Technical Specifications

B&T APR338

Sniper Rifle System cal. .338LM

manufactured by Brügger+Thomet, Switzerland

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1. General Description

The weapon system is basically consisting of a bolt action rifle cal. .338 LM with suppressor, a rifle scope and a user specific cartridge. The system is intended to be a soldier's primary weapon and serve him as anti-personnel rifle. The system must be able to hit a head-sized target up to 600 m distance or a torso-sized target over 1300 m and more with a first round hit probability of over 99%. Although being a precision-instrument, the system must resist the harsh military use and remain functional in typical operational environments.

2. Nomenclature and Technical Data of Rifle

2.1 Nomenclature of Rifle

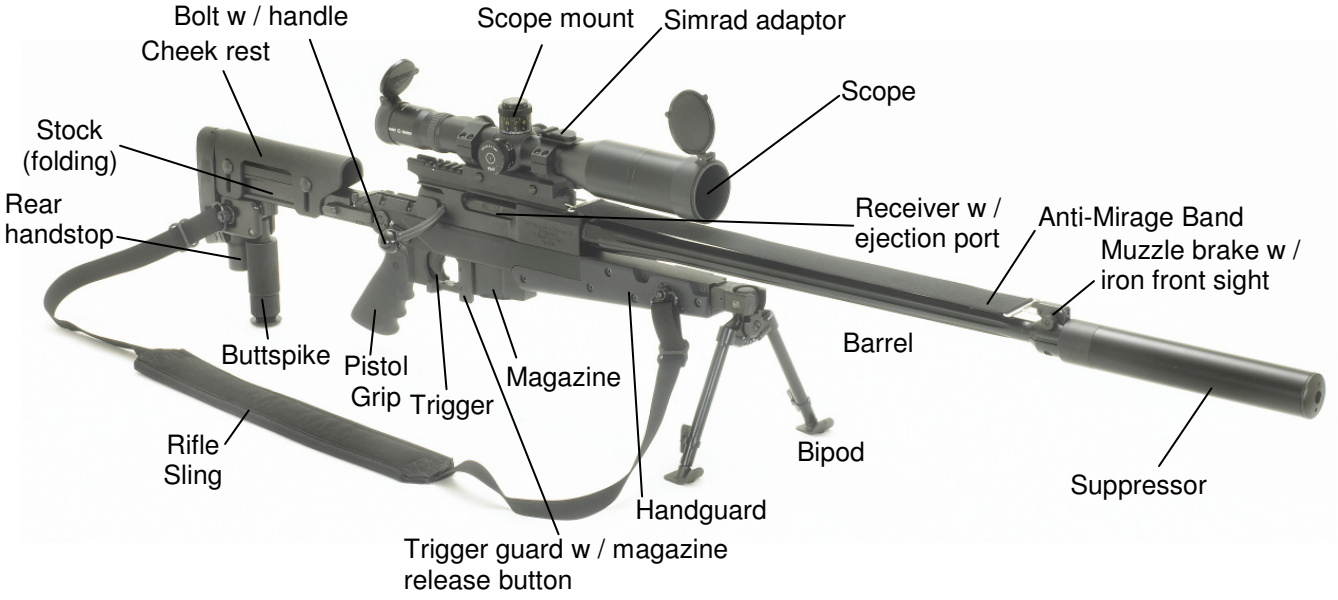


Fig. 2.1

2.2 Technical Data of Rifle

Manufacturer:	Brügger & Thomet AG, Switzerland	
Designation:	B&T APR338 (Advanced Precision Rifle)	
Product ID:	BT-APR338	
System:	Bolt action rifle, manually operated	
Caliber:	.338 Lapua Magnum (8.6x70 mm LM)	
Rifling:	6 grooves, right hand twist 1:11"	
Barrel Length:	690 mm	
Effective Range:	1300 m	
Precision:	< 7 mm (standard deviation at 100 m)	
Overall Length:	Buttstock folded	1002 mm
	Buttstock open	1236 mm (+ 75 mm buttstock extended)
Width (w/o bolt)	Buttstock folded	90 mm
	Buttstock open	50 mm
Sight radius:	837 mm	
Weight (weapon only):	8.2 kg	
Magazine Capacity:	10 rds, detachable	
Trigger Pull:	1.5 kg - 2.5 kg (fully adjustable w/o disassembly)	
Bolt configuration:	3 locking lugs, 60° opening angle	

2.3 Operational Condition Data of Rifle

Shock resistance:	500 shocks of 15 g / 6 ms[1]
Vibration resistance:	10 Hz to 500 Hz at 1.04 g for 2 h, at 4.8 g for 30 min[1]
Drop resistance:	1.5 m without accidental discharge[1]
Operational temperature:	- 30°C / +65°C[1]
Storage temperature:	- 30°C / +65°C (and 95% rel. humidity) for 72 h[1]
Barrel lifetime:	max. 5000 rounds[2]
Permissible Maximum Pressure:	5405 bar

[1]Verified by tests but not necessarily maxima.
[2]According to ammunition manufacturer experience.

