Guide & Manual 2020

DESIGNED & MANUFACTURED BY

Kontinitro

Swiss Manufacturer of Detonating Velocity Measuring Instruments for Explosives and Propellants Since 1936

MEASURING METHOD AND PRINCIPLE OF OPERATION

Simply the best measuring instrument manufactured by Kontinitro since 1987. The **Explomet 2T+™** is the first VOD measuring instrument with a self-calibrating quartz based on the outside temperature. Designed to withstand temperatures between -40 and 80 degrees Celcius (-40 and 176 degrees Farenheit), it can withstand the worst conditions, such as rain, mud, sand, dust and snow.

The Explomet 2T+ has 5 independent timers measuring the time intervals between the illumination of 6 fiber optic cables.

It is not necessary to respect an order to connect the optical fibers either on the explosive or the Explomet 2T+.

The instrument can record from 1 to 5 V.O.D measurements at a time depending on the number of optical fibers used from 2 to 6.

The Explomet 2T+ operates in one of the following modes:

1: Velocity and Time: the first optic fiber to be illuminated gives the starting signal: start and the last fiber to be illuminated gives the stop signal: stop. The Explomet 2T+ measures the time intervals in microseconds between the illumination of two consecutive optic fibers and calculates the Velocity of Detonation (V.O.D) in meter per second [m/s].

2: Time Only: The optic fibers are illuminated randomly. The Explomet 2T+ measures the time intervals (in microseconds) between the illumination of the first and the second fiber, then between the second and the third fiber, and so on until a maximum of 6 optical fibers.

SPECIFICATIONS

Dimension:

Explomet 2T+

130 x 184 x 50-80 [mm]

Explorer Transport Case (OPTIONAL)

Outside Diameter: 360 x 460 x 160 [mm]

Weight:

Explomet 2T+: 0.85 [kg],

Explomet 2T+ with case and material: 5.5 [kg]

QUICK VIEW

THE EXPLOMET 2T+ IS AN ELECTRONIC TIME COUNTER WHICH CAN MEASURE THE VELOCITY OF DETONATION OF ANY EXPLOSIVE OR PROPELLANT UP TO 15'000 [M/S]. THIS MEASURING INSTRUMENT IS TRIGGERED BY THE LIGHT EMITTED DURING THE EXPLOSION AND TRANSMITTED BY MEANS OF PLASTIC OPTIC FIBER PLACED INTO THE EXPLOSIVE.

APPLICATION AREAS:

- CIVIL ENGINEERING
- MILITARY ENGINEERING
- AEROSPACE ENGINEERING
- PHYSICS
- CHEMISTRY

KONTINITRO SA

15A ROUTE DE LOËX
1213 ONEX
GENEVA
SWITZERLAND

Autonomy:

11h hours on rechargeable Lithium Ion batteries 18650

AC/DC adapter/charger for 220-230V/50Hz or 110V/60Hz or car charger/adapter or alligator clips. Average batteries charging time: 4 hours

Operating range:

Distance between two optical fibers on the explosive: from 50 [mm] to 9999 [mm]

Detonating velocity up to 15’000 [m/s]

Time interval measurement: 10 nanoseconds to 10.7 seconds

Timers:

5 synchronous timers

Operating temperature:

-40 to 80°C

Accuracy:

+/- 10 nanoseconds [ns]

Fiber Optic:

ESKA™ SK-40 Simplex Plastic Optical Fiber Cable

Core ∅: 1mm, Outer ∅: 2.2mm

Simplex POF 1-2.2mm Characteristics: Download Available at the Top of Plastic

Optic Fiber & Connectors Page on our Website

SK-40 POF Core Characteristics: Download Available at the Top of Plastic Optic

Fiber & Connectors Page on our Website

File Type:

Text file (.txt) can be read with all programs reading txt files (Word, Excel, Notepad, Open Office, Text Edit, Pages, Numbers, etc.).

LIST OF PROVIDED EQUIPMENT

Explomet 2T+™

1 High-Strength Shock-Proof Peli 1500 Case

Made of polypropylene copolymer

Waterproof, resistant to chemicals, moisture and dust

Resistant to harsh temperatures (-33°C / +90°C)

Contains all the items listed below except the plastic optic fiber spool

6 Small Fiber Optic Cables

Six plastic optic fiber with a length of 20 [m] each for your V.O.D measurements

Read carefully the instructions on pages 10 to 12 for the preparation and installation of your optical fibers. **The quality and accuracy of your results depends in part on how your optical fibers are prepared and installed on the explosive or propellant.**

1 Spool (MOQ 100 [m]) of Plastic Optic Fiber Cable

The optical fiber of the spool is the same as proposed on page 3:

Plastic Optic Fiber Simplex 1-2.2 [mm]

The minimum quantity is 100 [m] but we recommend 300 [m] for safety reasons and a more convenient use.

1 Ledlenser™ TT High Performance LED Flashlight:

With your flashlight, you can:

Simulate an explosion by illuminating the optical fiber, one after the other.

Test the light transmission quality of your optical fibers

(maximum length of 300 [m]). Tested in our offices.

Max light output 140 Lumen

Max Runtime 25 hours

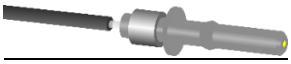
Impact resistant

Water resistant

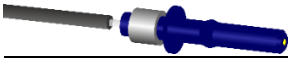
20 Optical Connectors: *10x* HFBR-4501Z with Crimp Ring (Grey) and *10x* HFBR-4511Z with Crimp Ring (Blue)

Optical connectors are essential for connecting the plastic optical fibers to the optical sensors of the Explomet 2T+.

