SPEEDTRACKER mach4

QUICK REFERENCE GUIDE

for **COMPETITIVE MARKSMANSHIP**

m4

VERSION: **V2.4**
DATE: **April 2023**

SPEEDTRACKER mach4

1 INTRODUCTION

SPEEDTRACKER mach4

IS THE MOST ADVANCED RADAR
FOR BULLET SPEED DETECTION ON THE MARKET

- Capturing speeds up to 1200 m/s – 4000 fps.

- Patented technology with highly optimized beam shaping and foam filter.

- Fits in the palm of your hand and is mounted directly onto your firearm.

- Engineered and developed by a team of European engineers from Germany and Czech Republic.

GUARANTEED	MANUFACTURED
12 MONTH WARRANTY	100% IN EUROPE
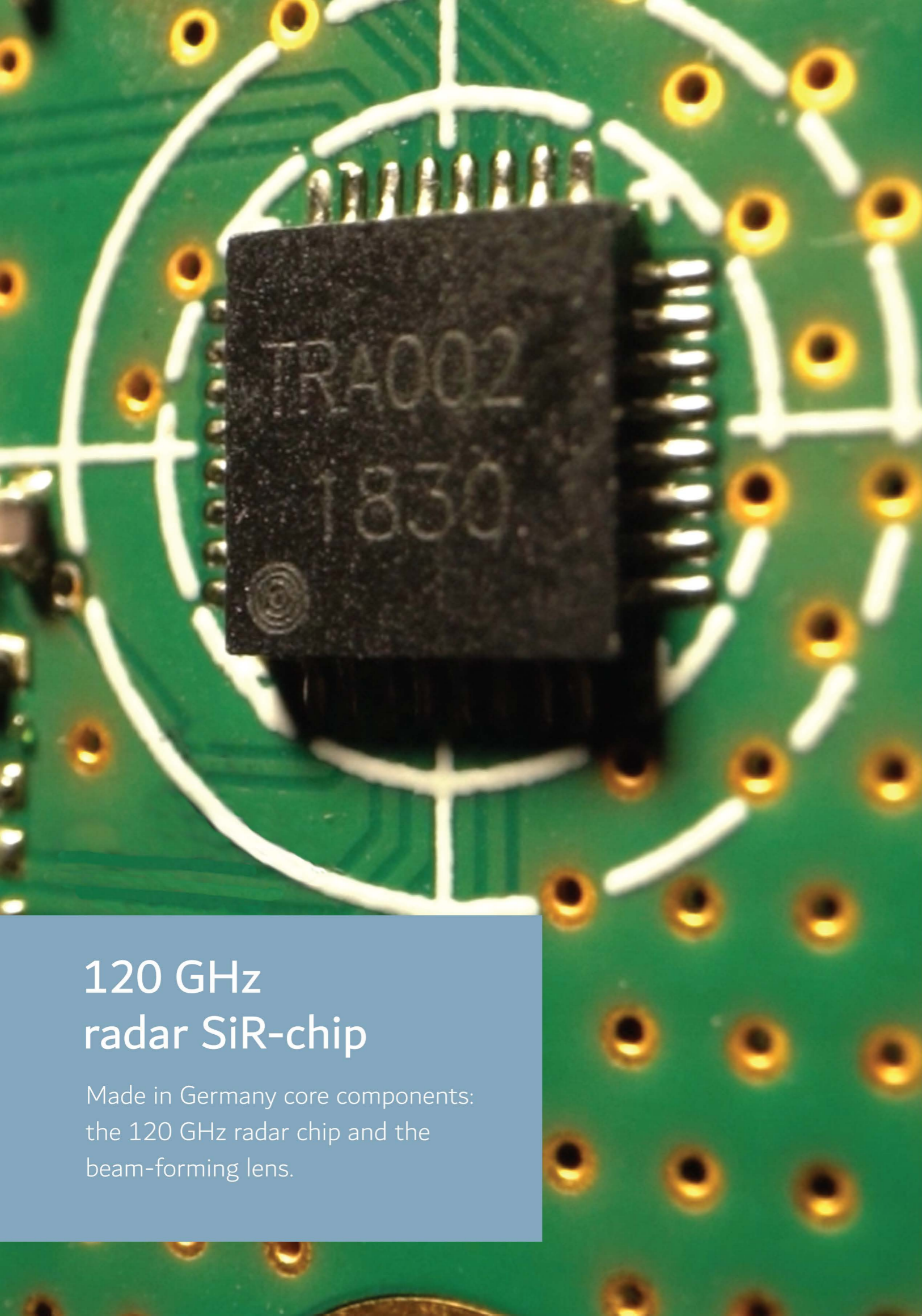
120 GHz radar SiR-chip

Made in Germany core components: the 120 GHz radar chip and the beam-forming lens.

2 TECHNICAL FEATURES

Biggest radar cross section of bullets and pellets on the market.

Enjoy extremely high accuracy with multiple detections in the 1st meter.

Detecting the bullet up to 2 000 times.
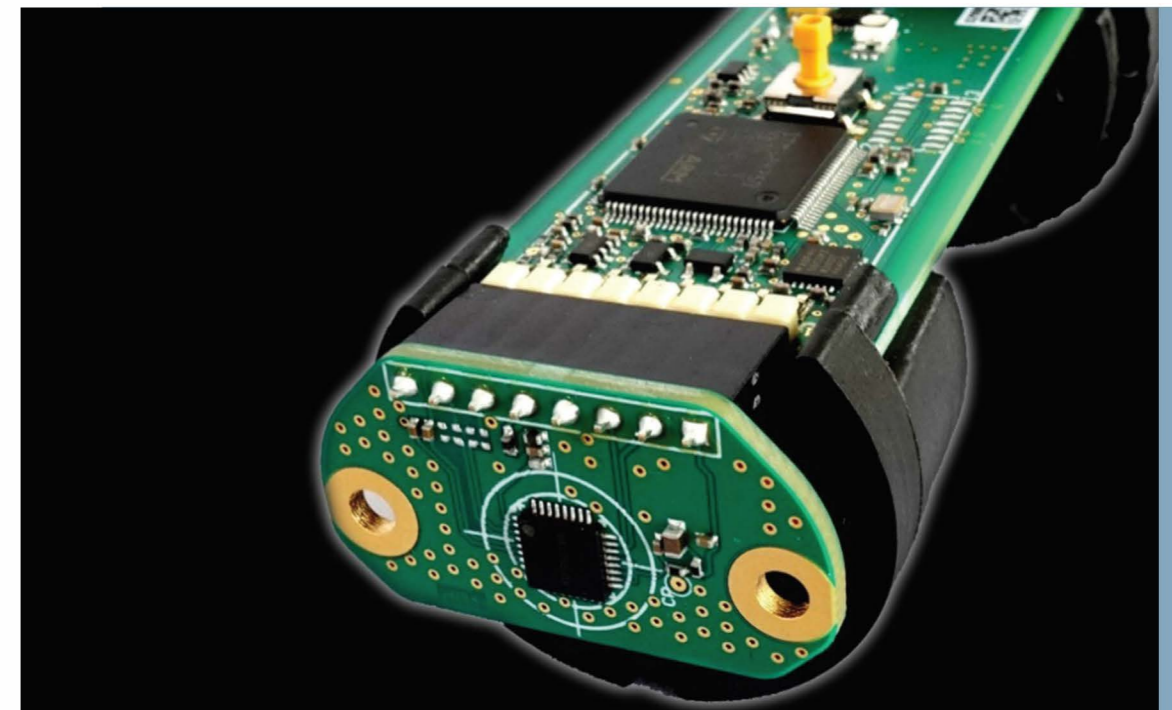
Not affected by wind and air pressure.

