



## FieldServer Driver - Serial FS-8700-17 Opto 22 Optomux

### Description

The Optomux Driver allows the FieldServer to transfer data to and from devices over either RS-232 or RS-485 using the Optomux Driver protocol. The Optomux driver is a client only driver and can poll an Optomux protocol compliant device but not emulate one.

The Optomux protocol provides a large command set. Many of the commands are used for OPTO22 device configuration. This driver supports the full command set and thus the driver may be used to configure as well as to poll OPTO22 devices.

### Operating Methods

The Optomux driver provides three methods of operation. Users may use any combination of methods.

#### *Static Operation*

If the hardware configuration is fixed and known then this is a suitable method. The devices to be polled/commanded are configured using the FieldServer CSV file.

#### *Dynamic Operation*

If the hardware configuration may change or if hardware settings may change dynamically or (more realistically) if you wish to change some aspect of the hardware configuration such as a delay time or reset a latch without changing the CSV file and resetting the FieldServer then this operating method is suitable. The commands set can be configured by changing the values in the FieldServer's data arrays. This operating mode may be considered a data driven one.

#### *Triggered Operation*

This operating mode allows commands to be triggered by changing the value in the FieldServer's data arrays. This operating mode is useful if requiring an action triggered by a remote device.

### Statistics and Command Responses

All FieldServer drivers report communication statistics that allow the operation of the driver to be monitored.

In addition to the standard statistics, this driver exposes the communication statistics for each port by presenting them in a user specified data array where they can be monitored by a remote device or HMI system.

The Optomux driver also exposes the response status to each poll and command (if required) by writing the response statuses to a user specified data array. This useful feature allows remote devices to check whether a command has been completed successfully.



Fieldserver Mode	Nodes	Comments
Client		
Server	N/A	Server side is not supported. See description.

**Formal Driver Type**

Serial  
Client Only

**Compatibility Matrix**

FieldServer Model	Compatible with this driver
FS-x2010	Yes
FS-x2011	Yes
FS-x30	Yes
FS-x40	Yes

**Connection Information**

**Connection type:** RS-485 (Two wire, Half-Duplex)  
**Baud Rates:** At the time of publication of this manual the OPTO22 devices support standard baud rates in the range 300-38400.  
**Data Bits:** 7,8  
**Stop Bits:** 1  
**Parity:** Odd, **Even**, None  
**Multidrop Capability** No

**Devices tested**

Device	Tested (FACTORY, SITE)
OptoMux (by Opto22 Inc.)	SITE





## **Communications functions - Supported functions at a glance:**

### **The Optomux driver can perform the following commands / queries**

POWER UP CLEAR	START OFF PULSE
RESET	SET TRIGGER POLARITY
SET TURN-AROUND DELAY	TRIGGER ON POSITIVE
SET WATCHDOG DELAY	TRIGGER ON NEGATIVE
SET WATCHDOG DELAY (Analog)	READ PULSE COMPLETE BITS
SET PROTOCOL	READ DURATION COUNTERS
IDENTIFY Optomux TYPE	READ AND CLEAR DURATION COUNTERS
SET ENHANCED DIGITAL WATCHDOG	CLEAR DURATION COUNTERS
SET ENHANCED ANALOG WATCHDOG	WRITE ANALOG OUTPUTS
SET TIMER RESOLUTION	READ ANALOG OUTPUTS
SET TEMPERATURE PROBE TYPE	UPDATE ANALOG OUTPUTS
CONFIGURE POSITIONS	READ ANALOG INPUTS
CONFIGURE AS INPUTS	READ AND AVERAGE INPUT
CONFIGURE AS OUTPUTS	START INPUT AVERAGING
READ MODULE CONFIGURATION	READ AVERAGE COMPLETE BITS
WRITE OUTPUTS	READ INPUT AVERAGE DATA
ACTIVATE OUTPUTS	READ TEMPERATURE INPUTS
DEACTIVATE OUTPUTS	READ AVERAGE TEMPERATURE INPUTS
READ STATUS	SET INPUT RANGE
SET LATCH EDGES	READ OUT-OF-RANGE LATCHES
SET LATCH OFF TO ON	READ AND CLEAR RANGE LATCHES
SET LATCH ON TO OFF	CLEAR OUT-OF-RANGE LATCHES
READ LATCHES	READ LOWEST VALUES
READ AND CLEAR LATCHES	CLEAR LOWEST VALUES
CLEAR LATCHES	READ AND CLEAR LOWEST VALUES
START/STOP COUNTERS	READ PEAK VALUES
START COUNTERS	CLEAR PEAK VALUES
STOP COUNTERS	READ AND CLEAR PEAK
READ COUNTERS	CALCULATE OFFSETS
READ AND CLEAR COUNTERS	SET OFFSETS
CLEAR COUNTERS	CALCULATE AND SET OFFSETS
SET TIME DELAY	CALCULATE GAIN COEFFICIENTS
INITIATE SQUARE WAVE	SET GAIN COEFFICIENTS
HIGH RESOLUTION SQUARE WAVE	CALCULATE AND SET GAIN
RETRIGGER TIME DELAY	SET OUTPUT WAVEFORM R
GENERATE N PULSES	IMPROVED OUTPUT WAVEFORMS
START ON PULSE	



