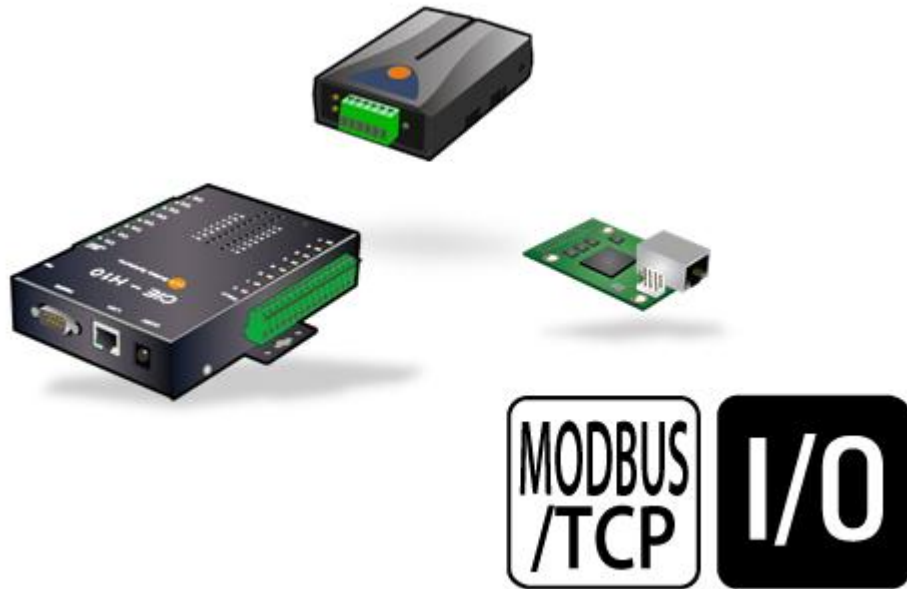


ezTCP Technical Documents

# Digital Pulse Output

Version 1.0



☞ *Caution: Specifications of this document may be changed without prior notice for improvement.*

Sollae Systems Co., Ltd.

<http://www.sollae.co.kr>

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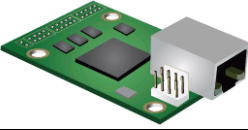


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# 1 Overview

As one of the control methods, all of our digital I/O controllers support Modbus/TCP in which it is possible to make user-defined functions for specific operations. Our products support a new function that outputs digital Pulse during certain time.

Directions for using this function are covered in this document.

Table 1-1 available products

Product	Type	Number of Port			Firmware version
		Digital		Analog	
		Input	Output	Input	
CIE-H10 	External	8	8	0	1.4B ~
CIE-M10 	Modular	8	8	1	1.4B ~
CIE-H12 	External	2	1	0	1.4B ~
EZI-10 	External	1	1	0	1.0D ~

## 2 Pulse Output

### 2.1 What is the Pulse Output?

Pulse output generally means that the level of output signals is toggled every certain time interval (period:  $T$ ). Contrastively, the Pulse output we define here is staying HIGH(ON) or LOW(OFF) for a specific time(duration:  $t$ ) and returns the previous status straightaway.