20 to 2 000+ measuring points.

Tunnel shooting option
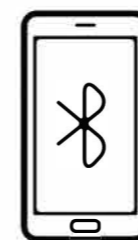
BLUETOOTH pairing to iPhone & Android.

3 FIRST SETUP

Press for switch on / off the switch for 1 second.

GREEN — Start Bluetooth connection. Open the APP.

ORANGE — Bluetooth pairing.

Start the APP, go to the HOME screen and press CONNECT.

The first time, a window will pop up asking for pairing permission.

CONNECT

780,9	2,8	9,4
Min	Std. Deviation	Spread
790,3	785,0	0 %
Max	Average	Battery

Active String: video 2
Speed [m/s]
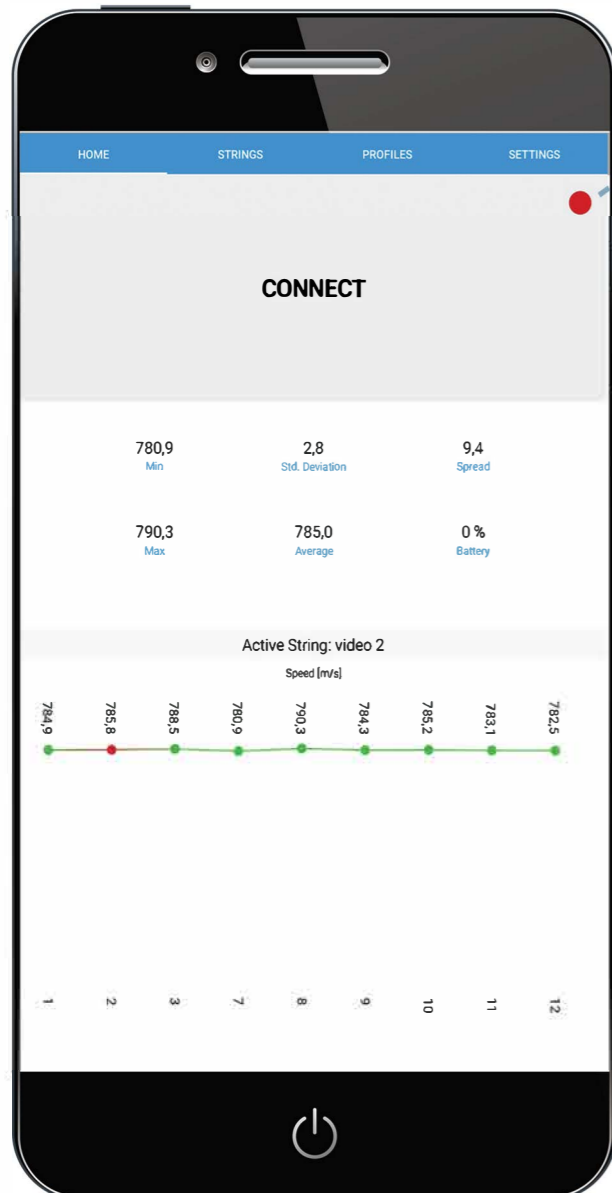
Red dot in the upper right corner indicates **not connected.**

During pairing, the *SPEEDTRACKER* LED lights up **orange**.

If the dot in the right upper corner has changed to **green**, the *SPEEDTRACKER* is **connected with your phone.**

The LED of the *SPEEDTRACKER* now also lights up green.

Ready for shooting.

$0_{m/s}$

0,0	0,0	0,0
Min	Std. Deviation	Spread
0,0	0,0	78 %
Max	Average	Battery

Active String: String 2
Speed [m/s]
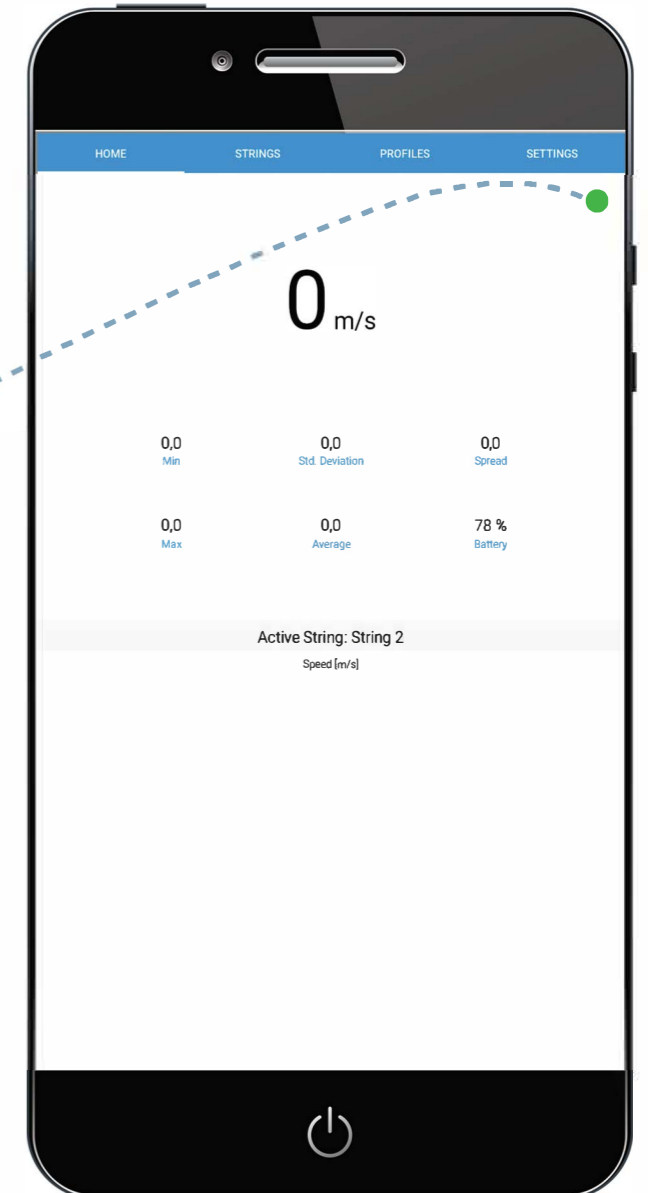
4 APPLICATION

- The application is very complex.

- All data is stored on your phone, it can be exported and used in external programs.

- You can create a backup and restore it again.

- You can create profiles.

- Store shot data such as rifle, barrel length, ammunition data, etc.

- Your location and weather data will be saved.

- Settings are reduced to the minimum.

- Everything is largely automated.

DOWNLOAD THE APP
SPEEDTRACKER MACH 4

Available on the
App Store

Get it on
Google play
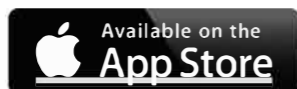
4.1 SETTINGS

All units can be set to metric or imperial.

| | HOME | STRINGS | PROFILES | SETTINGS |

Interface

| Sound | |
| Keep screen on | |

Bluetooth Device

Firmware version	v2.2
Status	N
Switch off after [sec]	5000
Extend switch off period after shot	
Switch off device on exit	
Sound on device on/off	

Display

Speed Unit	m/s
Energy Unit	J
Mass Unit	g r
Temperature Unit	°C
Pressure Unit	hPa

Connectivity

| Status | Connected |

CONNECT

Data

BACKUP

RESTORE

About

SHOW ABOUT

SOUND

The language set in the phone will be used.