### Unsupported Functions and Data Types

The driver was developed and tested using REV1 equipment. The basis for development was the OPTOMUX PROTOCOL USER'S GUIDE dated April 2000. The Opto22 protocol specification identifies the following limitations for equipment with a revision prior to Rev1. The following list is a guide. Please consult with Opto to ensure the functions you wish to use are supported by your legacy equipment.

Baud rates From Rev1 onwards, additional baud rates were supported.

Command Set From Rev1 onwards, the following commands are supported.

Digital	Analog
SET ENHANCED DIGITAL WATCHDOG SET TIMER RESOLUTION READ MODULE CONFIGURATION HIGH RESOLUTION SQUARE WAVE RETRIGGER TIME DELAY GENERATE n PULSES START ON PULSE START OFF PULSE	SET ANALOG WATCHDOG USER-DEFINED VALUE SET ANALOG WATCHDOG READ MODULE CONFIGURATION SET TEMPERATURE PROBE TYPE

The following notes are extracted from the OPTOMUX PROTOCOL USER'S GUIDE - April 2000.

### OPERATIONAL DIFFERENCES — OLD OPTOMUX BRAIN BOARDS

This protocol manual applies to Optomux units labeled "REV 1" and above. If the Optomux brain board (applies to B1 and B2 only) does not have a revision label, you have a very old Optomux unit and should be aware of the following differences. Brain board model B3000 is newer than "REV 1".

#### *Digital Brain Boards (B1)*

1. The "REV 1" (or greater) Optomux units will notify the host that a serial watchdog has timed out by responding to the first command after a serial watchdog time-out with an N06cr error code. The command will not be executed. This is similar to a power-up operation. This error code will not be sent in response to a "POWER UP CLEAR" command.
2. Pulse duration counters are edge triggered with the newer Optomux brain boards. The previous versions were level triggered.
3. Maximum counter frequency is now 400 Hz, 50 percent duty cycle (minimum ON or OFF pulse time is 1.25 milliseconds). Use of the "GENERATE n PULSES" command will degrade counter frequency to 350 Hz maximum.
4. The baud rate may now be changed without cycling power to the Optomux. Additional baud rates of 600, 2,400, 4,800, and 38,400 are now supported when using "REV 1" brain boards or above.
5. Two question mark characters (??) may be used instead of the calculated checksum characters in command strings.



### *Analog Brain Boards (B2)*

1. The “REV 1” (or greater) Optomux units will notify the host that a serial watchdog has timed out by responding to the first command after a serial watchdog time-out with an N06cr error code. The command will not be executed. This is similar to a power-up operation. This error code will not be sent in response to a “POWER UP CLEAR” command.
2. With “REV 1” (or greater) brain boards, averaging is performed using a continuous running average with a sample rate of 100 milliseconds. The number of samples to average is set with the “START INPUT AVERAGING” command as before, however, there is no need to restart the averaging after the number of samples has been reached. The “READ AVERAGE COMPLETE BITS” command indicates that the number of samples to average has been reached. The running average calculation used by Optomux is as follows (where n is the number of samples):  $\text{New Average} = ((n-1) (\text{Old Average}) + (\text{New Reading}))/n$
3. The baud rate may now be changed without cycling power to the Optomux. Additional baud rates of 600, 2,400, 4,800, and 38,400 are now supported when using “REV 1” brain boards or above.
4. Two question mark characters (??) may be used instead of the calculated checksum characters in command strings.



**Revision History**

Date	Resp	Format	Driver Version	Doc. Rev.	Comment
2/10/05	PMC		1.00	0	Previous releases of this document had no revision info. Updated by providing notes on limitation for legacy equipment (prior to rev1)
3/4/05	Meg	Meg	1.00	1	Formatting updated. Connection diagram inserted.