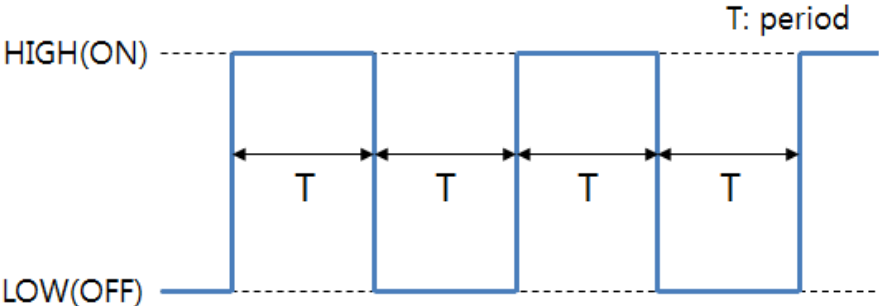


Figure 2-1 general pulse output

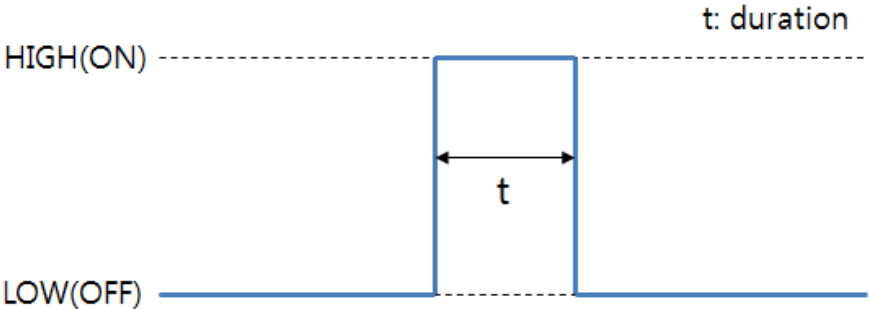


Figure 2-2 HIGH Pulse output function

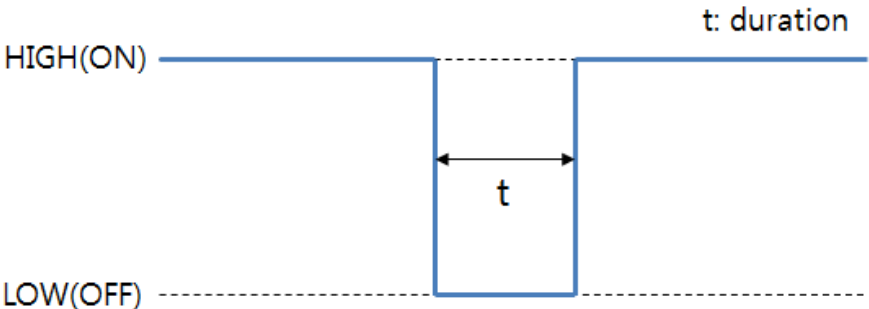


Figure 2-3 LOW Pulse output function

## 2.2 Implementation of Pulse Output

Modbus/TCP offers some functions such as Write Multiple Register (FC 16) and Write Coil (FC 05) for controlling output ports. If you are supposed to implement the Pulse output with the two functions, the Master program should calculate the exact time of arrival of Modbus/TCP queries to control the output ports for certain time.

For instance, let us assume that you need a normal open system which should be closed for 3 seconds in specific situations. Then you can realize the system with Write Coil function (FC 05) as follows:

### 2.2.1 Output a Pulse with FC 05

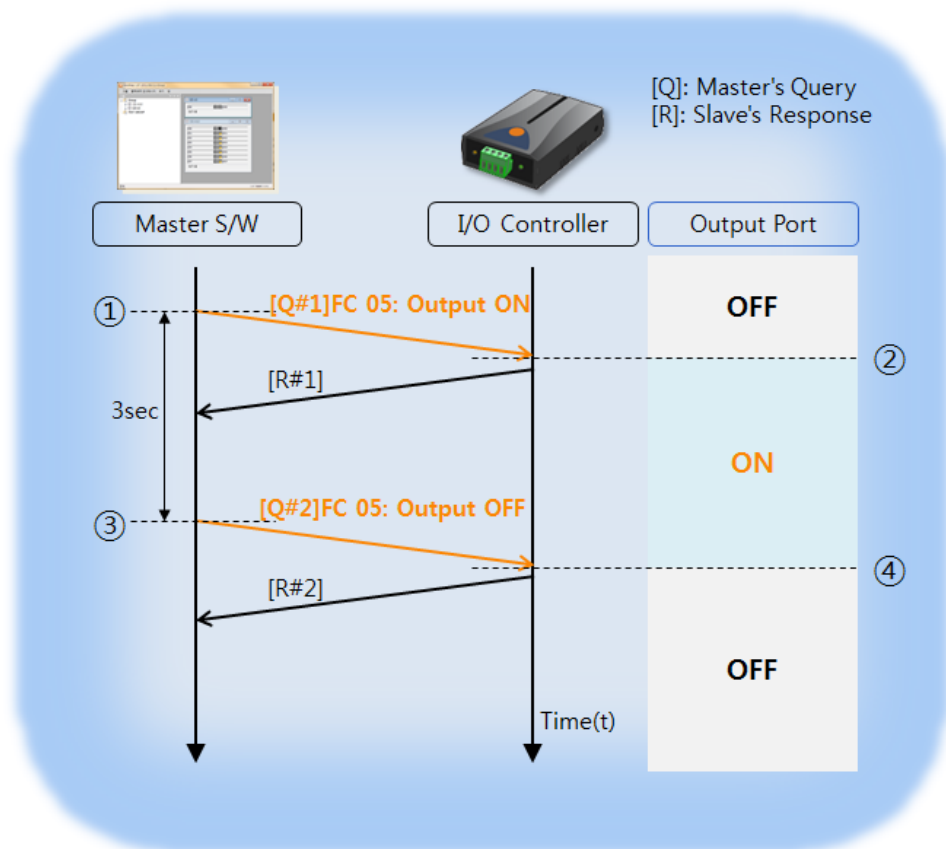


Figure 2-4 output a Pulse with FC 05

- ① A master S/W forwards [Q#1] to a controller
- ② A controller outputs HIGH by [Q#1]
- ③ 3 seconds later from forwarding [Q#1], the master S/W sends [Q#2]
- ④ The controller outputs LOW by [Q#2]

As use FC 05, the process might be a little complicated. However, it can be much easier with FC 105 like the chapter below.