3. Nomenclature and Technical Data of Rifle Scope

3.1 Nomenclature of Rifle Scope

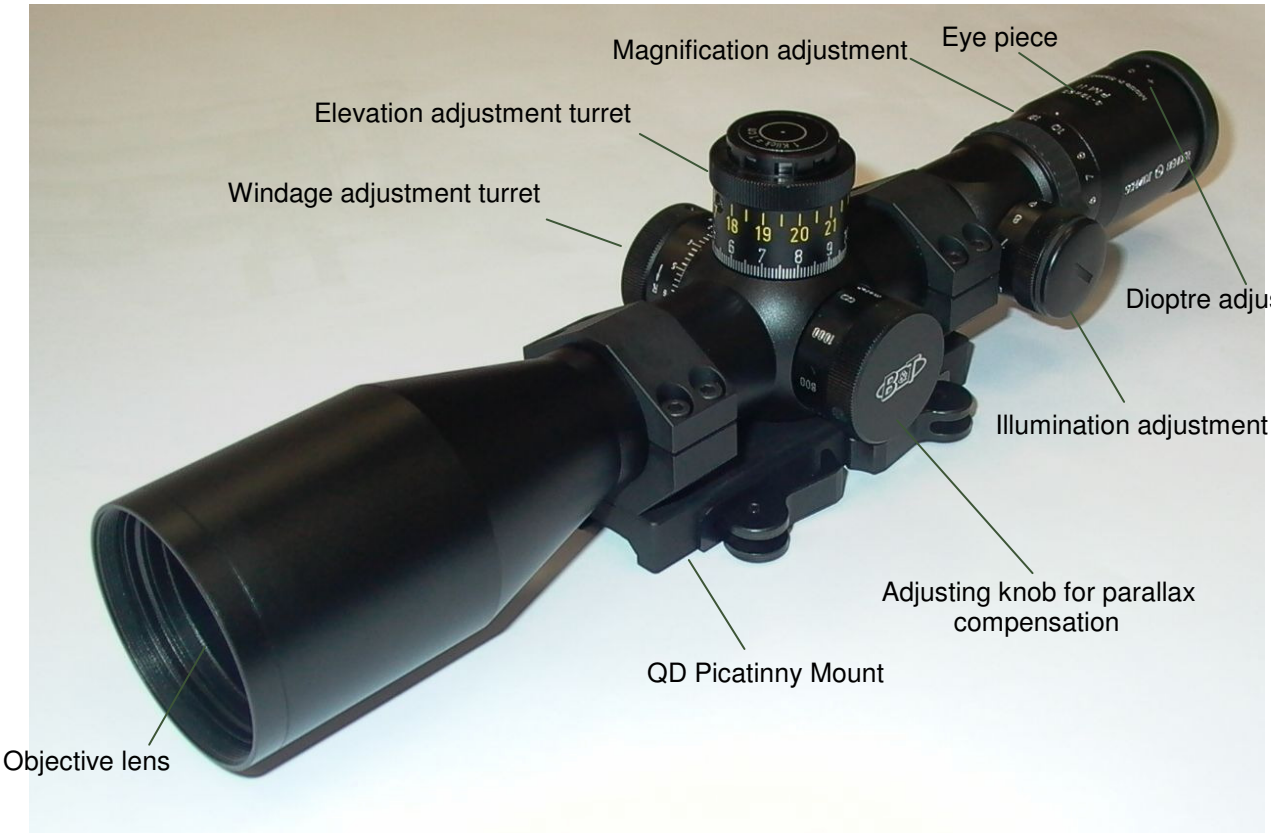


Fig. 3.1

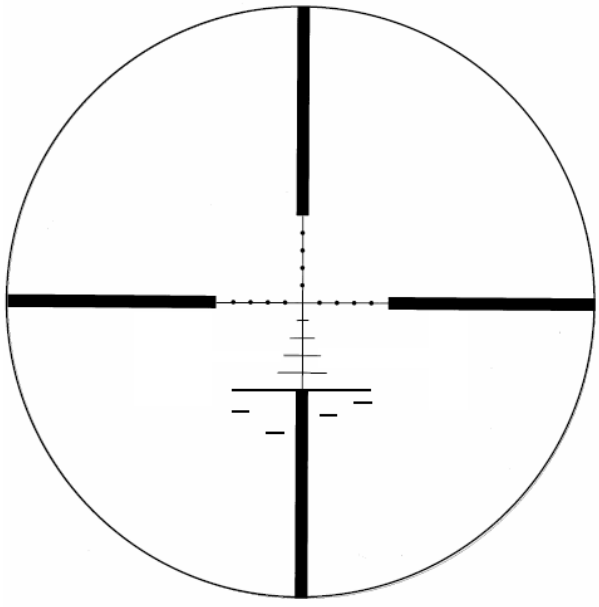


Fig. 3.2: B&T TRS Reticle pattern.
Distance dot to dot = 100 mm/100m.
Range estimation scale for 1 m reference height at 800 m, 400 m, 600 m and 1200 m (from left to right).

