

## Product Briefing: 6 things you should know before specifying a laser measurement system for your next project

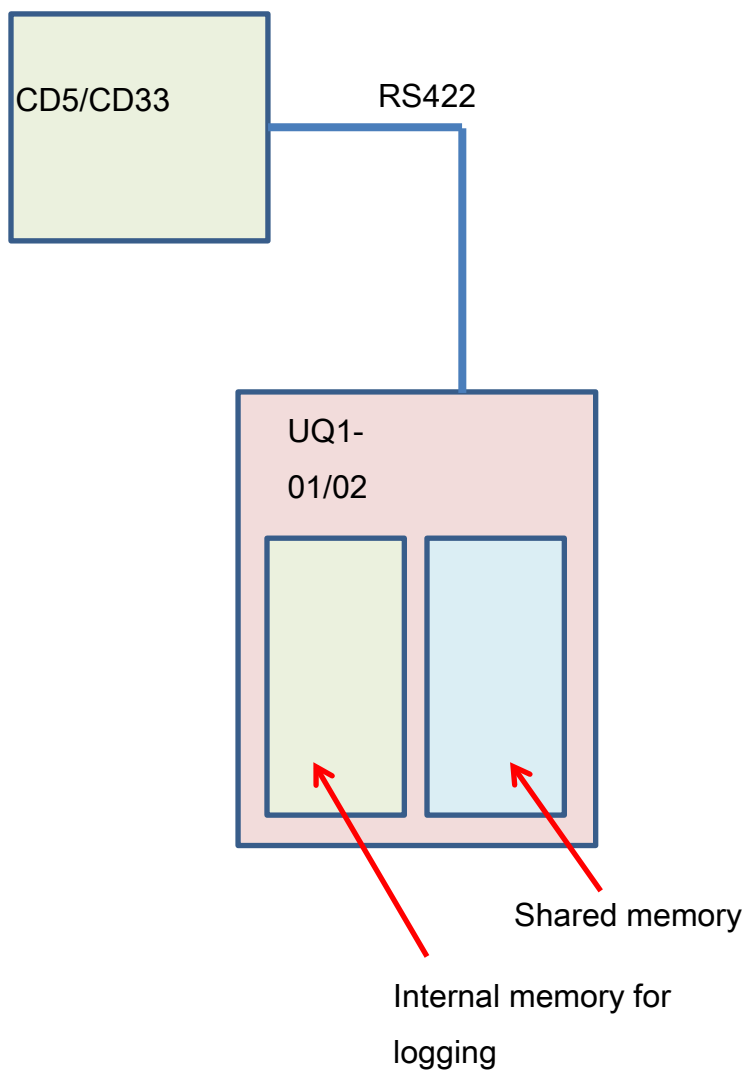


### Synopsis:

The UQ1 displacement laser sensor controller unit from Optex FA was designed to provide direct connection between Optex FA Laser measurement sensors and the Mitsubishi Q series PLC. The high speed controller incorporates a built in microprocessor, which automatically communicate with the PLC, eliminating complex communications set-up. The shared memory and data logging memory can be read by accessing the shared memory on the card.

# 1. The UQ1 laser measurement controller card from Optex FA provides Seamless Integration between the Optex Laser measurement sensor and the Q series PLC card.

