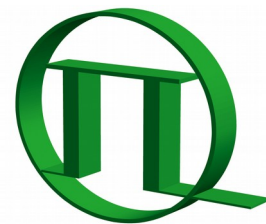


# TMF 400 and TMF 400-P



PICOQUANT

## Trigger Module for Gate Connector

### Part No. 70117 (400) and 70616 (400-P)

#### 1. Introduction

The TMF 400 is a small accessory designed to adapt the *laser active signal output* from the Olympus FV10-LDIF module, the Olympus FV3000 or the Nikon A1 laser scanning microscope (LSM) to be used with the fast and slow gate input of the PDL laser driver series. The fast gate input of the PDL drivers has a transition time of some nanoseconds and therefore allows to suppress (“gate”) individual laser pulses. This is useful for e.g. ROI-scanning or bleaching experiments. The required gating signal for the PDL drivers is a TTL signal with a very fast rise time and a positive voltage. The available gating signal of the FV10-LDIF module and the Nikon A1 has, however, only a microsecond rise time with negative polarity. The purpose of the TMF 400 is to recognize the falling edge of the signal with an adjustable threshold and to generate a fast rising positive TTL signal for the PDL drivers. It is inverting the signal logic. The TMF 400-P recognizes the rising edge of the input signal and outputs a fast rising positive TTL signal. It has a non-inverting signal logic.

#### 2. Installation and Adjustment for Nikon A1 LSM

The installation of the TMF 400 is straightforward and only requires to connect signal cables. The following connections need to be done:

1. connect the TMF 400 “Outputs” to the fast gate inputs of the PDL driver using the supplied Lemo / SMA cables
2. connect the TMF 400 “Input” to the additional cable with SMA connector which connects the TCSPC marker input with the Nikon A1 controller. This cable can be extended by the user if necessary.
3. connect the delivered power supply to the TMF 400.

The trigger threshold can be set between -5V and +5V using a potentiometer (“Level”) and a small screwdriver. The correct threshold setting can be found by monitoring the “Laser enabled” LED on the right side of the TMF 400. Apply the gating signal and turn the potentiometer until the the "Laser enabled" LED turns red while your experiment is running.

It should switch off when you stop the experiment.

Please note that with the Nikon A1, ROI-scanning using the TMF 400 and the PicoQuant lasers is not possible. For ROI scanning with the Nikon A1 the TMF 400-P has to be used. It has to be connected to the Nikon A1 controller with a special cable.

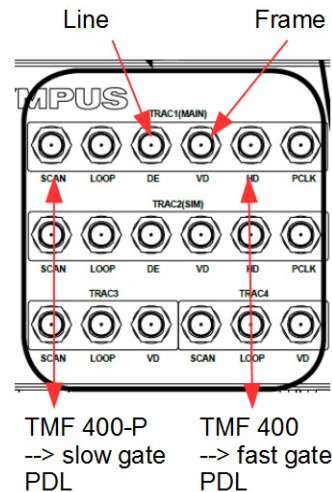
## Adjustment

- (a) the LED is on during an image scan
- (b) the LED is off after stopping the image scan

Laser Enabled LED during gate enabled time	Internal trigger threshold	Action on potentiometer
off	below amplitude of gating signal	turn clockwise
changing between on and off	equal to amplitude of gating signal	turn clockwise
on	above amplitude of gating signal	none

### 3. Installation and Adjustment for Olympus FV 3000 LSM

- For the PicoQuant laser control, Olympus FV3000 uses both the TMF 400 and the TMF 400-P modules. They are connected to “Scan” and “HD” connectors of the FV30-Analog Unit.
- The “Scan” connector has to be wired to the TMF400-P input, the output of the TMF-400-P with the “slow gate” of the PDL unit(s).
- The “HD” connector has to be wired to the TMF400 input, the output of the TMF-400-P with the “fast gate” of the PDL unit(s).
- If necessary the Trigger threshold of the TMF 400 and TMF 400-P devices need to be re-adjusted that the PicoQuant lasers are on during point measurements and FLIM imaging.



**Fig. 1 :** Trigger Port at the FV3000 FV30-Analog Unit

The “Scan” connector has to be wired to the TMF400-P input, the output of the TMF-400-P with the “slow gate” of the PDL unit(s).