HFBR-4501Z with Crimp Ring (Grey) on Page 3 of the AVAGO Catalog



HFBR-4511Z with Crimp Ring (Blue) on Page 3 of the AVAGO Catalog

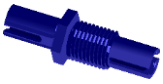


2 Optical Adapters: *1x* HFBR-4505Z (Grey) & *1x* HFBR-4515Z (Blue)

The optical adapters allow perfect connection between two optical connectors to transmit the light generated by the explosion to the Explomet 2T+ without loss of light signal

HFBR-4505Z (Grey) on page 3, 8 & 9 of the AVAGO Catalog

HFBR-4515Z (Blue) on page 3, 8 & 9 of the AVAGO Catalog



1 AFBR-4594Z Polishing Kit

The polishing kit Includes:

1x Polishing fixture for two optical fibers

5x Sheets of 600 grits abrasive paper

5x 3 [µm] Mipox Made in Japan ink lapping film

Please refer to pages 5 and 6 of the AVAGO catalog for the use of the polishing kit

1 Fiber Optic Cable Stripping Tool

Strip the jacket of your optical fibers without breaking or scratching it.

1 Crimping Tool

Use the 178 (Broadcom Avago HFBR connectors) or 151 (Siemens ST-1.0 connectors) aperture to fix the optical connectors to the optical fibers through their crimp ring as indicated on the attached BROADCOM / AVAGO document.

1 Folding Meter Swiss Made CE

1 [m] Folding meter to measure the distance between your plastic optical fibers:

See Mode **Velocity and Time** on pages 15 to 17.

1 Permanent Paint Marker Edding 750 White

Use the permanent marker to mark on the explosive cartridge where to fix (plug) the optical fibers.

1 Victorinox Climber Swiss Army Knife

Use the punch to make a 2 [mm] hole in the explosive cartridge to insert the optical fibers

Use the small blade to slice fiber optically cleanly

Use the large blade to cut off the portion of the optical fiber that has been damaged after the explosion

If you do not have your fiber optic cable stripping tool you can use the scissors and the cable stripper that is under the can opener.

1 Universal Extra Power Tesa Tape

Use tape to hold the optical fibers fixed <u>perpendicularly</u> in the explosive cartridge

1 Car charger cable

The car charger is supplied with the connection designed for the Explomet 2T+

1 Battery Charger ISY – IAC 2102

The charger is supplied with the connection for the Explomet 2T+ and the AC/DC adapter for your electric socket system

1 USB to SD Card reader/writer

High speed USB 2.0 & micro USB 2.0

Compatible with all version of SD/HC, Micro SD cards

1 SD card SanDisc 32 GB

Do not use an SD card with a capacity greater than 32 GB.

Formatted.

All data received by the Explomet 2T+ are automatically saved to the SD card

OPERATING INSTRUCTIONS

Battery charging

Before the first use of the Explomet 2T+, charge the batteries using one of the following charging options:

1) Car charger cable

2) Charger ISY – IAC 2102

Charging time is about 4 hours.

Optical fiber preparation

Follow the instruction on the attached BROADCOM / AVAGO document to prepare the cable terminations and connectors

Avago HFBR Characteristics & Guide: Download Available at the Bottom of Plastic

Optic Fiber & Connectors Page on our Website

To check the proper transmission of light through the optical cable from the test area to the Explomet 2T+ you can simulate a measure with the supplied Ledlenser flashlight.

We recommend protecting the last meters of the optical fiber plugged into the explosive with a 3 [mm] diameter P.V.C. pipe. This insure a better immunity against parasitic light at explosion's time and will also reduce the amount of optical fiber destroyed at each measure.

We also recommend the use of our:

Reinforced Duplex POF 1-2.2mm Characteristics: Download Available at the Top of

Plastic Optic Fiber & Connectors Page on our Website

Reinforced 6 Channels POF 1-2.2mm Characteristics: Download Available at the Top of

Plastic Optic Fiber & Connectors Page on our Website

For the preparation of the optic fiber:

- Cut the needed length of fiber optic
- Fix an optical connector HFBR-4501Z with Crimp Ring (Grey) or HFBR-4511Z with Crimp (blue) at one end, see description on:

Avago HFBR Characteristics & Guide: Download Available at the Bottom of Plastic

Optic Fiber & Connectors Page on our Website

- With your Swiss knife, cut straight the other end of the optical fiber
- Connect the necessary optical fibers (from 2 to 6) to the Explomet 2T+. Either directly or through one of the following reusable optical cables:

DUPLEX CABLE (2 channels = 1 V.O.D measurement)

SURFACE CABLE (6 channels = 5 V.O.D measurements)

It is not necessary to respect an order to connect the optical fibers either on the explosive or the Explomet 2T+.

Optical fiber installation

Important to know before you start:

1. **The quality and accuracy of your results depends in part on how your optical fibers are prepared and installed on the explosive or propellant.**

2. **Ensure that the length of your optical fibers is equal. A too big difference in length (for example: 30 [m]) can contribute to distorting your V.O.D measurement.**

3. **It is not necessary to respect an order to connect the optical fibers either on the explosive or the Explomet 2T+.**

4. **For Dynamites, Water gels Explosives or Cartridges Explosives, respect a minimum distance of three times the diameter of the cartridge between the primer (detonator) and the 1st optic fiber.**

5. **We recommend protecting the unused optical receivers of the Explomet 2T+ with the supplied grey plastic caps to avoid any stray light.**

EQUIPMENT FOR THE MEASUREMENT OF DETONATION VELOCITY OF AN EXPLOSIVE WITH THE EXPLOMET 2T+ AND ITS OPTICAL FIBERS

- **Explomet 2T+**
- **From 2 to 6 Optical Fiber equipped with connector**
- **Folding Meter**
- **White marker Edding 750**
- **Swiss Knife**
- **Universal Extra Power Tape**

Example

V.O.D measurement of an emulsion explosive cartridge (50[mm] diameter, 1000[mm] length) on a test area.