## 2.2.2 Output a Pluse with FC 105

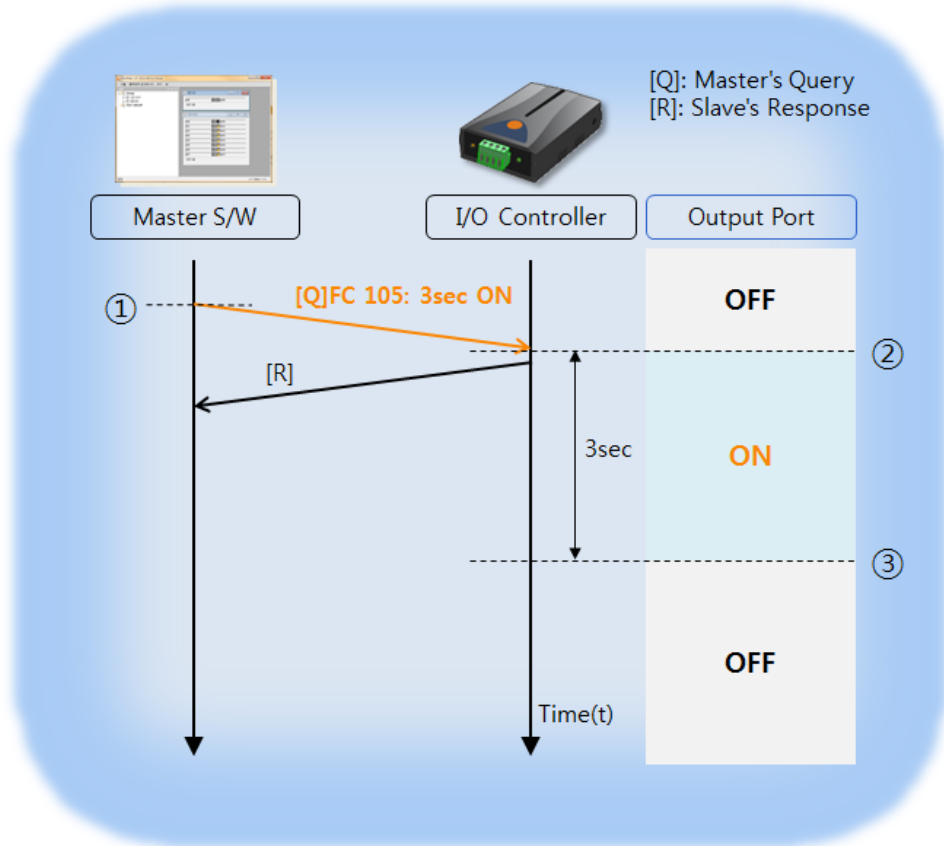


Figure 2-5 output a Pulse with FC 105

- ① A master forwards [Q]
- ② A controller outputs HIGH by [Q]
- ③ After 3 seconds, the controller quits output

As you can see, it is so convenient because the process is accomplished with just one frame of request with FC 105.

## 3 Write Pulse

### 3.1 Frame Structure

#### 3.1.1 Request / Response

##### Request / Response of Write Pulse



Figure 3-1 request / response frame of the Write Pulse

- byte 0: function code  
Function code of write pulse is 0x69(=105).
- byte 1~2: reference number  
This is address of an output port you want to control.
- byte 3~4: duration  
The unit is millisecond. You can set this value from 40 to 10000. (0x0028 ~ 0x2710)  
Some examples are as follows:

decimal	hexadecimal (HEX)	note
40 (0.04sec)	0028	minimum value
500 (0.5sec)	01F4	-
1000 (1sec)	03E8	-
3000 (3sec)	0BB8	-
10000 (10sec)	2710	maximum value

- byte 5: On/Off  
Set the data value to '0xFF' for giving HIGH level output and set it to '0x00' for giving LOW level output.

## 3.1.2 Exception

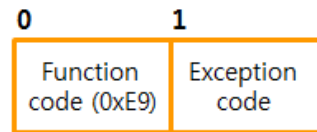
**Exceptions of Write Pulse**

Figure 3-2 exceptions of write pulse

- byte 0: function code  
Function code of exception response is 0xE9
- byte 1: exception code  
Exception code can be 0x01, 0x02, 0x03 or 0x06.

Table 3-1 exception codes

code	name	description
0x01	Illegal Function	Error in the function code
0x02	Illegal Data Address	Error in the reference number
0x03	Illegal Data Value	Error in the data value
0x06	Slave Device Busy	Another master is already controlling the slave by FC 105.



### 3.2 Matters to be attended

Before controlling a device by FC 105, a master S/W should check the current status of the slave. Please check if the slave is in one of the two states below.

#### 3.2.1 Control Status Error

The slave's output port which is on a pulse output control by itself or another device cannot be controlled till the previous control is finished.