3.2 Technical Data of Rifle Scope

Manufacturer:	Made by Schmidt & Bender, Germany, exclusively for B&T (B&T branded)
Designation:	B&T TRS (Tactical Rifle Scope)
Product ID:	BT-3-12x50-CC (complete with mount, sun shade and lens protectors)
Magnification:	3-12x
Free of Parallax at:	Adjustable (50 m to ∞)
Reticle:	Specific as fig. 3.2, illuminated
Power source:	CR2032 3V
Field of View at 100 m:	11.3 - 3.5 m
Objective Diameter:	50 mm
Exit Pupil:	14.3 - 4.3 mm
Twilight Factor:	8.5 - 24.5
Eye Relief:	90 mm
Middle Tube Diameter:	34 mm
Overal length:	355 mm
Weight:	900 g
Windage/elevation adj.:	0.1 mrad/Click (10 mm at 100 m)
Elevation adj. range:	22 mrad (2.2 m at 100 m)
Mount:	B&T Quick detachable mount Picatinny (MIL STD 1913) plus Simrad adaptor
Bore height:	74 mm

3.3 Operational Condition Data of Rifle Scope

Shock resistance:	2000 shocks of 70 g / 3 msec
Vibration resistance:	Amplitude 3.2 mm, frequency 30 Hz, duration 5 min
Drop resistance:	2 m (charged with 17 kg)
Operational temperature:	- 25°C / +55°C (and 95% rel. humidity)
Storage temperature:	- 55°C / + 70°C for 12 h
Submersibility:	10 m for 4 h (in salt water)

4. Nomenclature and Technical Data of Suppressor

4.1 Nomenclature of Suppressor

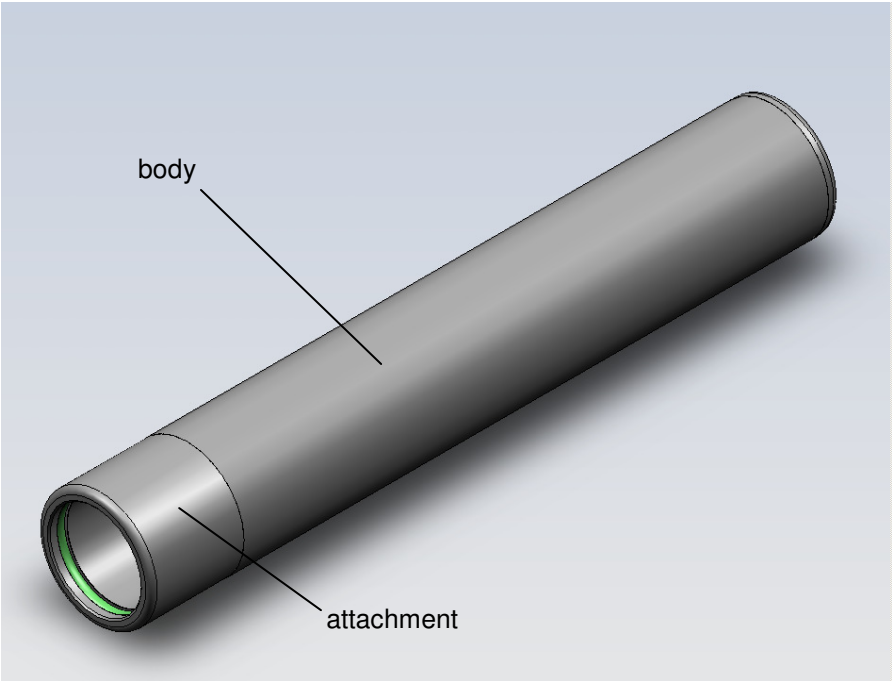


Fig. 4.1

4.2 Technical Data of Suppressor

Manufacturer:	Brügger + Thomet AG, Switzerland
Designation:	GRS
Product ID:	SD-12065
Caliber:	.338 Lapua Magnum (8.6x70 mm LM)
Overall length:	269 mm
Diameter:	40 mm
Weight:	900 g
Attachment:	Thread M22x1 (attaches on muzzle brake)
Suppression:	32 dB A
Lifetime:	5000 rds

5. Ammunition

5.1 Specifications of Cartridge

5.1.1 Technical Data of Cartridge (CIP standard)

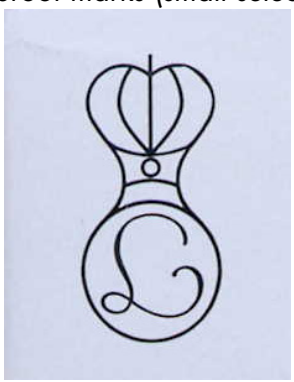
Cartridge overall length:	< 94 mm
Bullet weight (according to twist rate 1:11"):	< 260 grs / 16.9 g
Average maximum pressure at breech end:	≤ 4700 bar
Maximum maximum pressure at breech end	≤ 5405 bar

5.1.2 Compatible and Non-compatible Ammunitions

As the rifle was designed according to CIP-standards, every cartridge .338 Lapua Magnum and 8.6x70 LM (with exceptions as stated below) manufactured according to the same standards can be used with the rifle. CIP standard according cartridges normally carry a proof mark on the box (examples fig. 5.1).