1. Position your explosive cartridge flat on the ground on the test area.

2. Choose at which end you will insert your primer. For example, on the **left**.

3. Measure the diameter of the cartridge using your folding meter and multiply by 3. For example, the diameter of your explosive is 50 [mm], multiplied by 3 that makes **150 [mm]**.

4. From the **left end** of your explosive, measure ~**150 [mm]**. This will mark the point where you insert your 1st optical fiber.

5. To do this, with your white marker, draw a mark at ~150 [mm] on the explosive.

6. Use the punch of your Swiss Army Knife to drill a small 2[mm] hole at the place of your mark to insert the optical fiber into your explosive. Insert the fiber about 10 to 20 [mm] perpendicular to the explosive.

7. For added security, attach the optical fiber to the explosive using your tape.

8. Choose a segment with a minimum length of 50 [mm] from the 1st fiber and mark the distance again with your red marker. This gives you where to insert your 2nd optical fiber.

9. Measure the distance between fiber 1 and 2. For example: 225 [mm]. You will need to report this distance on the Explomet 2T+ when entering the data in mode **Velocity and time.**

10. If necessary, insert other optical fibers and proceed in the same way as before (points 8 and 9).

11. Connect the necessary optical fibers (from 2 to 6) to the Explomet 2T+. Either directly or through one of the following **reusable optical cables**:

    DUPLEX CABLE (2 channels = 1 V.O.D measurement)

    SURFACE CABLE (6 channels = 5 V.O.D measurements)

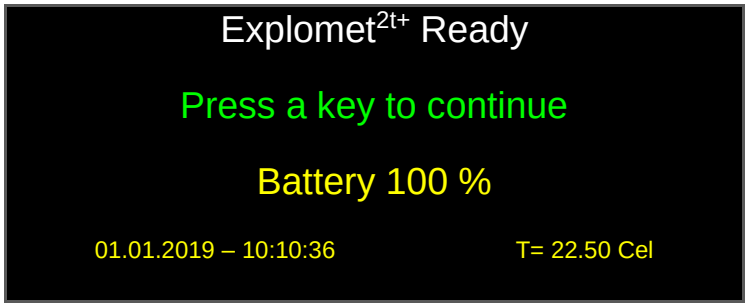
12. It is not necessary to respect an order to connect the optical fibers either on the explosive or the Explomet 2T+.

13. For further operation with the Explomet 2T+, see page 11, **Velocity and Time** Mode

Turn on the Explomet 2T+™

The Explomet 2T+ is menu driven. Press anywhere on the resistive touch screen to access the required menu.

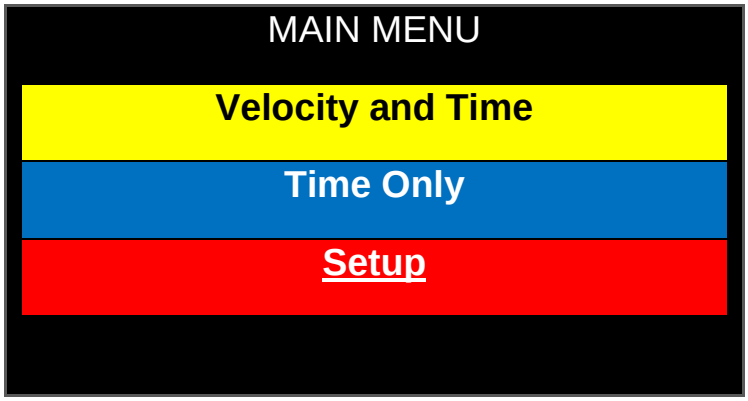
START MENU



Start menu with date, time (24:00), temperature of the instrument (T=) and its power reserve in %.

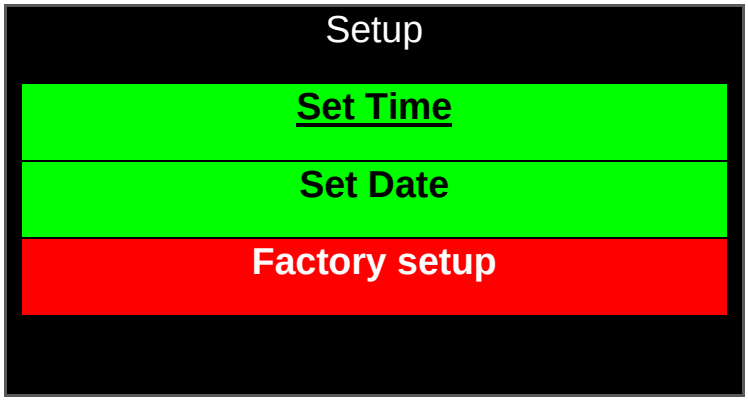
Press anywhere to continue.

SETUP

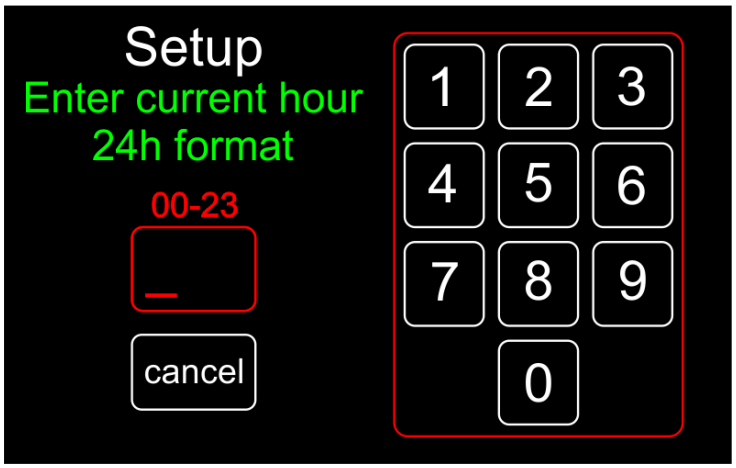


To start using the Explomet 2T+, you must first set the time and date. This will be your reference for all your VOD tests