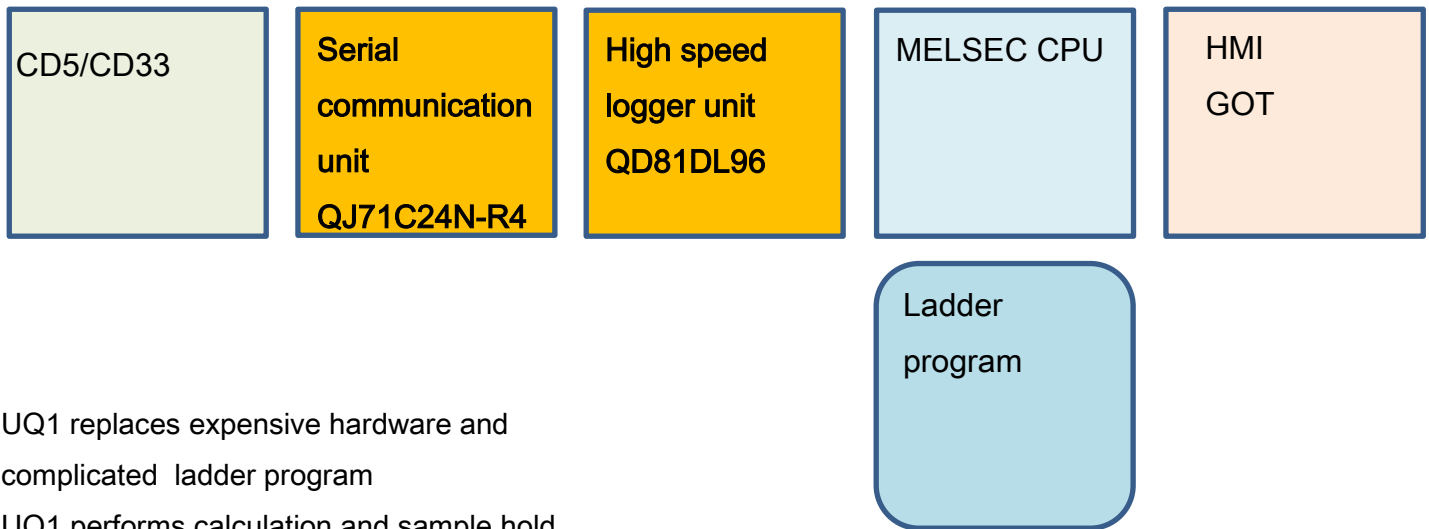
When the sensor is wired to the card and the card is connected to the Q series bus, the onboard microprocessor of the controller card establishes communication with the sensor. The microprocessor reads the information from the sensor and places the sensor's parameters and measurement data in internal and shared memory inside the card.



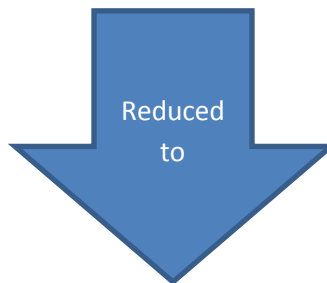
## 2. The UQ1 laser controller card combines a communication card and data logging card into one lower cost solution

By incorporating a communication module and data logger into one unit the number of components required for set-up and data acquisition have been reduced.

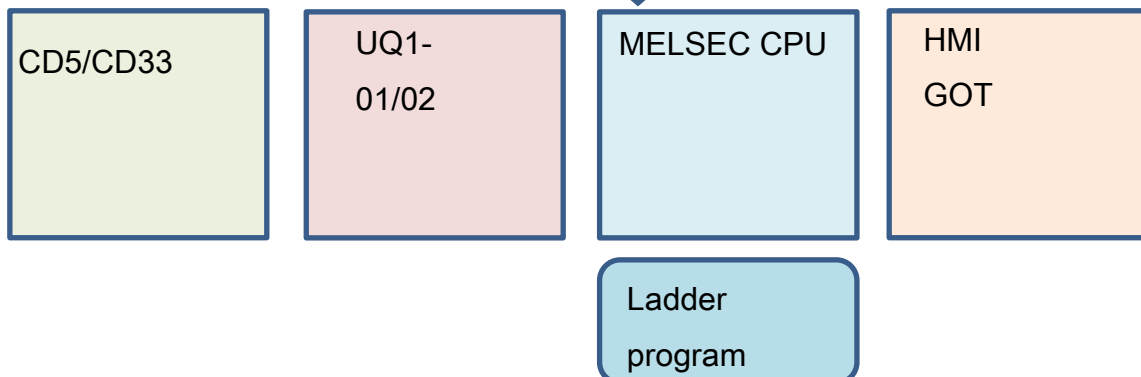
### Previous Solution



1. UQ1 replaces expensive hardware and complicated ladder program
2. UQ1 performs calculation and sample hold



### UQ1 Solution



### 3. Two Laser heads can be connected to one card providing trigger inputs and 2 physical digital outputs

The chart below shows how the data is processed in the UQ1 Series controller card.