CIP proof marks (small selection)

Finland (Lapua)



Sweden (Norma)

Italy (Fiocchi)

Fig. 5.1

Best results have been achieved with Lapua Scenar 250 grs.
With respect to the muzzle brake and especially when using the rifle with mounted suppressor, the use of bullets which disintegrate at the muzzle departure is forbidden. The shrapnels are very likely to hurt people sidewards to the weapon or can choke the suppressor. This concerns namely sub-caliber bullets with sabot.

5.2 Ballistic Data

5.2.1 Trajectory Table

Weapon: B&T APR338 cal. .338 LM 690 mm twist 1:11"
Scope: B&T Tactical Rifle Scope 3-12x50 74 mm over barrel
Ammo: Lapua Scenar 250 grs
Atmosphere: ICAO 500 m AMSL

distance [m]	y* [m]	t** [s]	velocity [m/s]	energy [J]	Wind 1m/s Drift in cm
0	-0.07	0.00	897	6537	
50	-0.02	0.06	873	6187	0.1
100	0.00	0.12	849	5851	0.3
150	-0.01	0.17	825	5531	0.7
200	-0.06	0.24	802	5225	1.3
250	-0.15	0.30	779	4932	2.0
300	-0.28	0.36	757	4653	3.0
350	-0.45	0.43	735	4388	4.1
400	-0.66	0.50	713	4134	5.5
450	-0.93	0.57	692	3892	7.0
500	-1.24	0.65	671	3662	8.8
550	-1.61	0.72	651	3443	10.8
600	-2.04	0.80	631	3235	13.0
650	-2.53	0.88	611	3037	15.5
700	-3.09	0.96	592	2849	18.2
750	-3.71	1.05	573	2670	21.2
800	-4.41	1.14	555	2501	24.5
850	-5.19	1.23	537	2341	28.1
900	-6.05	1.32	519	2189	32.0
950	-7.01	1.42	502	2046	36.2
1000	-8.06	1.52	485	1912	40.8
1050	-9.22	1.63	469	1786	45.7
1100	-10.49	1.74	453	1668	50.9
1150	-11.88	1.85	438	1559	56.6
1200	-13.39	1.96	424	1459	62.6
1250	-15.05	2.08	410	1367	69.0
1300	-16.84	2.21	397	1282	75.8
1350	-18.80	2.34	385	1206	83.1
1400	-20.92	2.47	374	1136	90.7
1450	-23.21	2.60	364	1074	98.6
1500	-25.70	2.74	354	1018	107.0

*y: MPI over POA in meters. Rifle zeroed at 100 m.
**t: Flight time at distance.

5.2.2 Sight Adjustment Chart

Weapon:	B&T APR338 cal. .338 LM 690 mm twist 1:11"
Scope:	B&T Tactical Rifle Scope 3-12x50 74 mm over barrel
Ammo:	Lapua Scenar 250 grs
NVD:	Simrad KN252 150 mm over barrel
Atmosphere:	ICAO 500 m AMSL

distance	elevation		windage per	movement by	
[m]	**day**	**night***	1 m/s wind	1 click in mm	1 mrad in m
50	4	19	0		
100	0	8	0	10	0.10
150	1	6	0	15	0.15
200	3	7	1	20	0.20
250	6	9	1	25	0.25
300	10	12	1	30	0.30
350	13	15	1	35	0.35
400	17	19	1	40	0.40
450	21	23	2	45	0.45
500	25	27	2	50	0.50
550	30	31	2	55	0.55
600	35	36	2	60	0.60
650	40	41	2	65	0.65
700	45	46	3	70	0.70
750	51	52	3	75	0.75
800	56	57	3	80	0.80
850	62	63	3	85	0.85
900	69	69	4	90	0.90
950	75	76	4	95	0.95
1000	82	83	4	100	1.00
1050	90	90	4	105	1.05
1100	97	98	5	110	1.10
1150	105	106	5	115	1.15
1200	114	114	5	120	1.20
1250	123	123	6	125	1.25
1300	132	133	6	130	1.30
1350	142	142	6	135	1.35
1400	152	153	6	140	1.40
1450	163	164	7	145	1.45
1500	175	175	7	150	1.50

*To apply when Simrad NVD mounted.