SHOW ABOUT

Press the button the APP version will be displayed.

4.2 PROFILES

Profiles

| HOME | STRINGS | PROFILES | SETTINGS |

New Profile 1

New Profile 2

← New Profile 1

| HOME | STRINGS | PROFILES | SETTINGS |

Gun Name	New Profile 1
Barrel Length	
Ammunition	
Brand	
Name	
Gun Powder Weight	
Primer	
Default Projectile Mass [g]	1

DELETE PROFILE
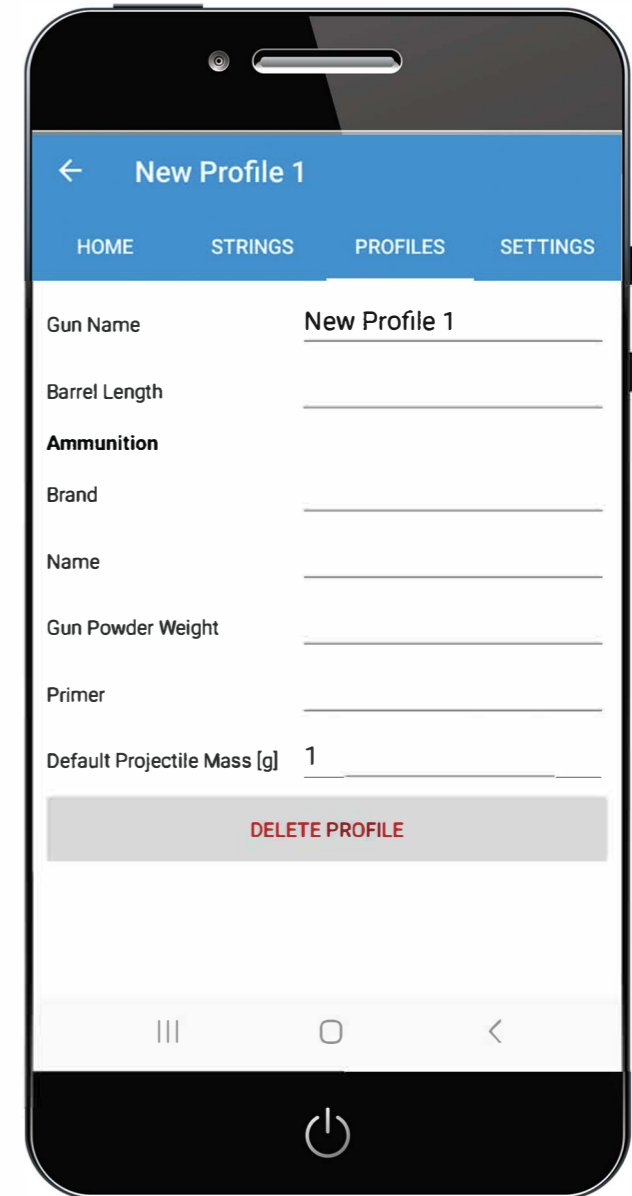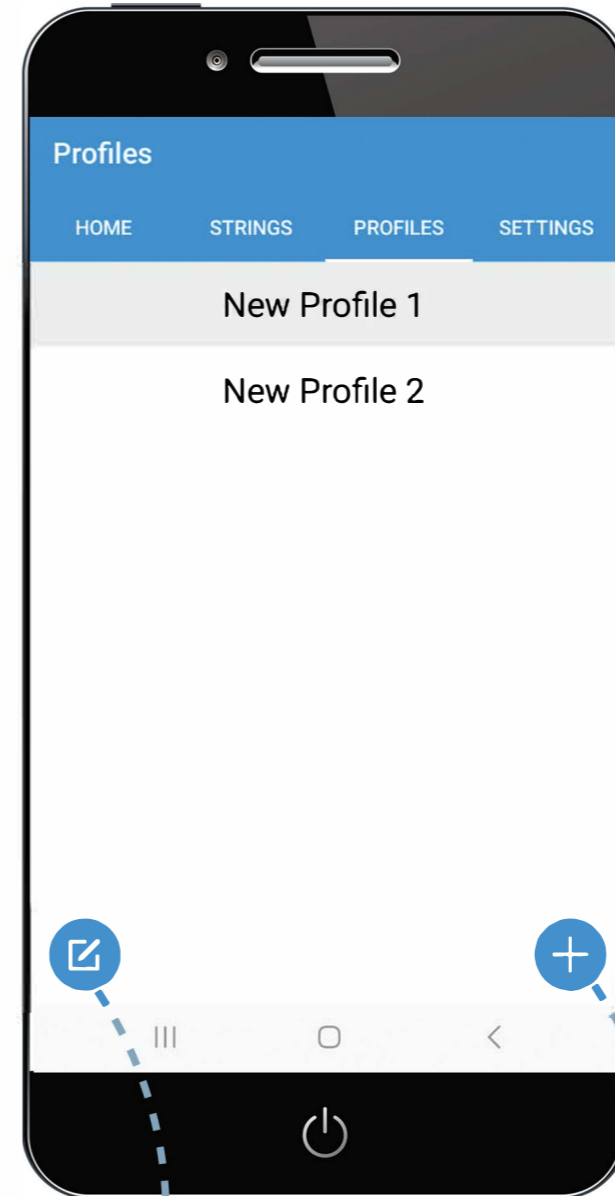
EDIT THE PROFILE

CREATE NEW PROFILE

4.3 HOME

SELF-EXPLANATORY

THE NUMBER OF DETECTIONS

GREEN	very good	>100
ORANGE	good enough	50-100
RED EFFICIENT	improve position	<50

more detections is always better

782,5 m/s

179 DETECTIONS

| 780,9 Min | 2,8 Std. Deviation | 9,4 Spread |
| 790,3 Max | 785,0 Average | 35 % Battery |

Active String: video 2

Speed [m/s]
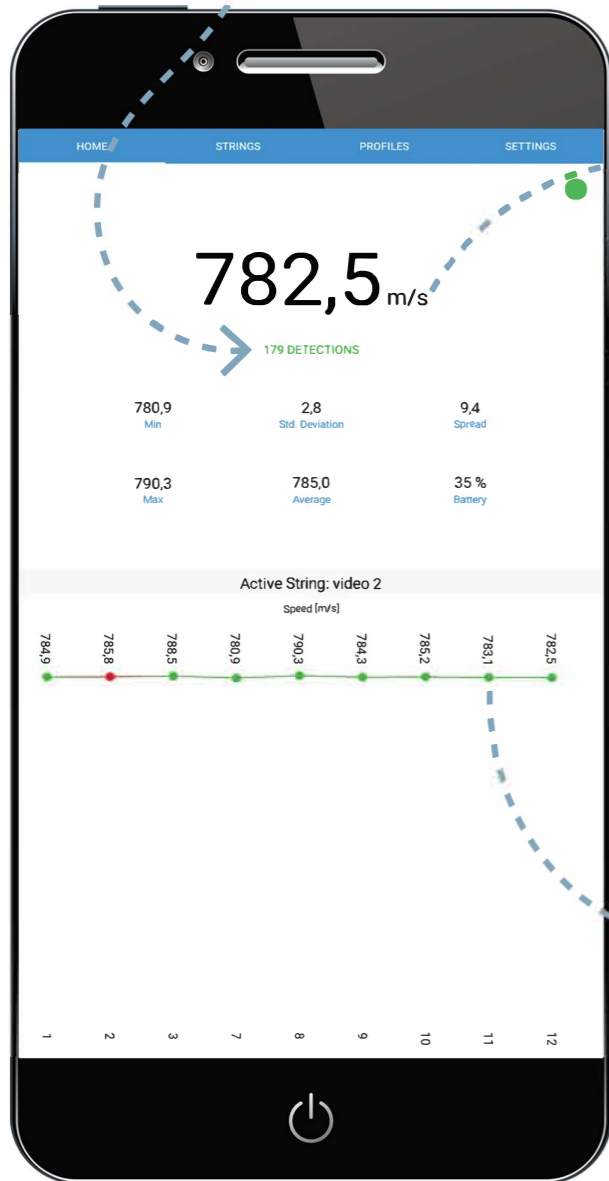
Speed values according to the setting in **SETTINGS** (metric / imperial).