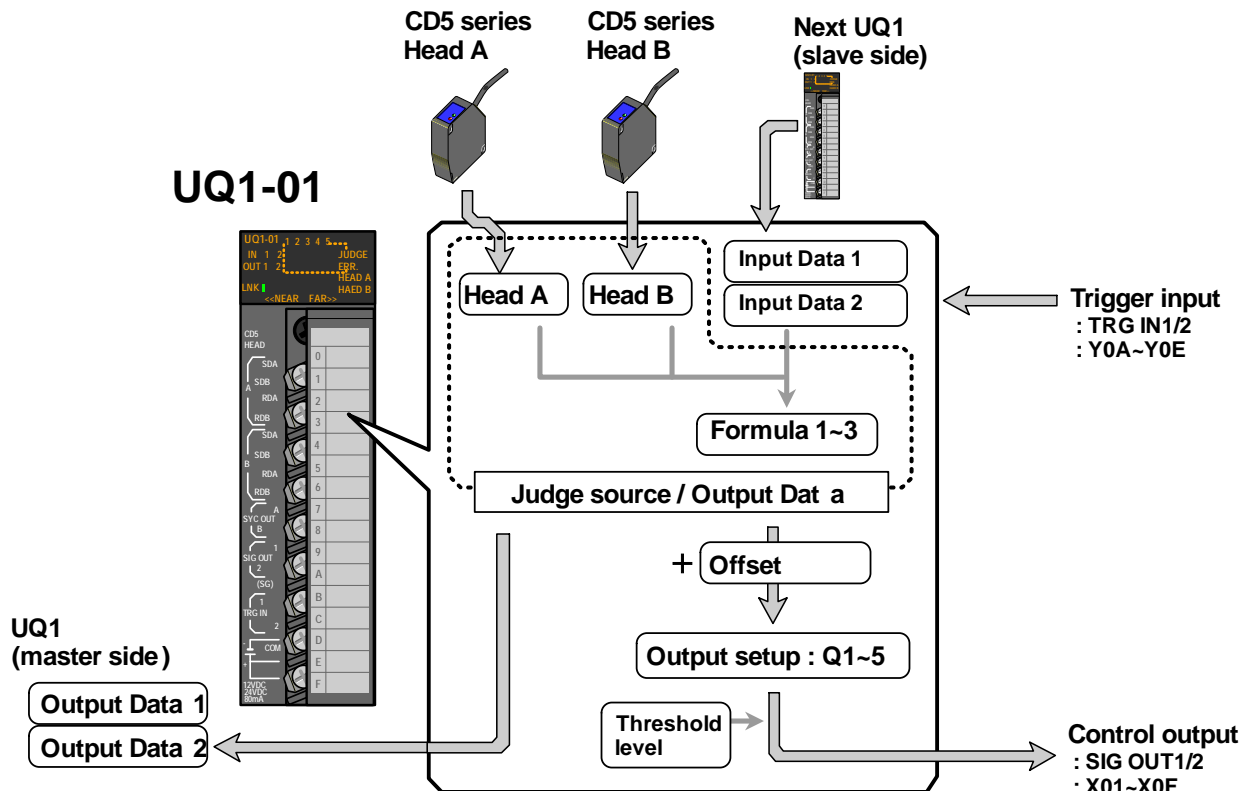
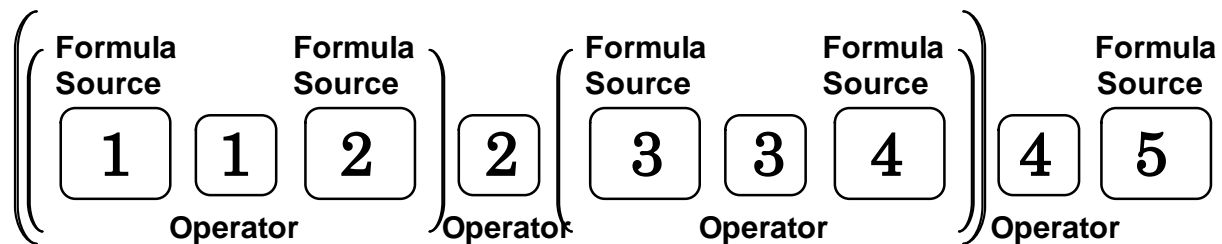


