter the desired value to the target connection port with the numerical buttons in the above window, and then press the OK button. The newly entered value will appear on the Client Settings window.
- (6) To set the delimiter, select the Delimiter field to be set and press [F5 Change]. The Choose Delimiter window will appear as shown below.



- (7) Select the desired delimiter code (use CRLF for the Cognex camera) in the above window, and then press the OK button. The new delimiter code will appear on the Client Settings window.
- (8) Check the new entry, then press the OK button to make the new entry go into effect.
- If you press the Cancel button instead of the OK button, the new entry will be cancelled. To close the Client Settings window, press the OK or Cancel button

# Robot's Aquire Image Program

```

!TITLE "Aquire an image from Cognex"
PROGRAM Aquire

DIM iX AS INTEGER
DIM iTIME_OUT AS INTEGER

FOR iX = 0 TO 6      'clear the textboxes in the panel screen
S[iX] = ""
NEXT iX

COM_STATE #8,I2    'check that we are connected to the camera network
IF I2 = -1 THEN    'if the camera is not connected to the camera network, this will make the connection
  COM_ENCOM #8
  FLUSH #8
  DELAY 10
  PRINT #8 "admin" 'if you changed the default administrator in the camera, this will need to match that change.
  PRINT #8 ""      'if you assigned a password to your camera, this will need to match that password.
  INPUT #8, S[0]
ENDIF

FLUSH #8          'clear any data in the robot comm. buffer

PRINT #8, "GVU168" 'Native mode command sent to the Cognex camera to read the Insight cell "U168" which
                  ' stores the part offset in X, Y, Angle and Block Type

INPUT #8, S1,WTIME=2000, RVAL=iTIME_OUT, S2,WTIME=2000, RVAL=iTIME_OUT, S3,WTIME=2000,
      RVAL=iTIME_OUT, S4,WTIME=2000, RVAL=iTIME_OUT, S5,WTIME=2000, RVAL=iTIME_OUT

IF iTIME_OUT = 0 THEN
  S[6] = "NO VISION DATA... ENDING"
  END
ENDIF

COM_DISCOM #8

END
  
```

# Robot's Panel Program

The screenshot displays the robot's panel interface and its source code. The panel window, titled 'Layout - Panel1', shows a green background with the text 'Aquire Cognex Vision Data'. Below this, there are six text boxes labeled TB1.TEXT through TB6.TEXT, each with a corresponding label and value: TB1.TEXT = S[0], TB2.TEXT = S[1], TB3.TEXT = S[2] (X), TB4.TEXT = S[3] (Y), TB5.TEXT = S[4] (ANGLE), and TB6.TEXT = S[5] (BLOCK TYPE). A green button labeled 'AQUIRE IMAGE' is positioned to the right of the text boxes. A yellow bar at the bottom of the panel is labeled IPB2. The source code window, titled 'Source - Panel1', shows the following code:

```

00001
00002 DEF IPB1_CLICKED()
00003   RUN AQUIRE
00004 END
00005
00006 DEF Panel1_INITIALIZE()
00007   S[0] = ""
00008   S[1] = ""
00009   S[2] = ""
00010   S[3] = ""
00011   S[4] = ""
00012   S[5] = ""
00013   S[6] = ""
00014 END
00015
00016 DEF IPB2_REFRESH()
00017   TB1.TEXT = S[0]
00018   TB2.TEXT = S[1]
00019   TB3.TEXT = S[2]
00020   TB4.TEXT = S[3]
00021   TB5.TEXT = S[4]
00022   TB6.TEXT = S[5]
00023   IPB2.CAPTION = S[6]
00024 END
00025
  
```