The color scale can also be found below in the graph of all shots.

4.4 STRINGS

SELF-EXPLANATORY

Open with a finger tip.

Strings

HOME   STRINGS   PROFILES   SETTINGS

Filters

Search   X
From   X
To   X

String 2
test dar
video 2
video
String 1
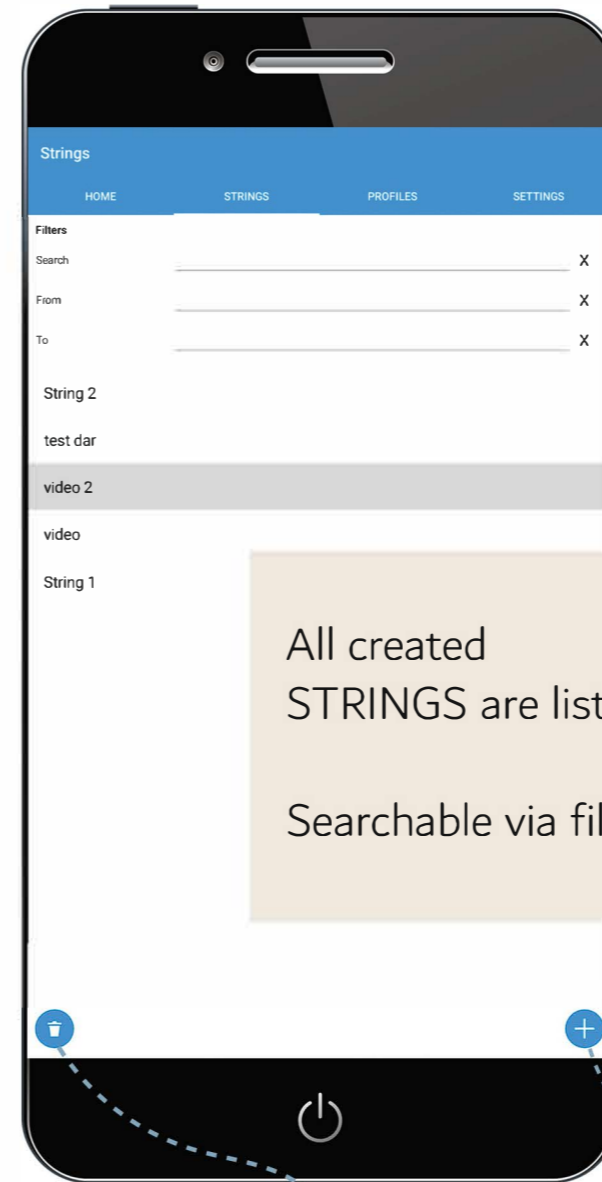
All created STRINGS are listed.

Searchable via filter.

Strings

HOME   STRINGS   PROFILES   SETTINGS

Filters

Search   X
From   X
To   X

○ test dar
video 2
○ video
○ String 1
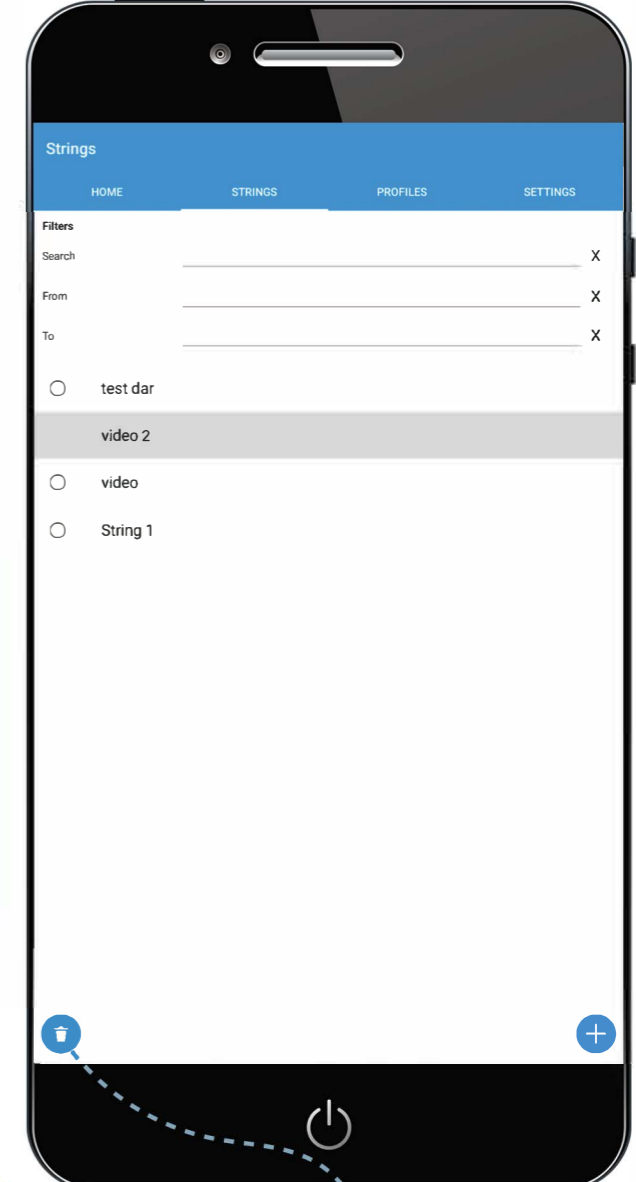
DELETE THE STRING

CREATE NEW STRING

MULTIPLE DELETE

m4

Name	video 2
Created	18.11.2022 10:01:11
Gun Name	accuracy
Barrel Length	22
Notes	

Ammunition ⌄
Statistics ⌄
Location ⌃
Name	
Latitude	50,80408669
Longitude	14,27756166

Weather ⌄

OPEN SHOTS
TAKE TARGET PICTURE
OPEN TARGET PICTURE
COPY
EXPORT
DELETE STRING

If you copy a string,
the current data
is duplicated
(rifle, barrel
length, ammo,
etc.). But
without the shot
data .