5.2.3 Table of Hit Probabilities

Weapon: B&T APR338 cal. .338 LM 690 mm twist 1:11"
Scope: B&T Tactical Rifle Scope 3-12x50 74 mm over barrel
Ammo: Lapua Scenar 250 grs
Atmosphere: ICAO 500 m AMSL

distance [m]	$W_{0.99}$ [mm]	$H_{0.99}$ [mm]
100	2.7	2.7
150	4.1	4.2
200	5.8	6.0
250	7.3	7.6
300	8.8	9.4
350	10.5	11.2
400	12.2	13.4
450	13.9	15.8
500	15.8	18.5
550	17.5	21.3
600	19.5	24.2
650	21.4	27.5
700	23.4	31.3
750	25.5	35.4
800	27.7	40.0
850	29.9	44.9
900	32.1	50.2
950	34.5	56.2
1000	37.0	62.8
1050	39.7	70.0
1100	42.3	77.9
1150	45.0	86.3
1200	47.7	95.7
1250	50.6	105.9
1300	53.8	116.9
1350	56.9	128.7
1400	60.1	141.4
1450	63.3	155.2
1500	66.7	169.7

* $W_{0.99}$, $H_{0.99}$: Width and height of a rectangular target with first round hit probability of 99%.

6. Weapon Main Components

6.1 Presentation of Main Components

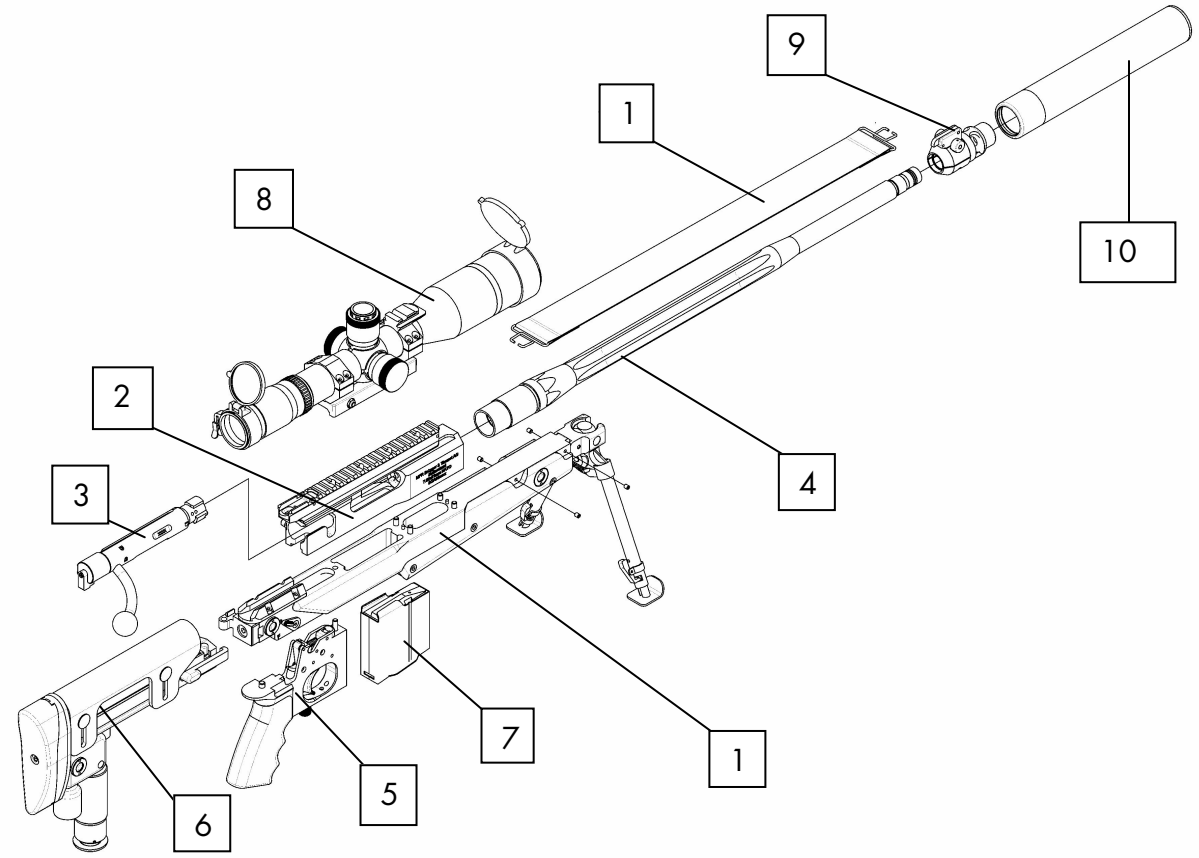


Fig. 6.1

Pos.	Description
1	Lower Receiver
2	Upper Receiver
3	Bolt
4	Barrel
5	Trigger Group
6	Folding Stock
7	Box Magazine
8	Rifle Scope with Mount
9	Muzzle Brake
10	Suppressor
11	Anti-mirage Band