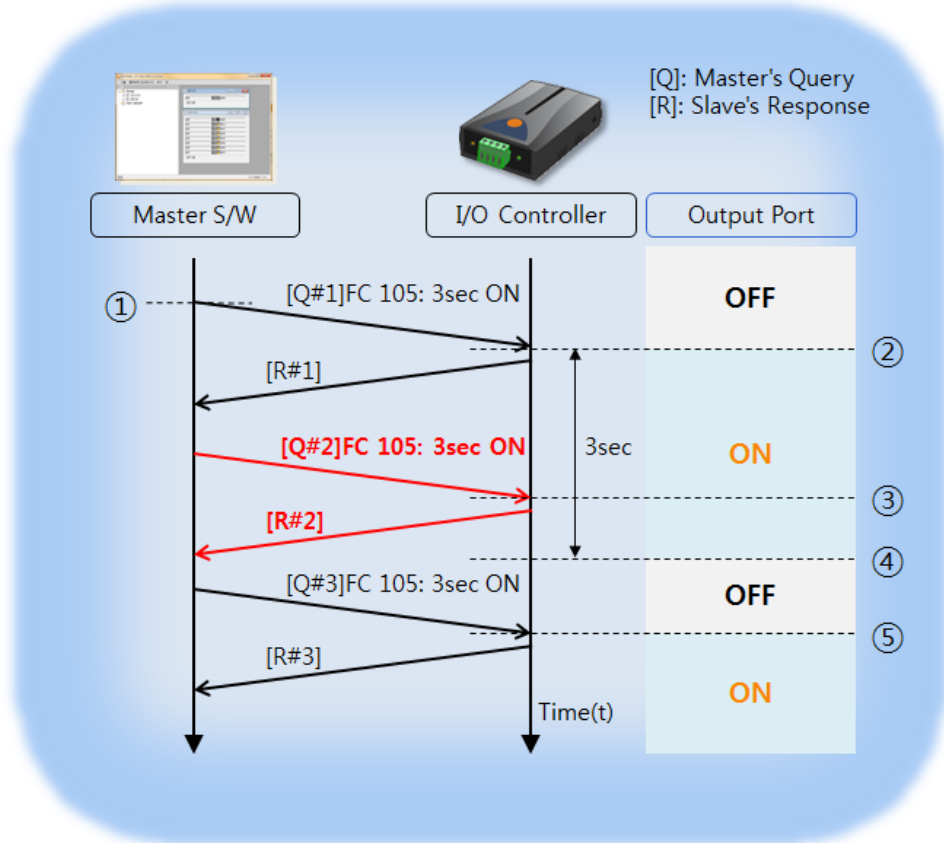


Figure 3-3 control state error

At the time point ③, a controller cannot set the output port to HIGH by [Q#2] because the control by [Q#1] has not been finished yet. The exception code of [R#2] is 0x06. (Slave Device Busy)

### 3.2.2 Level State Error

The slave's output port cannot be controlled by FC 105 if the port is set to the same level as the query of the function code.

Table 3-2 available conditions for FC 105

Control Level	Current State	Result
HIGH	HIGH	error response
<b>HIGH</b>	<b>LOW</b>	<b>normal operation</b>
<b>LOW</b>	<b>HIGH</b>	<b>normal operation</b>
LOW	LOW	error response