Press: **Setup**

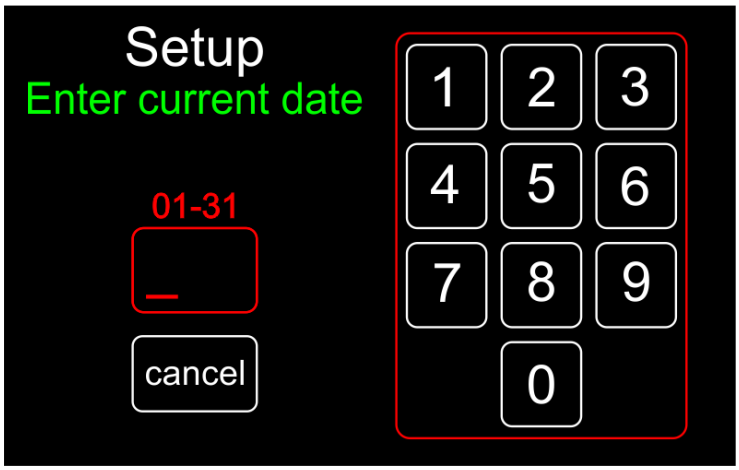


Press: **Set Time**



Please follow the instructions and do the same for the date

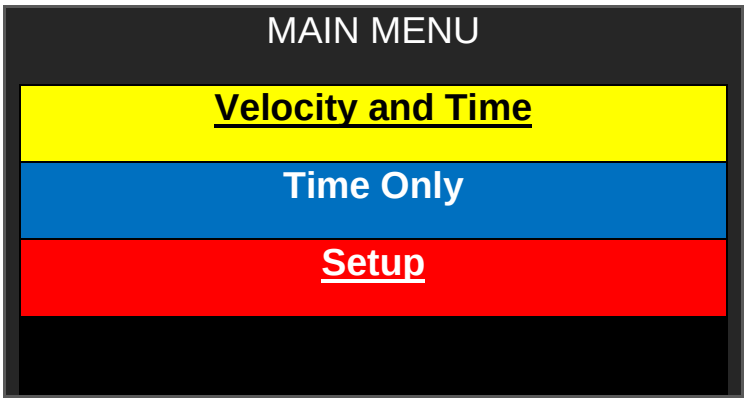
Press: **Set Date**



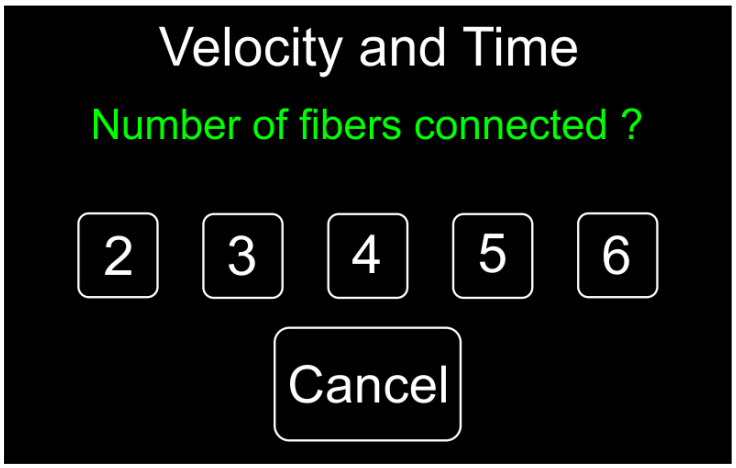
Set Factory Setup

Factory Setup

Please contact us by email or by phone to receive your personal code.



Press **Velocity and time**



all your VOD measurements are saved on the SD card. Once the SD card is plugged into your computer, the results appear like this:

 # day.month.year / hour.minute.second : This is the sequential number given to a measure. The measurement number is given according to the date and time. Each measurement number is therefore unique.

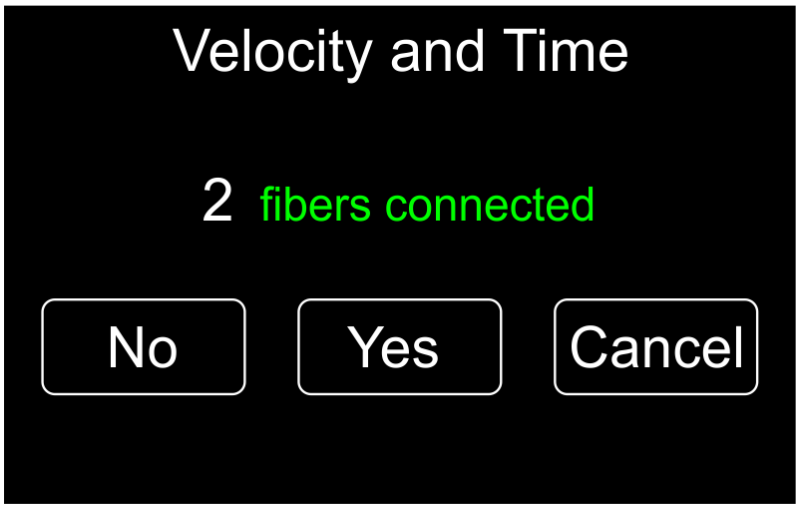
For our example, the V.O.D measurement will have the number: **13.07.2019 / 08.31.46.** The VOD measurement was made the 13th of July of the year 2019 at 8 o'clock, 31 minutes and 46 seconds PM.

Example 1:

Enter number of optic fibers (2, 3, 4, 5 or 6): Enter the number of optic fibers that you will use for your V.O.D measurement.