EXPANDED DATA

Ammunition
Statistics
Location
Weather

Ammunition	⌃
Brand	sako
Name	
Gun Powder Weight	
Primer	
Projectile Mass [gr]	168

Statistics		⌃
	Speed [m/s]	Energy [J]
Min	0,0	0,0
Max	0,0	0,0
Average	0,0	0,0
Std. Deviation	0,0	0,0

Location	⌃
Name	Roztoky
Latitude	50,1388301
Longitude	14,4522934

Weather	⌃
Temparature [°C]	0,4
Pressure [hPa]	1022
Humidity [%]	84

OPEN SHOTS
TAKE TARGET PICTURE
OPEN TARGET PICTURE

Shot List of video 2

HOME	STRINGS	PROFILES	SETTINGS

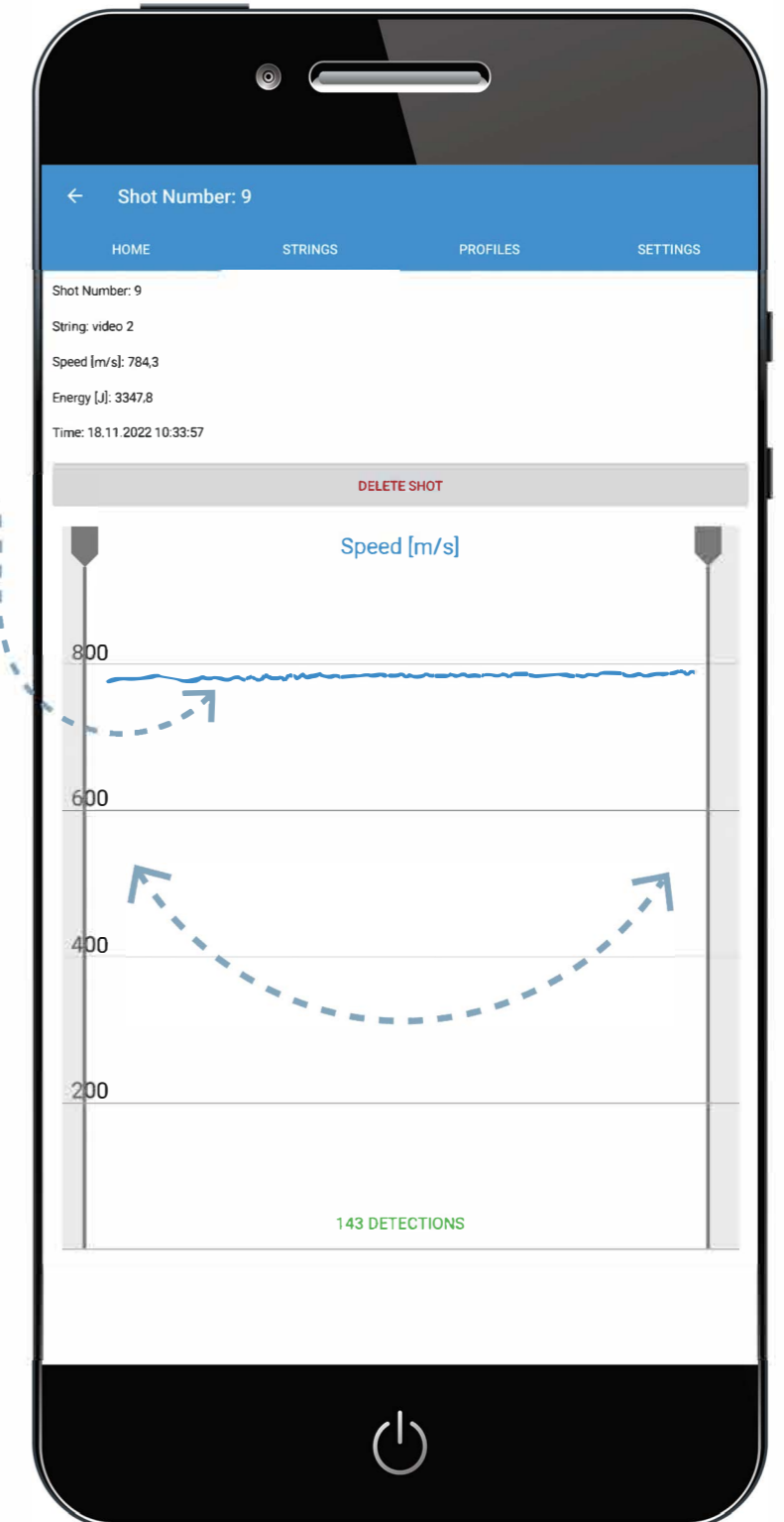| Shot Number	Speed [m/s]	Time
12	782,5	10:53:34
11	783,1	10:51:21
10	785,2	10:35:23
9	784,3	10:33:57
8	790,3	10:31:23
7	780,9	10:21:50
3	788,5	10:13:41
2	785,8	10:11:42
1	784,9	10:07:49

Open single shot by finger tip.

If you press the **delete button**, another window opens for selecting the shots to be deleted.

The graph shows every single detection of the shot. The average speed is determined from these detections.

With the finger slider, you can manually filter out unwanted data that can be caused by the angular error at the beginning or end.