Chart above shows the data flow of the UQ1-01 for the CD5 series  
UQ1-02 version is for the CD33 Series. The same principle applies

#### 4. The onboard microprocessor has several measurement algorithms included that eliminate complicated programming.

Up to 3 formulas can be set up at the same time. Here is the format for the calculation



Formula Source

- 0: None
- 1: Measurement result of Head A
- 2: Measurement result of Head B
- 3: Receiving data 1 (FlrST transmit data 1 from next unit)
- 4: Receiving data 2 (FlrST transmit data 2 from next unit)
- 5: Fixed value

#### ● Operator

Specify operator of the formula.

You can use "+: addition", "-: subtraction", "=: multiplication" and "÷: division".

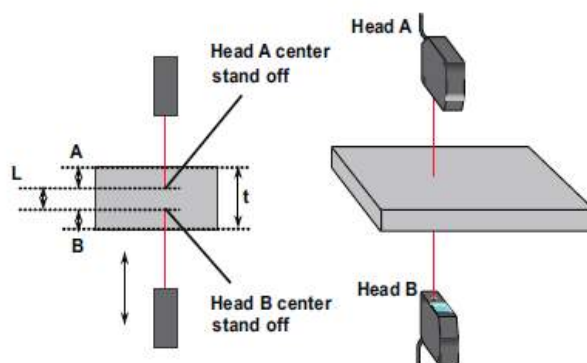
[Parameters]

- 0: +
- 1: -
- 2: \*
- 3: ÷

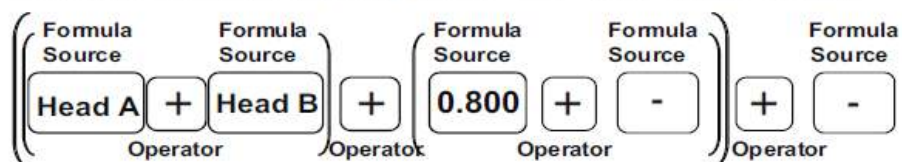
Here are some examples of the formulas that can be set-up.

### Calculation of thickness

Because the distance between two sensor heads is fixed, the object thickness is calculated by  $t=(A+B)+L$ . Please set "L" by calibration using a gauge.

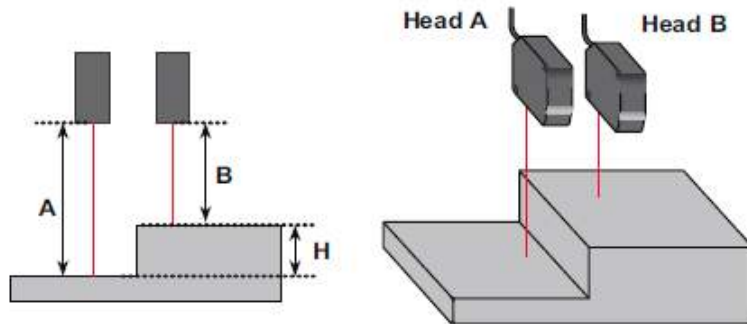


For example, when the thickness of the object is 10mm and "A+B" is 9.2mm, set the formula as follows. Set the "Fixed value" as "0.800" ( $L=t-A-B$  then  $10\text{mm} - 9.2\text{mm} = 0.8\text{mm}$ ).