The instrument accepts from 2 to 6 fibers

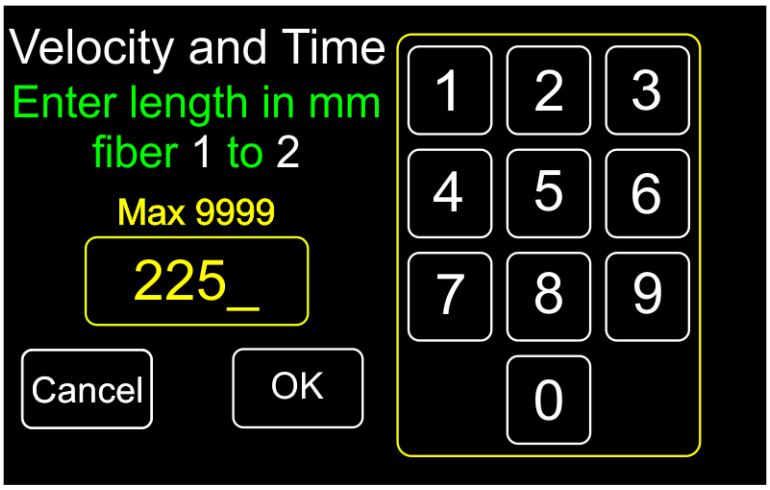
For our **Example 1** measure, we choose **2** optic fibers (see next page).



If you want the instrument to display the V.O.D, enter in [mm] (maximum 9999 [mm]) the **very precisely** measured distance between the 1st and 2nd fiber on the explosive. We recommend using the **meter** supplied with your hardware or a **digital caliper** for high accuracy measurement.

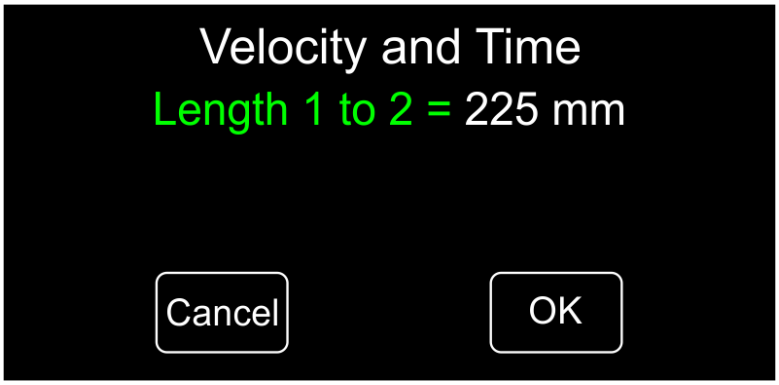
Enter the length, measured on the explosive, on the Explomet 2T+. See example on page 12.

For example: **225 [mm]**

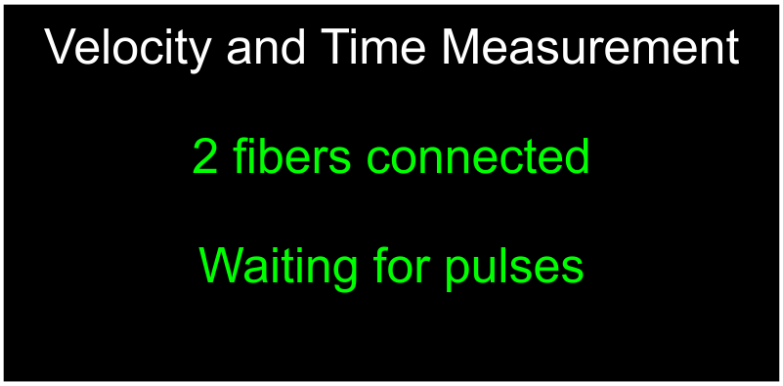


Press **OK**

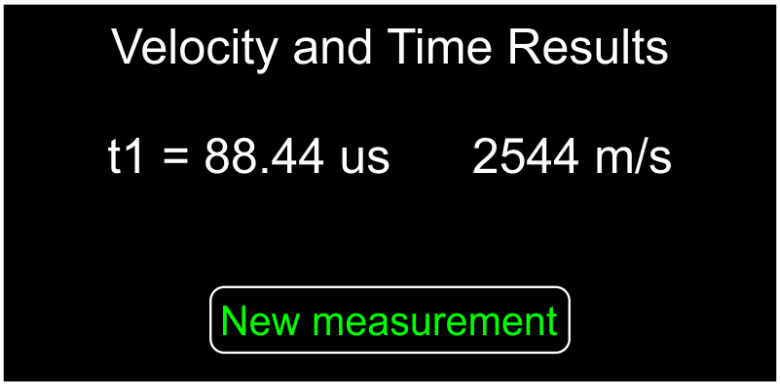
Use **Cancel** key to delete incorrect data and start again.



The Explomet 2T+ is waiting to receive the data. It will not shut down or go into sleep mode.

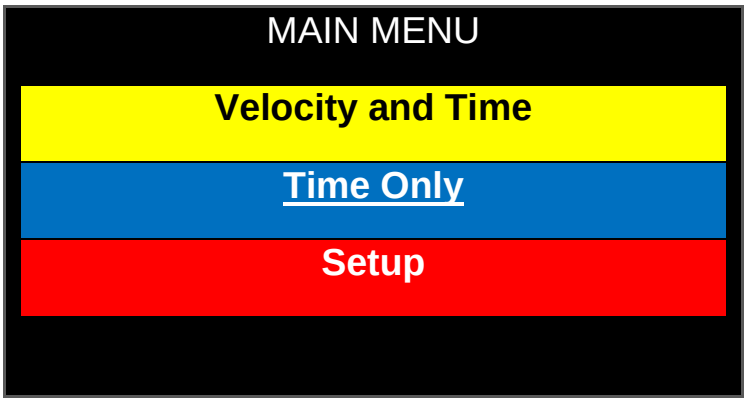


When you are ready, fire the explosive and collect your data. All data is automatically saved on the SD card. the SD card plays the role of a black box for the Explomet 2T+.