Shot Number: 9

HOME	STRINGS	PROFILES	SETTINGS

Shot Number: 9

String: video 2

Speed [m/s]: 784,3

Energy [J]: 3347,8

Time: 18.11.2022 10:33:57

DELETE SHOT

Speed [m/s]
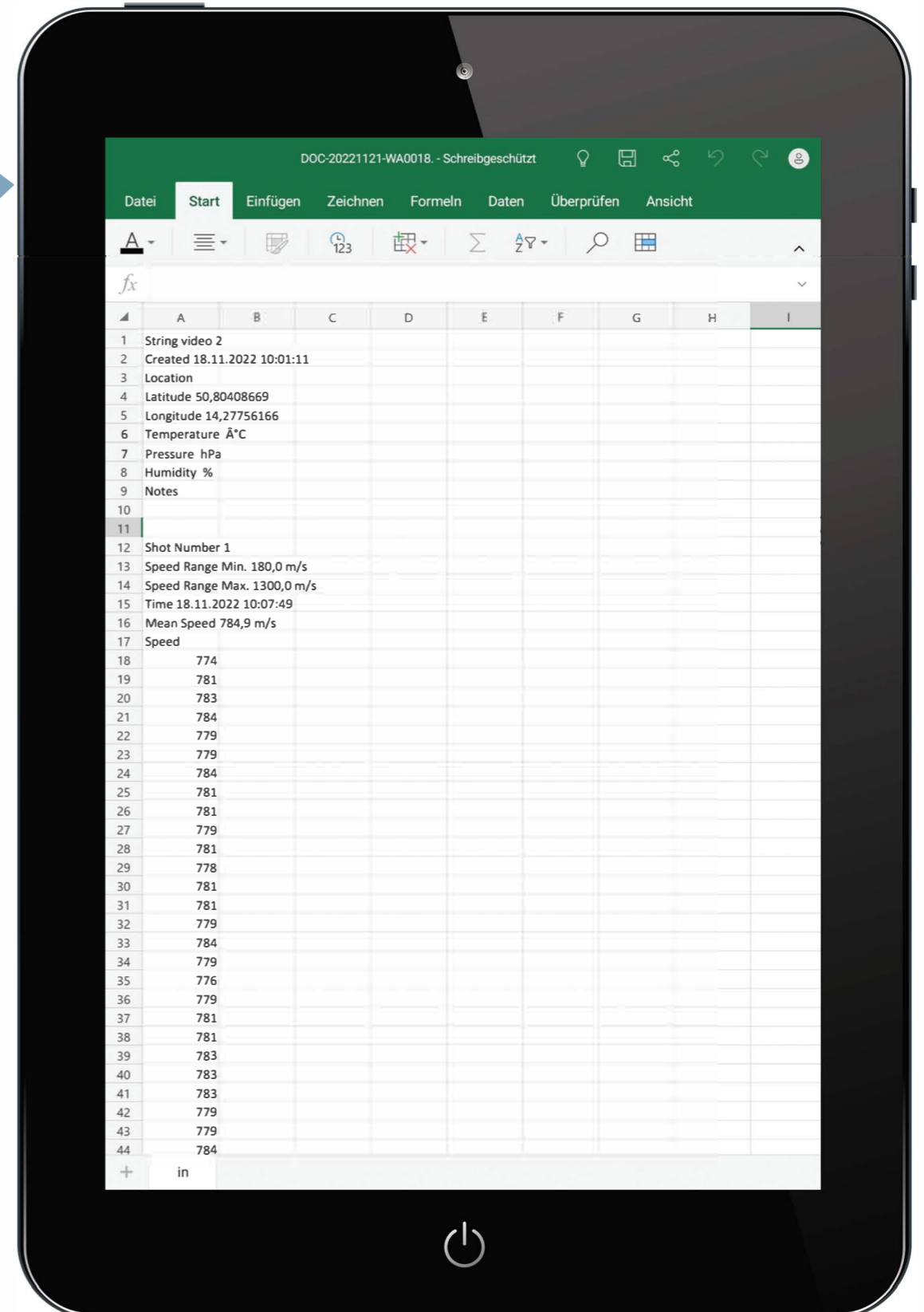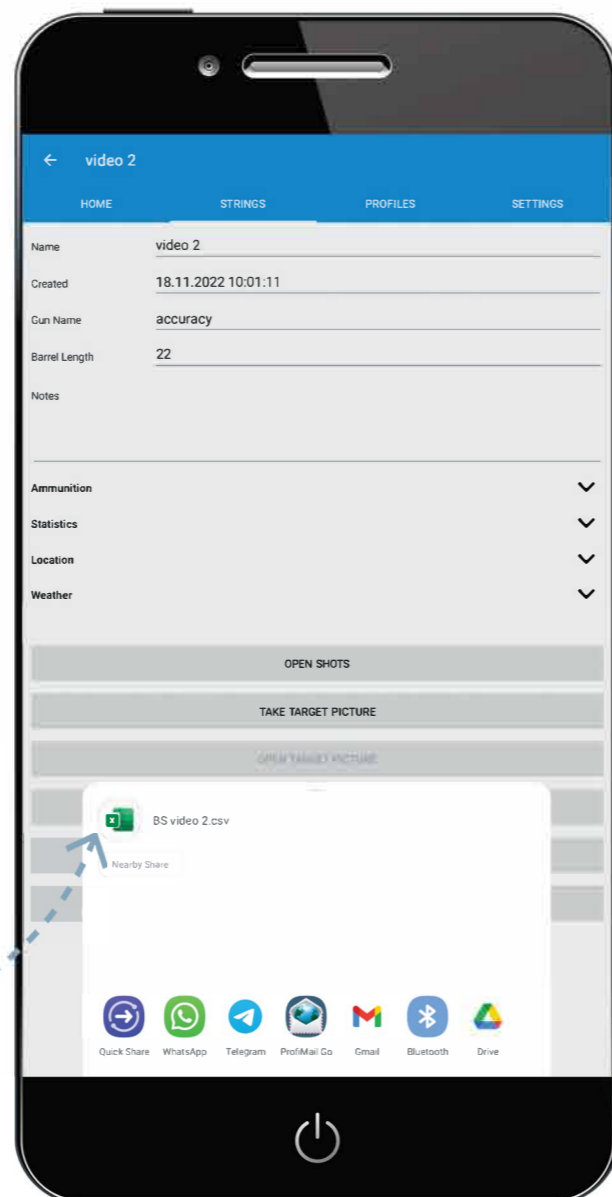
800

600

400

200
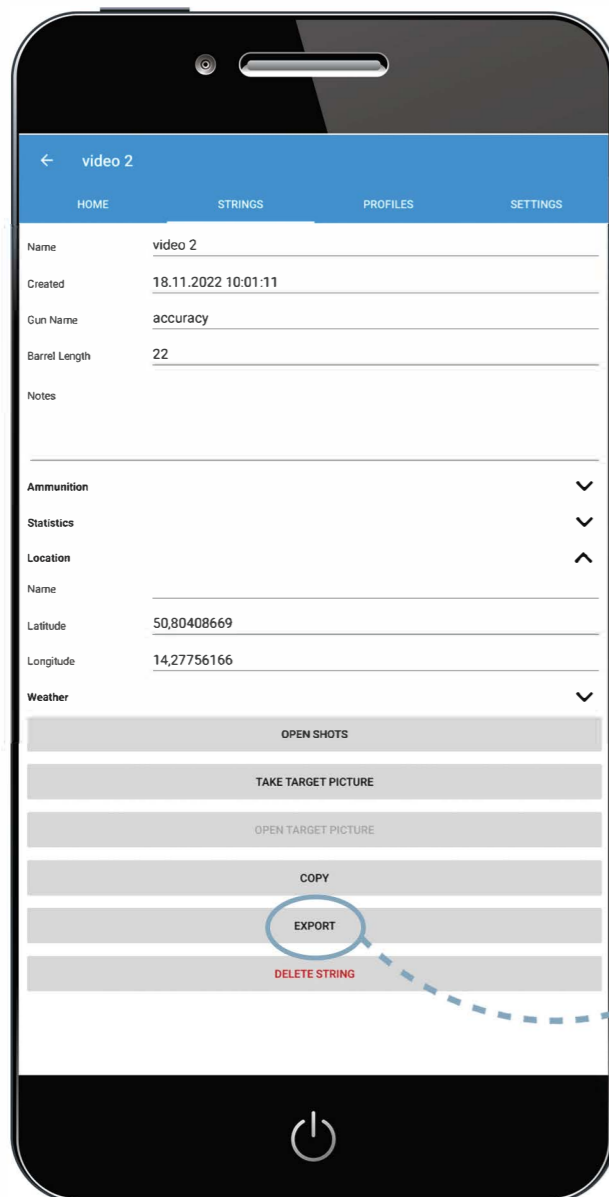
143 DETECTIONS

4.4 STRINGS

If you want to **EXPORT YOUR DATA**, a popup window opens with a variety of export options.

The name is editable.

The format is .csv for use in spreadsheets.

The .csv data is transferred directly to the spreadsheet. You can process the data here according to your needs.

5 POSITIONING

SPEEDTRACKER mach4

Explosive ammunition creates a muzzle cloud from hot gases and metallic abrasion. This cloud of plasma and metal splinters is electrically conductive. It can interfere with the radar waves and wipe out the signal.

We have tested several different muzzle brakes. Each one has it's own sweet-spot.

Muzzle brakes with a guided gas jet such as star or spiral shape allows the radar signals to pass through very well.

BEST PRACTISE

Find the right position on your gun by testing.

You can improve this slightly by looking at the number of detections per shot. **More is better.**

Mount your *SPEEDTRACKER* parallel to the barrel, lateral distance max. 15 cm / 6" and max. 60 cm / 24" behind the muzzle brake. These distances can be increased with the parabolic adapter.