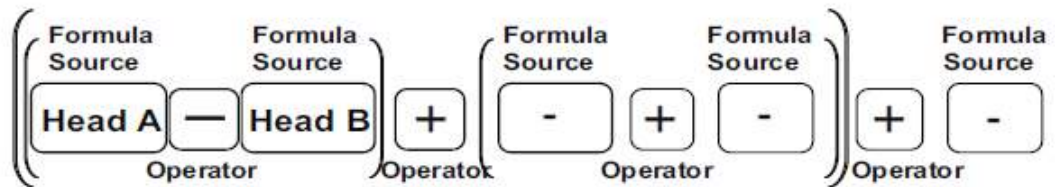


## Calculation of step height

Height of the step from the base is calculated by " $H=A-B$ ".



Formula for calculation of step height is as follows.

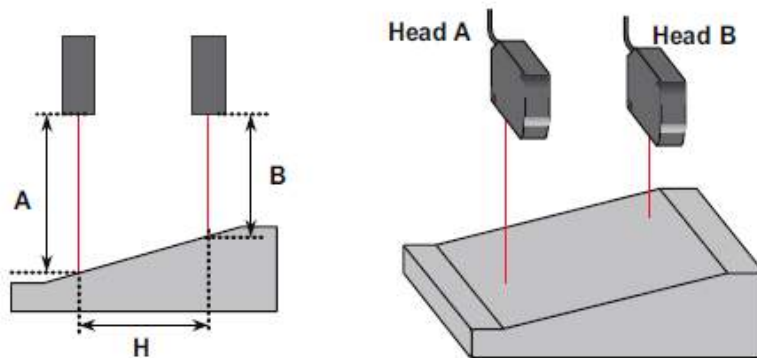


## Calculation of inclination

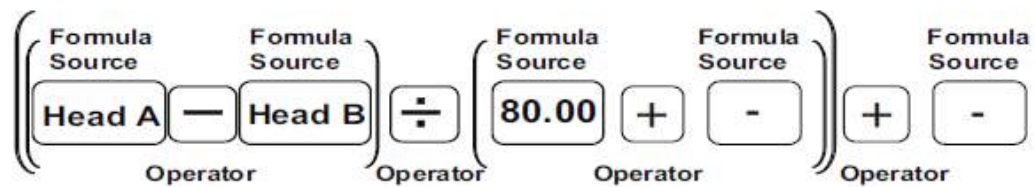
Inclination is calculated with distance between sensor heads (Fixed value "L").

The formula is as follows.

$$\theta = \tan^{-1} \left( \frac{A - B}{L} \right) \xrightarrow{\text{Approximation}} \theta = (A - B) / L$$



When the distance between two sensor heads is 80mm for example, the formula is as follows.





## **5. High speed response independent of PLC scan time**

The UQ1 has a built in Microprocessor and data storage that can operate independently of the PLC Microprocessor and scan time. This enables high speed communication that is as fast as 100 microseconds for the CD5 series. The UQ1 card also incorporates 2 digital outputs that are also independent of the PLC for GO - NO GO logic.