The “HD” connector has to be wired to the TMF400 input, the output of the TMF-400-P with the “fast gate” of the PDL unit(s).

## 4. Installation and Adjustment for Olympus FV 1200 LSM

The installation of the TMF 400 is straightforward and only requires to connect signal cables. The following connections need to be done:

4. connect the TMF 400 “Outputs” to the fast gate inputs of the PDL driver using the supplied Lemo / SMA cables
5. connect the TMF 400 “Input” the output of the FV10-LDIF using the supplied BNC / SMA cable. This cable can be extended by the user if necessary.
6. connect the delivered power supply to the TMF 400.

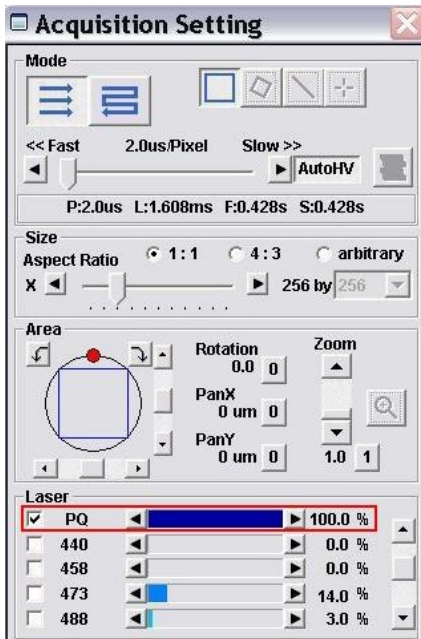


Fig. 1: Screenshot of the Olympus software showing the optimum settings for the PicoQuant laser

The internal trigger threshold of the TMF 400 is pre-adjusted to the setting corresponding to 100% laser intensity in the Olympus software (see Fig. 1). At these settings the trigger signal from the FV10-LDIF changes from +1V to -2V; the trigger threshold of the TMF 400 is therefore pre-set to a value of -0.5V.

**NOTE:** While it is possible to control the laser power of the cw lasers with this setting, it has no influence on the power of the pulsed laser. This is controlled by the settings of the PDL driver. However, changes in the laser intensity does change the amplitude of the trigger signal. It is therefore recommended to keep the intensity at 100%.

If the laser intensity is changed, the trigger threshold of the TMF400 might have to be adjusted.

### Adjustment

The trigger threshold can be set between -5V and +5V using a potentiometer (“Level”) and a small screwdriver. The correct threshold setting can be found by monitoring the “Laser enabled” LED on the right side of the TMF 400. Apply the gating signal by connecting all cables and turn the potentiometer until the

- (a) the LED is on during an image scan
- (b) the LED is off after stopping the image scan

Laser Enabled LED during gate enabled time	Internal trigger threshold	Action on potentiometer
off	below amplitude of gating signal	turn clockwise
changing between on and off	equal to amplitude of gating signal	turn clockwise
on	above amplitude of gating signal	none

## 5. Technical specifications

### Gating Signal Input

Pulse amplitude -5 V...+5 V  
Pulse width >5 ns

### Signal Output

Pulse amplitude 5 V  
Pulse polarity inverse to polarity of gating signal input (TMF 400)  
Pulse polarity as polarity of gating signal input (TMF 400-P)  
Pulse width >5 ns

Trigger threshold -5V..+5V, adjustable, pre-set to -0.5V

Power supply 7,5V ... 12V DC

## 6. Retraction Of Old Devices

Waste electrical products must not be disposed of with household waste. This equipment should be taken to your local recycling centre for safe treatment.

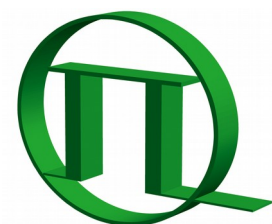


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PICOQUANT

PicoQuant GmbH  
Unternehmen für optoelektronische Forschung und Entwicklung  
Rudower Chaussee 29 (IGZ), 12489 Berlin, Germany

Telephone: +49 / (0)30 / 1208820-0  
Fax: +49 / (0)30 / 1208820-90  
e-mail: [info@picoquant.com](mailto:info@picoquant.com)  
WWW: <http://www.picoquant.com>