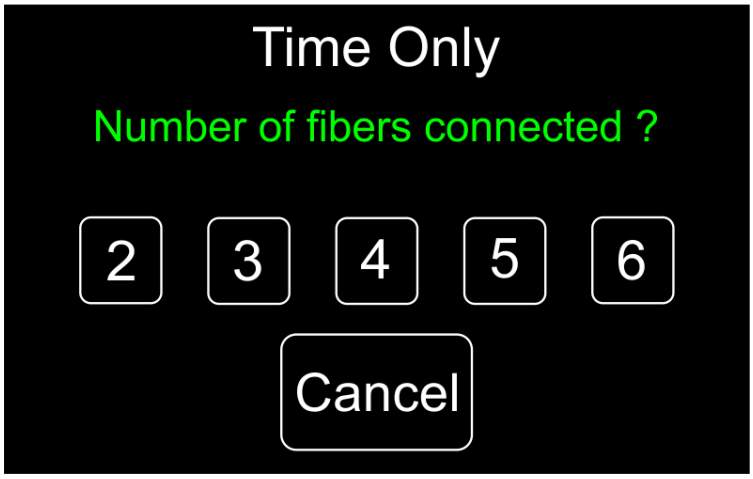


Here is the result of your V.O.D measure **Example 1 = 2544 m/s**

To start a new V.O.D measurement, press **New Measurement**



Press**:** **Time only**

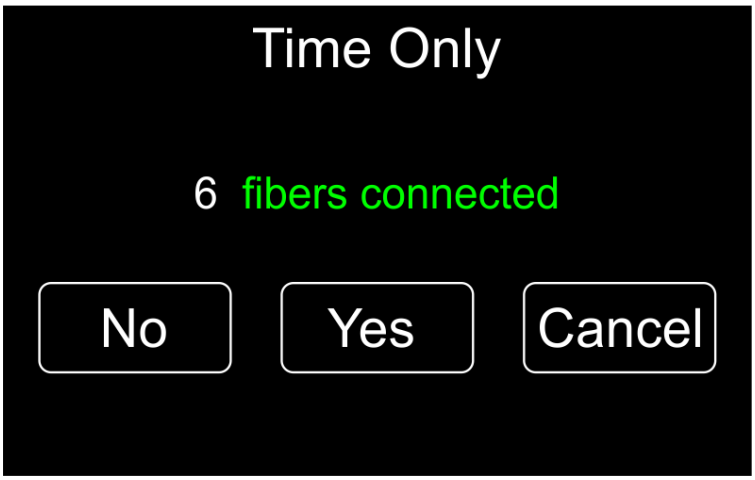


Example 2:

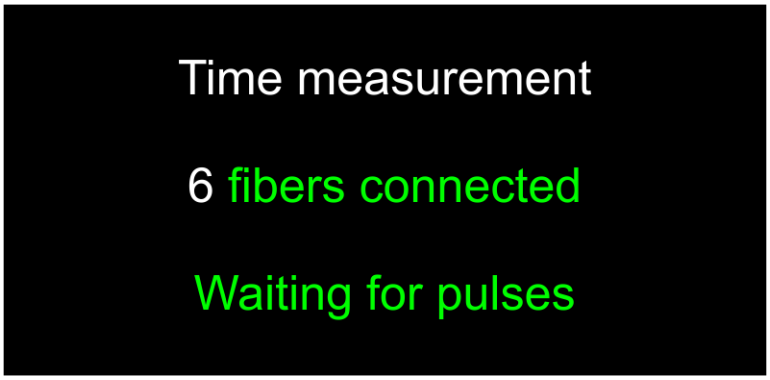
Enter number of optic fibers (2, 3, 4, 5 or 6): Enter the number of optic fibers that you will use for your V.O.D measurement.

The instrument accepts from 2 to 6 fibers

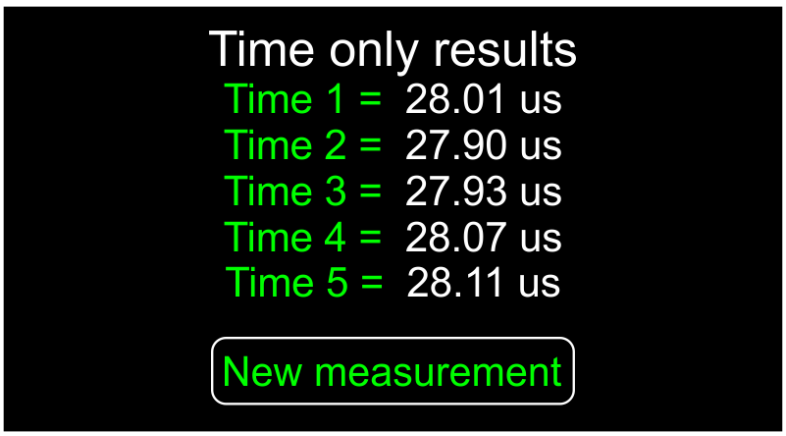
For our **Example 2** measure, we choose **6** optic fibers (see next page).



The Explomet 2T+ is waiting to receive the data. It will not shut down or go into sleep mode.



When you are ready, fire the explosive and collect your data. All data is automatically saved on the SD card.



Here are the results of your V.O.D measure **Example 2.**

To start a new V.O.D measurement, press **New Measurement**

READING DATA

Insert your SD card directly into your computer or using the USB-SD card reader.

All your measurements made with the Explomet 2T+ are recorded systematically and appear chronologically by dates and by hours.