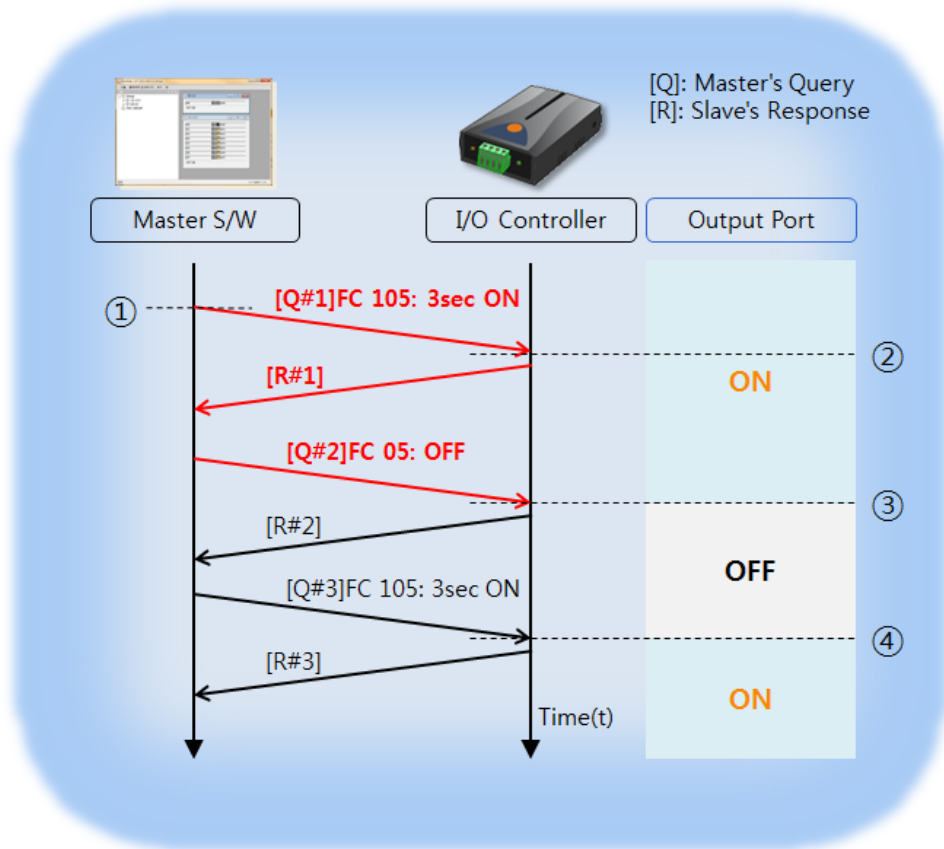


Figure 3-4 level state error

At the time point ②, a controller cannot set the output port to HIGH by [Q#1] because the output port is already set to HIGH. In this case, the master S/W should change the level to LOW by FC 05 or etc., before controlling the port with FC 105.

The exception code of [R#1] is 0x03. (Illegal Data Value)

## 4 Example using ModMap

### 4.1 What is ModMap?

ModMap is a Modbus/TCP master program which offers controlling multiple remote I/O devices on a single window for MS Windows.

*You can download ModMap on our web site for free.*

### 4.2 Implementation of Pulse Output

#### 4.2.1 Add I/O Controller

- [Group] > [Add I/O Controller]

Run ModMap and add the remote I/O device. You can add it automatically and manually.

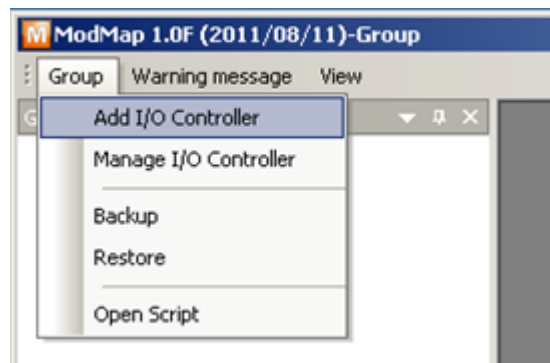


Figure 4-1 add I/O controller

#### 4.2.2 Set Pulse Output

- [Modify I/O Controller Settings]

Right click the name of I/O controller on a control window or tree region.

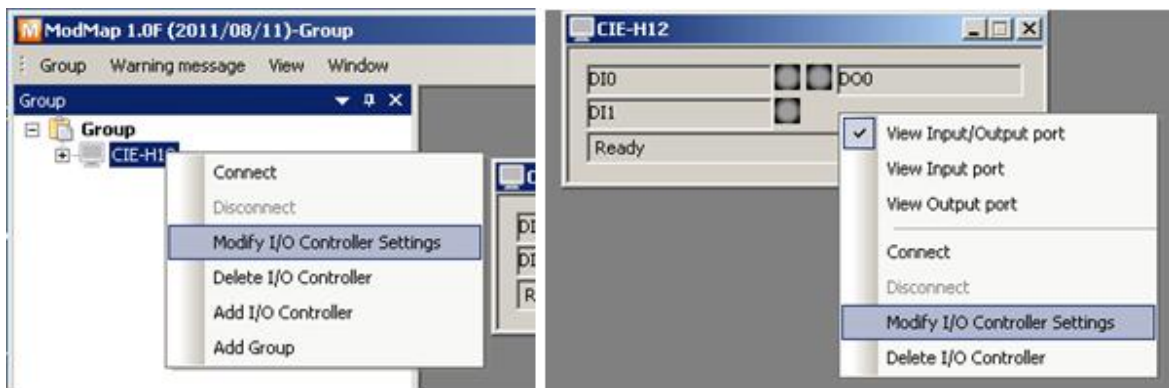


Figure 4-2 modify I/O controller

● [Set Pulse Control]