6.2 Description of Main Components

6.2.1 Lower Receiver

The lower receiver is the core of the rifle. Integrated is the manual safety and it also includes the bipod assembly and a forend assembly with ergonomical panels. The more, the forend is offering mounting interfaces for further accessories, e.g. laser designation systems and Anschutz front handstop.
At its rear end, the folding stock is attached; folding stock and lower receiver are forming something that is close to the stock of a conventional rifle design.
On its top, the upper receiver is attached. Therefore, the surface between upper and lower receiver is what in conventional rifle designs is called the bedding.
Under the receiver attaches the trigger group. Unlike conventional rifle designs, the trigger is not attached to the receiver and therefore the classical distinction between "firing unit" and "carrying unit" is hardly applicable for the actual design.
The manual safety is designed as ambidextrous lever safety and it allows to load and unload the weapon in safe mode.

6.2.2 Upper Receiver

Main components of the upper receiver are a housing, in which a locking ring is permanently fixed, and a Picatinny rail as interface to the rifle scope. Integrated in this scope mount rail is the rear part of the emergency sight, designed as factory zeroed flip-up sight.
Into the above mentioned locking ring, the bolt locks by rotation; thus, receiver with locking ring, bolt and barrel are forming the breech of the rifle.

6.2.3 Bolt

The bolt assembly features mainly a body with handle for operation and carries extractor, ejector and firing pin. The bolt head shows three strong locking lugs for maximum strength and opens at a 60° angle.

6.2.4 Barrel

The barrel is a one-piece construction of forged steel. A special barrel steel is used, providing at once best corrosion resistance and longevity. The barrel shows very distinctive flutings which reduce the weight of the stiff, heavy contoured barrel.
With its chamber end, the barrel becomes screwed into the receiver and presses onto the locking ring. On the muzzle side, a highly efficient muzzle brake is fixed.

6.2.5 Trigger Group

The complete trigger mechanics are built into a housing which carries a M16-style pistol grip, offering very familiar ergonomics to the operator.

The trigger is a so called double-stage trigger. It is designed in a way to allow an external adjustment without dismantling the trigger group. The trigger pull is adjustable as well as its path.
In the large trigger guard, the magazine retainer is integrated. It is holding the magazine in two positions: one is fully inserted for magazine feeding, the other position is offering comfortable round-by-round manual feeding.

6.2.6 Folding Stock

The folding stock is a rather complicated construction, containing nearly half the parts of the complete rifle. It offers ergonomic features as adjustable cheek rest, adjustable butt plate, adjustable length and a buttspike which is foldable and adjustable in height. It is attached to the lower receiver with a rugged steel hinge.

6.2.7 Box Magazine

Unlike "hunting style" rifles, the actual system features a detachable box magazine, as used in assault rifles, submachine guns and pistols. With ten rounds, it features one of the highest capacities among sniper rifles.
The complete magazine is consisting of a rugged stainless steel body with a follower assembly inside. Attached to the follower is a special spring of sophisticated design in order to provide constant force from the first to the last round. When the magazine is empty, it stops the forward motion of the bolt.
The magazine feeds through the lower receiver into the upper receiver and is held by a magazine catch, which is integrated in the trigger group.

6.2.8 Rifle Scope with Mount

Around the central tube of the rifle scope, two rugged rings are tightened (one with Simrad adaptor). Those rings are attached to the mount base, showing a Picatinny interface to the rifles upper receiver. Scope and mount are clamped on the rifles Picatinny rail by the tension of two levers, allowing the operator to quickly remove the scope in case of failure or while cleaning or transporting. Detaching and attaching the scope repeatedly will not affect the zero.
The scope itself is a model out of the well established Schmidt&Bender PMII line, featuring a unique reticle and a Double Turn elevation turret for maximum adjustment range.

6.2.9 Muzzle Brake

Basically, the muzzle brake reduces recoil by over 40%. Its rugged steel body also carries the front part of the emergency sight, the flip-up front sight. The more, its design provides the possibility to attach a suppressor directly on the muzzle brake, which therefore never has to be removed. The muzzle brake assembly includes a thread protector to protect the thread if no suppressor is mounted.

6.2.10 Suppressor

Even being an assembly, the suppressor is to be considered as a part: For safety reasons, all parts are sealed and it is not possible to dismantle the suppressor.
For installation, the suppressor is simply screwed over the muzzle brake.
The suppressor reduces the acoustical and optical muzzle signature (muzzle blast and muzzle flash), providing camouflage to the operator as well as minimising the weapon danger area and the risk of hearing damages.

6.2.11 Anti-mirage Band

Especially when long series are fired as in training scenarios, the anti-mirage band suppresses efficiently mirage (hot air rising from barrel).