Your text files (.txt) can be read by most programs (Word, Excel, Notepad, Open Office, Text Edit, Pages, Numbers, etc.) on operating systems, Mac, Windows, Linux.

BATTERY CHARGER

Use only the Ansmann AC48 or car charger cable and its adapter supplied with the Explomet 2T+ to ensure the proper operation of your device.

CALIBRATION

The Explomet 2T+ is calibrated only once during its manufacture and this for the duration of its use which is on average of fifteen years. Nevertheless, we remain at your disposal for any verification of your device and can issue a certificate of V.O.D/Calibration to guarantee the perfect functioning of your measuring instrument.

GENERAL

As the Explomet 2T+ uses microelectronic technology, do not expose it to humidity, dust and preserve it from shocks. Be sure to close the optical receptors with the supplied grey plastic caps.

Swiss Made

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tel : +41227921028, email : info@kontinitro.com Web : www.kontinitro.com

Plastic Optic Fiber Characteristics

SIMPLEX **POF 1 / 2.2 [mm] Structure**				
Product **Description**		**Specification**		
		Minimum	*Type*	*Maximum*
Optical Fiber **ESKA™ SK-40** **Mitsubishi™**	*Core Material*	Polymethylmethacrylate Resin		
	Clad Material	Fluorinated Polymer		
	Core Reflective Index	-----	1.49	-----
	Clad Reflective Index	-----	1.41	-----
	Reflective Index Profile	Step index		
	Numerical Aperture (NA)	-----	0.5	-----
	Core Diameter [µm]	920 µm	980 µm	1'040 µm
	Clad Diameter [µm]	940 µm	1000 µm	1'060 µm
	Core Number	**1**		
Jacket	*Inner Jacket Material*	Polyethylene		
	Inner diameter [mm]	2.13 mm	2.20 mm	2.27 mm
	Jacket Color	Black		
Approximative Weight		4.00 [g/m]		
Indication of UL Style Number		None		
Fiber Length on Spool [m] Spool measurements [10cm x 30cm x 30cm] for more details see the "Spools Characteristics" Document.		100m, 150m, 200m, 250m, 300m, 350m, 400m, 450m		
Fiber Length on Spool [m] Spool measurements [19.5cm x 39.5cm x 39.5cm] for more details see the "Spools Characteristics" Document.		1'000m, 1'100m,1'200m, etc. until 2'600m		

SIMPLEX POF 1 / 2.2 [mm] Performance					
Product **Description**			Specification		
			Minimum	*Type*	*Maximum*
Maximium Rating	*Storage Temperature [℃]*	No Physical Change	-55	-----	70
	Operation temperature [℃]	No Deterioration in Optical Properties	-55	-----	70
	Operation Temperature under 95% RH [℃]	No Deterioration in Optical Properties	-----	-----	65
Transmission Loss	*Attenuation (Collimated light) [dB/km]*	**650** [nm] (Ta = 25 °C)	-----	-----	160
		650 [nm] (Ta = operation temp)	-----	-----	170
		660 [nm] (Ta = operation temp)	-----	-----	265
	Bandwidth	Launch NA > Fiber NA	40 MHz.50m	-----	-----
Mechanical Characteristics	*Minimum Bending Radius*	(Ta: Operation temp.)	-----	25	-----
	Repeated Bending Endurance [Times]	Loss Increment ≤1dB 90° 25mmR, Dead Weight: 500g	10'000	-----	-----
	Tensile Strength [N]	Tensile Force at 5% Elongation in Conformity to the JIS C 6861	70	-----	-----
	Twisting Endurance *[Times]*	Loss Increment ≤1dB Sample Length: 1[m], Tensile Force 4.9[N]	5	-----	-----
	Impact Endurance *[N.m]*	Loss Increment ≤1dB in Conformity to the JIS C 6861	0.4	-----	-----

All tests are carried out under temperature of 25 °C unless otherwise specified.

Plastic Optic Fiber Characteristics

DUPLEX **2x POF 1 / 2.2 [mm] Structure**				
Product **Description**		**Specification**		
		Minimum	*Type*	*Maximum*
Optical Fiber **ESKA™ SK-40** **Mitsubishi™**	*Core Material*	Polymethylmethacrylate Resin		
	Clad Material	Fluorinated Polymer		
	Core Reflective Index	-----	1.49	-----
	Clad Reflective Index	-----	1.41	-----
	Reflective Index Profile	Step index		
	Numerical Aperture (NA)	-----	0.5	-----
	Core Diameter [µm]	920 µm	980 µm	1'040 µm
	Clad Diameter [µm]	940 µm	1000 µm	1'060 µm
	Core Number	**2**		
POF Jacket	*Inner Jacket Material*	Polyethylene		
	Inner diameter [mm]	2.13 mm	2.20 mm	2.27 mm
	Jacket Color	Black		
Reinforced Jacket	*Jacket Material*	Super Eska Polyethylene Buffered & Polyvinyl Chloride Sheeted Fiber Cord		
	Outer Diameter	5.8 mm	6.00	6.2
	Jacket Color	Black (Yellow Fiber Cord)		
Approximative Weight		38.00 [g/m]		
Indication of UL Style Number		None		
Fiber Length on Spool [m] **25m** Wickelboy Spool measurements [4.5 cm x 30cm x 15cm] for more details see the "Spool Characteristics" Document.		20m, 25m		
Fiber Length on Spool [m] **450m** Spool measurements [10cm x 30cm x 30cm] for more details see the "Spool Characteristics" Document.		30m, 35m, etc. until 150m		
Fiber Length on Spool [m] **2600m** Spool measurements [19.5cm x 39.5cm x 39.5cm] for more details see the "Spool Characteristics" Document.		150m, 160m, etc. until 500m		