Due to the large number of combinations of weapons, ammunition and possible positions, we cannot suggest general recommendations. Try out different positions and optimize this with the help of the number of detections on the screen (red - orange - green).

Parabolic Adapter

Usually we measure in the first meter. In the case of problematic muzzle clouds, however, if the signal is blocked, by using with the adapter we can see up to 3m - i.e. beyond the muzzle clouds.

Due to its parabolic shape and larger diameter, the parabolic adapter carries more signals to the receiver.

The diameter is chosen to be smaller than the size of the *SPEEDTRACKER+* click adapter. Therefore easy to assemble.

BEST PRACTISE
FIND THE RIGHT POSITION ON YOUR GUN BY TESTING.

Swing Adapter
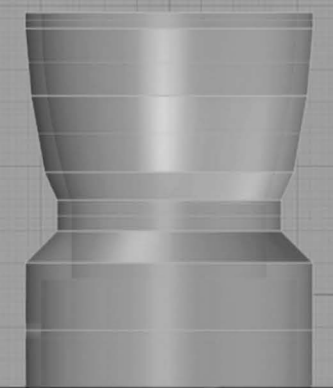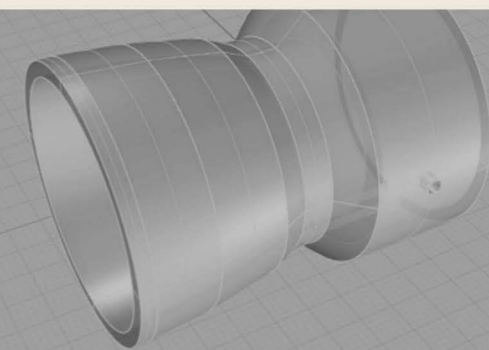
- For stepless position adjustment.
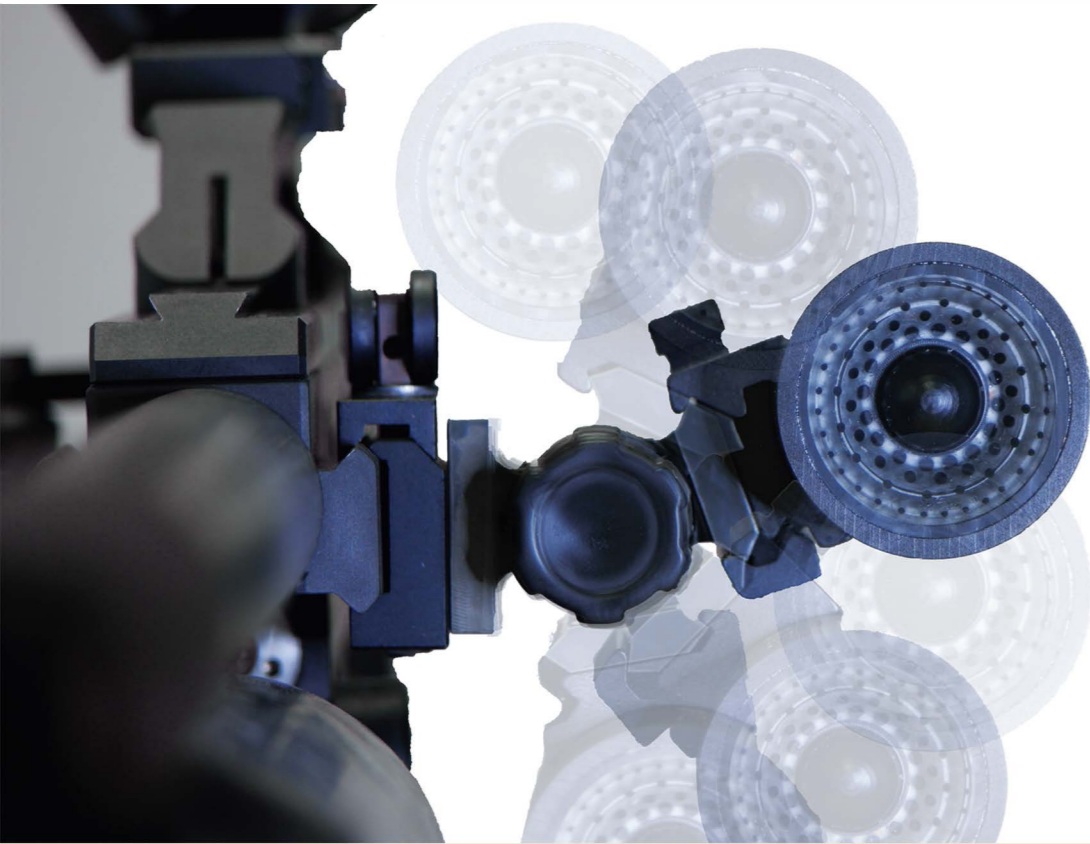
Parabolic Adapter

- When using the silencer, we recommend using the ParabolicAdapter, which increases the range from 1 to approx. 3 m.

- The same applies to difficult conditions with strong muzzle flashes or bulk ammunition.

BEST PRACTISE
FIND THE RIGHT POSITION ON YOUR GUN BY TESTING.

NOTICE FOR USA

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Unauthorized modifications may void the authority granted under Federal communications Commission Rules permitting the operation of this device.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTICE FOR CANADA

Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

.Usually this is followed by the following RSS caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The device is CE and FCC certified.

AUTOMATICALLY SAVED DATA STRINGS

SPEEDTRACKER MACH4 APP has an integrated databank and is saved on your phone.

DETECTIONS ARE DISPLAYED WITHOUT SHOOTING

The battery voltage has dropped too far - recharge the *SPEEDTRACKER* or other electromagnetic fields affect the radar.

FILE FORMAT

Exported data have the file format "string name.csv".

PARTIAL DETECTION ONLY

This is a positional issue caused by a radar shadow or cloud of fire. A change in position is required.

Good control is seen in the number of detections. To see below the speed in the HOME screen. More detections = better position. Another option is to use the Parabolic Adapter or mounting rails for easy position improvement.

NO OR PARTIAL DETECTION

Turn off ALL Bluetooth connections except the *SPEEDTRACKER* connection.

Check if other electrical or electronic devices in the immediate vicinity are interfering with the radar signal.

BATTERY

3 hours of continuous use. 2 hours charging.

BLUETOOTH CONNECTION ISSUE

If you have paired your BLUETOOTH device with the *SPEEDTRACKER* and it is not working.

It may be in the background and it is important to note that the foreground APP has the priority.

In principle, several BLUETOOTH connections are possible with one device. However, usually only one is active. If there are two tools (*SPEEDTRACKER* and another) connected to your device throug BLUETOOTH, a conflict is identified.

Make the *SPEEDTRACKER* the priority APP.