7. Weapon Function

7.1 Starting Position

Fig. 7.1 is showing the weapon just after a shot has been fired: The bolt is closed and locked, the firing pin is uncocked, the trigger is pulled and an empty case is in the chamber. The same condition without pulled trigger and without case in the chamber corresponds to the neutral condition of the rifle (unloaded, unarmed/uncocked).

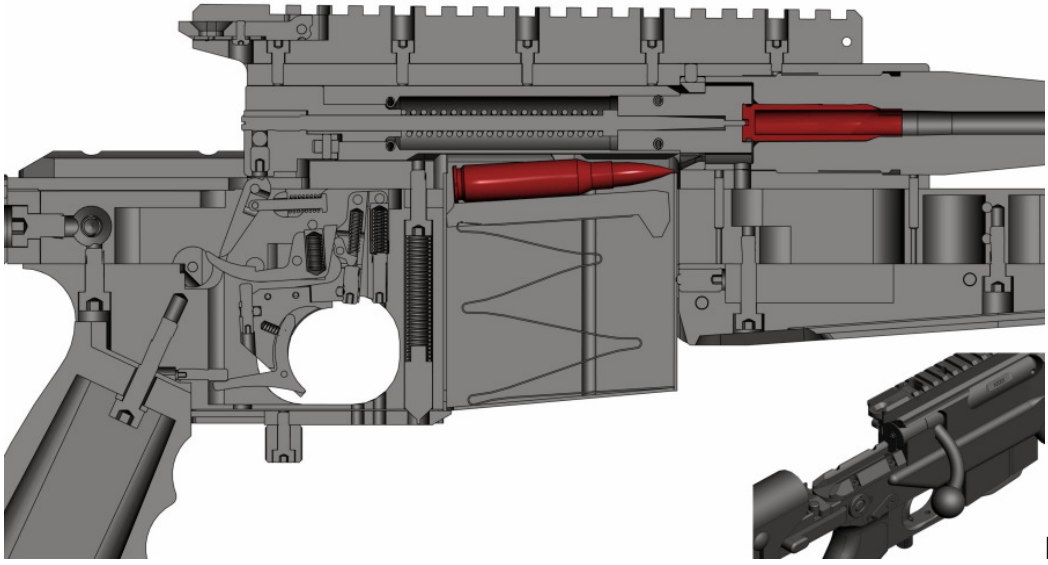


Fig. 7.1

7.2 Unlocking bolt and cocking firing pin

In fig. 7.2, the trigger has been released and is locked by the trigger safety. Lifting the bolt handle manually by 60°, the bolt unlocks and the firing pin becomes cocked.

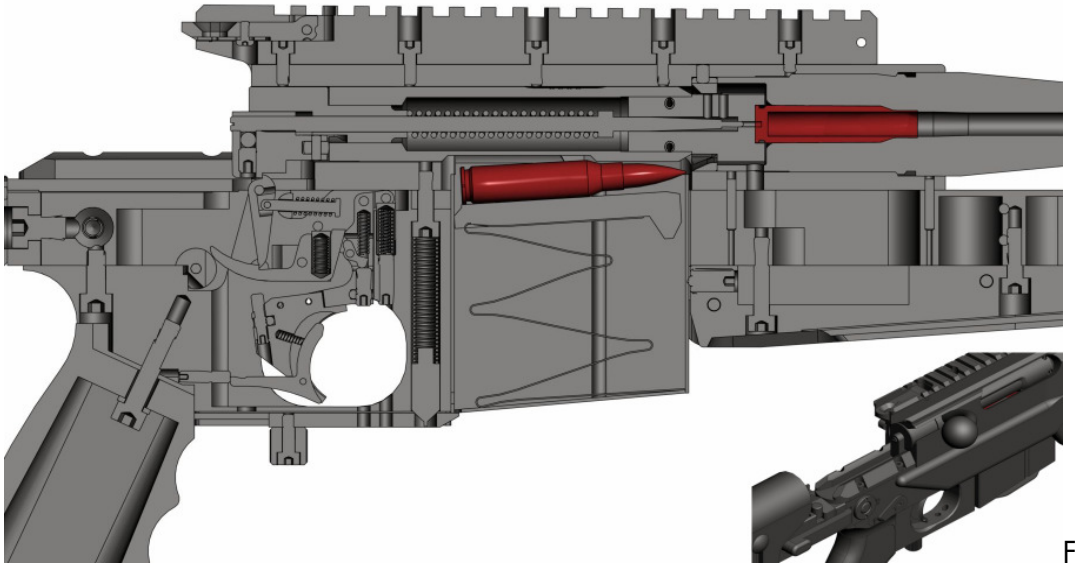


Fig. 7.2

7.3 Opening bolt

When fully opening the bolt manually, the empty case becomes extracted and ejected (fig. 7.3).