DUPLEX **2x POF 1 / 2.2 [mm] Performance**					
Product **Description**			Specification		
			Minimum	*Type*	*Maximum*
Maximium Rating	*Storage Temperature [℃]*	No Physical Change	-55	-----	70
	Operation temperature [℃]	No Deterioration in Optical Properties	-55	-----	70
	Operation Temperature under 95% RH [℃]	No Deterioration in Optical Properties	-----	-----	65
Transmission Loss	*Attenuation (Collimated light) [dB/km]*	**650** [nm] (Ta = 25 °C)	-----	-----	160
		650 [nm] (Ta = operation temp)	-----	-----	170
		660 [nm] (Ta = operation temp)	-----	-----	265
	Bandwidth	Launch NA > Fiber NA	40 MHz.50m	-----	-----
Mechanical Characteristics	*Minimum Bending Radius*	(Ta: Operation temp.)	-----	25	-----
	Repeated Bending Endurance [Times]	Loss Increment ≤1dB 90° 25mmR, Dead Weight: 500g	10'000	-----	-----
	Tensile Strength [N]	Tensile Force at 5% Elongation in Conformity to the JIS C 6861	70	-----	-----
	Twisting Endurance *[Times]*	Loss Increment ≤1dB Sample Length: 1[m], Tensile Force 4.9[N]	5	-----	-----
	Impact Endurance *[N.m]*	Loss Increment ≤1dB in Conformity to the JIS C 6861	0.4	-----	-----

All tests are carried out under temperature of 25 °C unless otherwise specified.

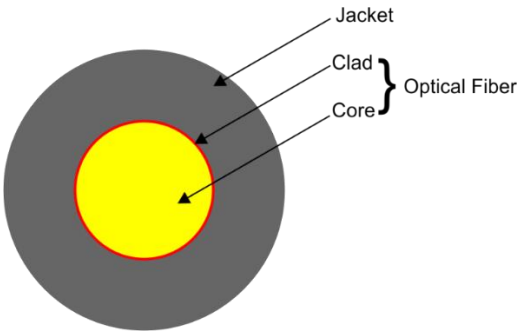
Plastic Optic Fiber Characteristics

6 CHANNELS (Specially Designed for Explomet 2T+ & Explomet-fo-2000) 6x POF 1 / 2.2 [mm] Structure				
Product **Description**		**Specification**		
		Minimum	*Type*	*Maximum*
Optical Fiber **ESKA™ SK-40** **Mitsubishi™**	*Core Material*	Polymethylmethacrylate Resin		
	Clad Material	Fluorinated Polymer		
	Core Reflective Index	-----	1.49	-----
	Clad Reflective Index	-----	1.41	-----
	Reflective Index Profile	Step index		
	Numerical Aperture (NA)	-----	0.5	-----
	Core Diameter [µm]	920 µm	980 µm	1'040 µm
	Clad Diameter [µm]	940 µm	1000 µm	1'060 µm
	Number Core	**6**		
POF Jacket	*Inner Jacket Material*	Polyethylene		
	Inner diameter [mm]	2.13 mm	2.20 mm	2.27 mm
	Jacket Color	Black		
Reinforced Jacket	*Jacket Material*	Reinforced PVC Tube		
	Outer Diameter	9.8mm	10.00	10.2
	Jacket Color	Red or Yellow		
Approximative Weight		44.00 [g/m]		
Indication of UL Style Number		None		
6 Channels POF Cable		26m (Red), 51m (Yellow)		

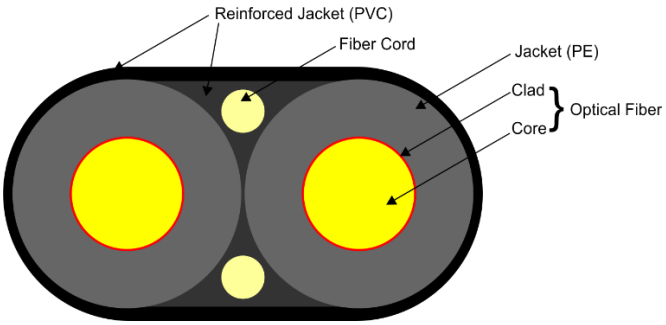
6 CHANNELS (Specially Designed for Explomet 2T+ & Explomet-fo-2000) 6x POF 1 / 2.2 [mm] Performance					
Product Description			Specification		
			Minimum	*Type*	*Maximum*
Maximium Rating	*Storage Temperature ℃*	No Physical Change	-55	-----	70
	Operation temperature [℃]	No Deterioration in Optical Properties	-55	-----	70
	Operation Temperature under 95% RH [℃]	No Deterioration in Optical Properties	-----	-----	65
Transmission Loss	*Attenuation (Collimated light) [dB/km]*	**650** [nm] (Ta = 25 °C)	-----	-----	160
		650 [nm] (Ta = operation temp)	-----	-----	170
		660 [nm] (Ta = operation temp)	-----	-----	265
	Bandwidth	Launch NA > Fiber NA	40 MHz.50m	-----	-----
Mechanical Characteristics	*Minimum Bending Radius*	(Ta: Operation temp.)	-----	25	-----
	Repeated Bending Endurance [Times]	Loss Increment ≤1dB 90° 25mmR, Dead Weight: 500g	10'000	-----	-----
	Tensile Strength [N]	Tensile Force at 5% Elongation in Conformity to the JIS C 6861	70	-----	-----
	Twisting Endurance [Times]	Loss Increment ≤1dB Sample Length: 1[m], Tensile Force 4.9[N]	5	-----	-----
	Impact Endurance [N.m]	Loss Increment ≤1dB in Conformity to the JIS C 6861	0.4	-----	-----

All tests are carried out under temperature of 25 °C unless otherwise specified

Cross Section of Simplex POF



Cross Section of Duplex POF



Cross Section of 6 Channels POF Cable