SPEEDTRACKER *mach4*

ANGLE ADJUSTMENT ERROR

fps

V_o deviation in alignment between Radar and bore line, 0-18 degrees

deg	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	3298	3292	3287	3282	3275	3268	3259	3250	3239	3228	3215	3202	3188	3172	3156	3138	3120	
	3198	3192	3188	3182	3176	3169	3161	3151	3141	3130	3118	3105	3091	3076	3060	3043	3026	
	3098	3092	3088	3083	3077	3070	3062	3053	3043	3032	3021	3008	2994	2980	2965	2948	2931	
	2998	2993	2989	2984	2978	2971	2963	2954	2945	2934	2923	2911	2898	2884	2869	2853	2837	
	2898	2893	2889	2884	2878	2872	2864	2856	2847	2837	2826	2814	2801	2788	2773	2758	2742	
	2798	2793	2789	2785	2779	2773	2766	2757	2749	2739	2728	2717	2705	2692	2678	2663	2647	
	2698	2693	2690	2685	2680	2674	2667	2659	2650	2641	2631	2620	2608	2595	2582	2568	2553	
	2598	2594	2590	2586	2581	2575	2568	2561	2552	2543	2533	2523	2511	2499	2486	2473	2458	
	2498	2494	2490	2486	2481	2476	2469	2462	2454	2445	2436	2426	2415	2403	2391	2378	2364	

deviation in degree

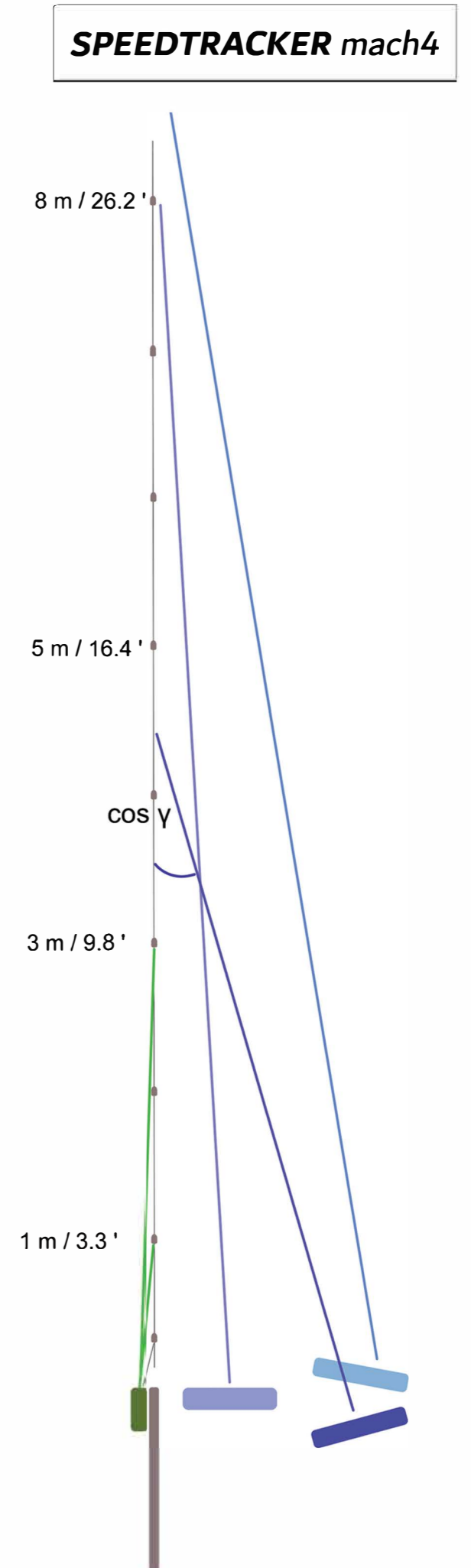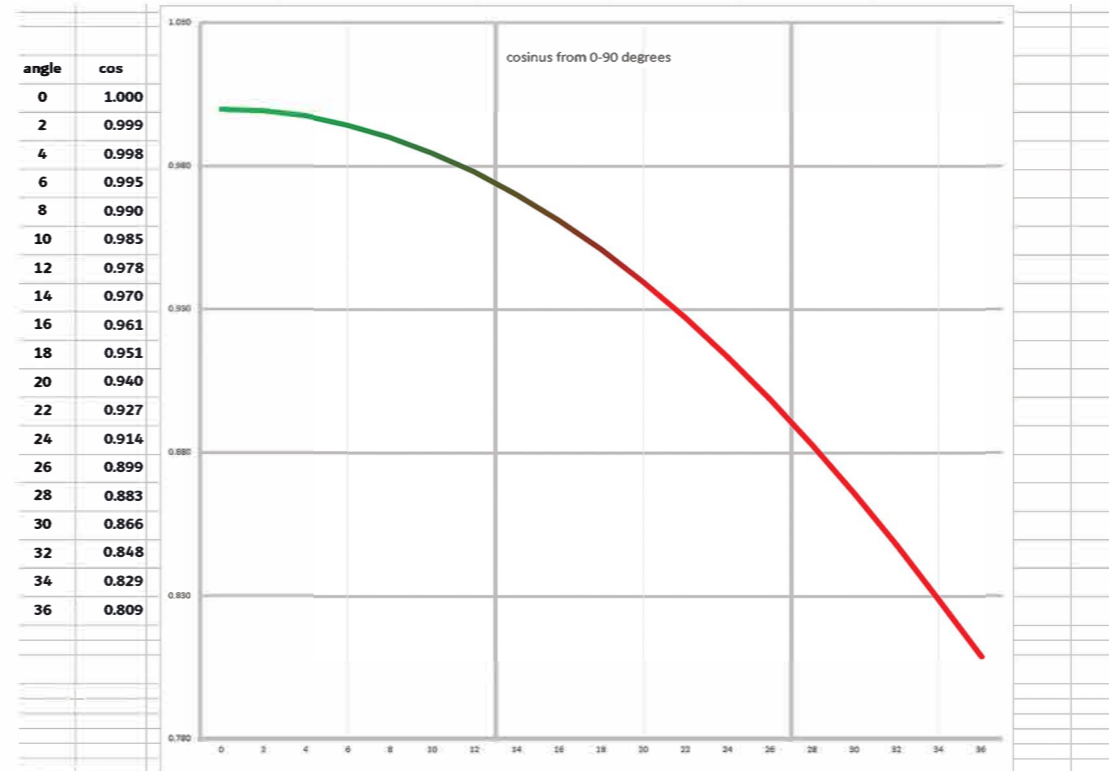## ALIGNMENT

▬ **WHY IS IT SO IMPORTANT**

The velocity of the projectile is determined using the Doppler frequency. With the frequency shift we can measure the speed of the moving object. However, the measurement is dependent on the angle.
We calculate this using the cosine gamma.
The difference of 0 degrees (ideal orientation) and only **10 degrees** radar line to the line of fire the measurement error is already **1.5 %**.

But 1.5 % at 900 m/s -- 2952 fps = 13.5 m/s -- 44 fps !!!

▬ That's why we designed the *SPEEDTRACKER* to get as close to the line of fire as possible. Due to the assembly on the rifle, you always have the same position and the data can always be compared easily.

angle	cos
0	1.000
2	0.999
4	0.998
6	0.995
8	0.990
10	0.985
12	0.978
14	0.970
16	0.961
18	0.951
20	0.940
22	0.927
24	0.914
26	0.899
28	0.883
30	0.866
32	0.848
34	0.829
36	0.809

cosinus from 0-90 degrees

8 m / 26.2 '

5 m / 16.4 '

cos γ

3 m / 9.8 '

1 m / 3.3 '

SPEEDTRACKER *mach4*

QUESTIONS? **CONTACT US**

🌐 **www.speedtracker.tech**

✉ welcome@speedtracker.tech
✉ support@speedtracker.tech

📍 Marketing & Sales by:
SEKR-TEK Speed Tracking Systems

m4

VERSION: **V2.4**
DATE: **April 2023**

CE FC 🗑