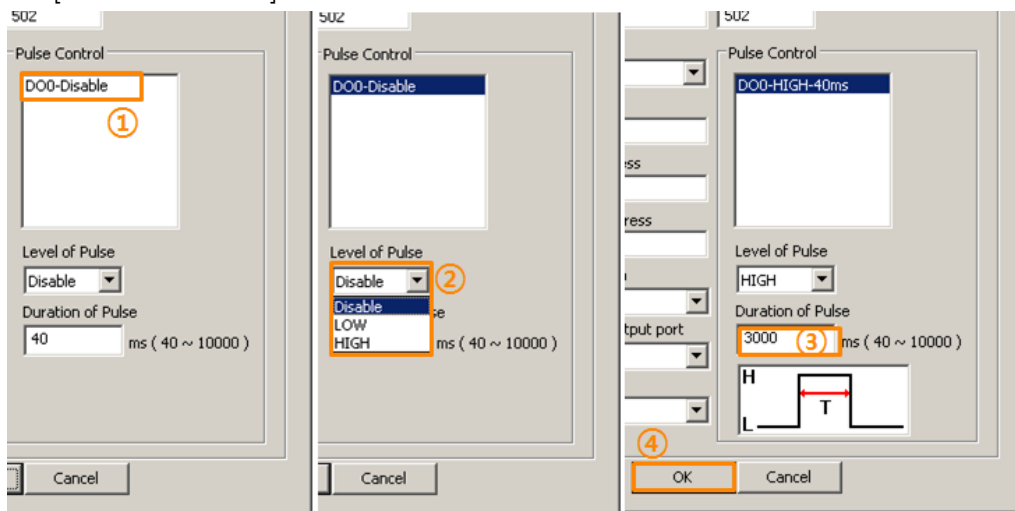


Figure 4-3 set pulse control

- ① Choose an output port.
- ② Select an output level.
- ③ Input a duration of pulse.
- ④ Press the [OK] button.

● [Completion of the setting]

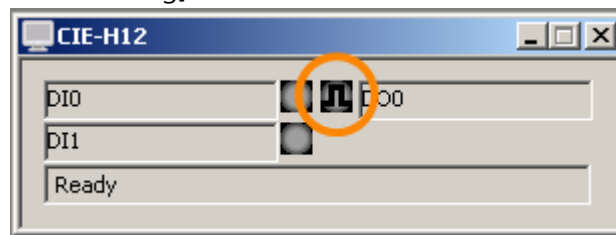


Figure 4-4 completion of setting pulse control

### 4.3 Other Prevention

If a level status error occurs, the message below will be popped up.

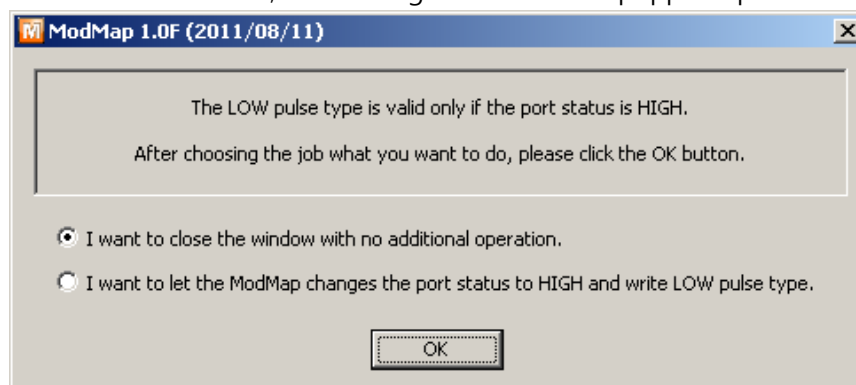


Figure 4-5 message by level state error

## 5 Revision History

Date	Version	Description	Author
2011.09.02	1.0	○ Initial release	Roy LEE