## 6. The Q series PLC can access the set-up, measurement data, and calculation data by reading the shared memory of the UQ1 controller

Data available in the shared memory

Evaluation result for Q1 – Q5 with offset added

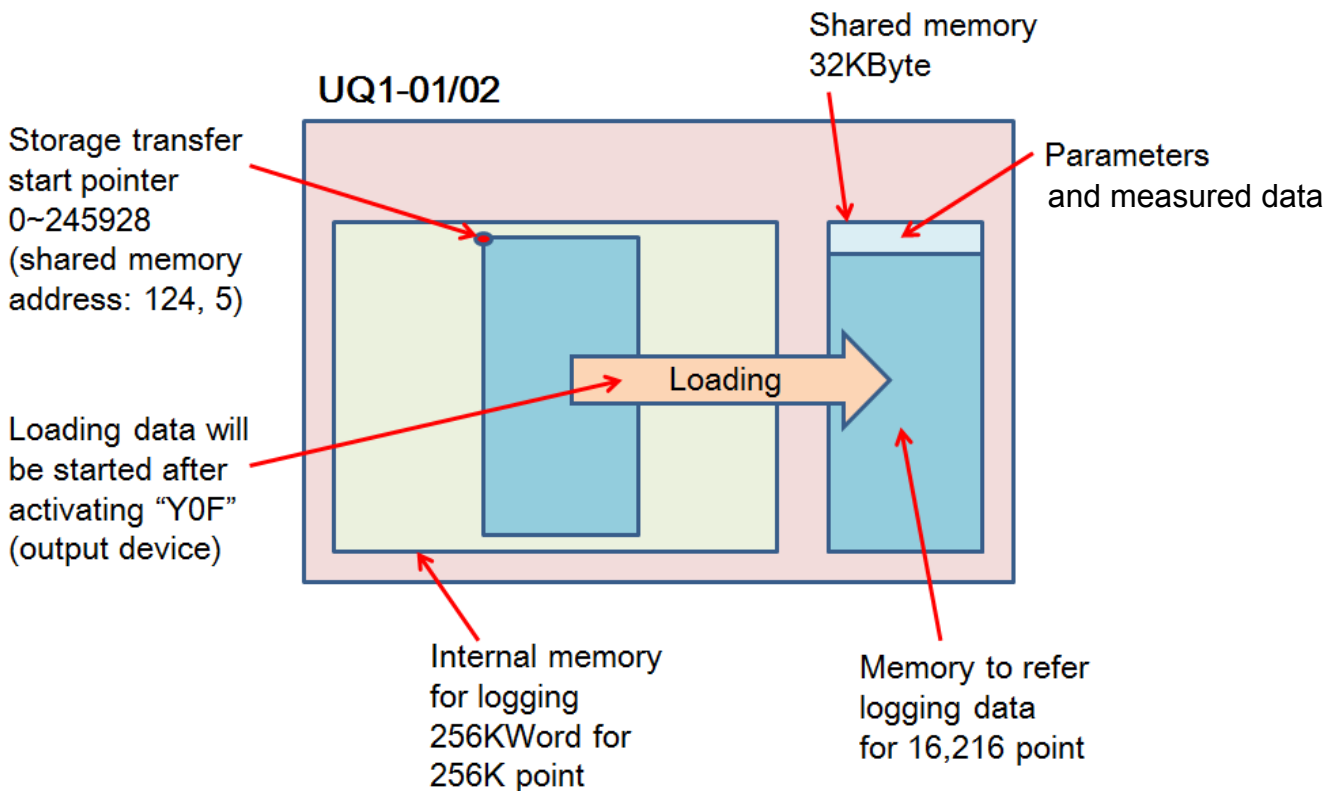
Measured result from Head A and Head B

Calculated results of any formulas

Received data between cards connected together via IR port

Hold Results: Sample, Peak hold, Bottom Hold, Average Hold

Results of data logging



To learn more about the Optex FA UQ1 displacement laser measurement controller card and Optex FA laser measurement solutions please give us a call at 800-280-6933 and visit our website at [www.optex-ramco.com](http://www.optex-ramco.com). If you would like for us to arrange an evaluation/ demo please give our office a call at 800-280-6933 or email us at [nsales@ramcoi.com](mailto:nsales@ramcoi.com)