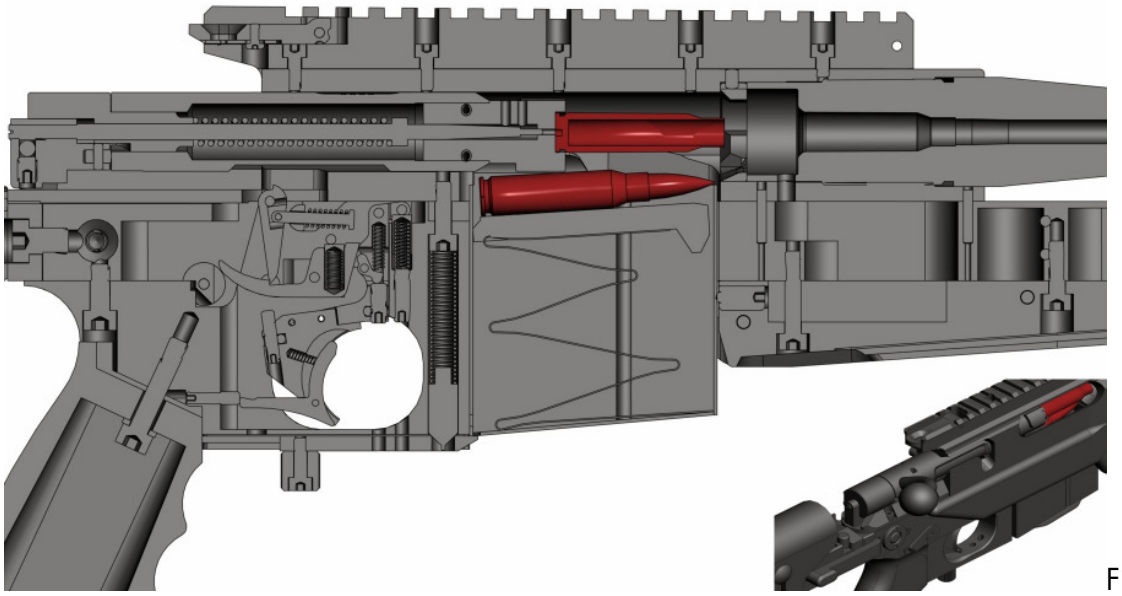


Fig. 7.3

7.4 Closing bolt

By closing the bolt manually, a new cartridge is fed from the magazine into the chamber. With a 60° clockwise rotation, the bolt locks behind the locking ring and the rifle is ready to fire again.

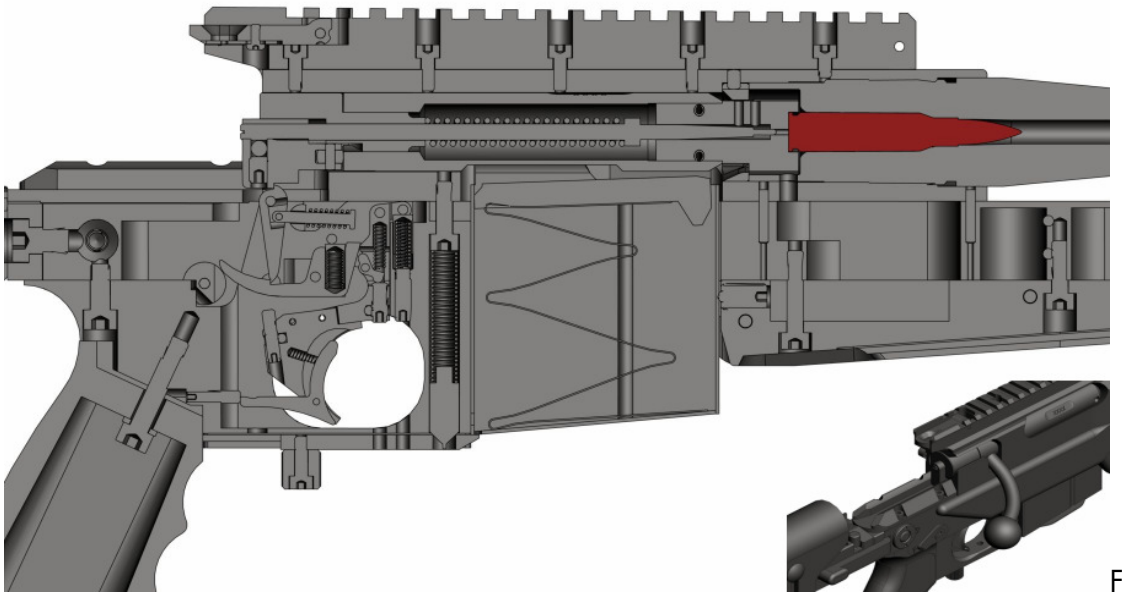


Fig. 7.4

8. List of Technical Data Required

S/N	Characteristics	Unit	Input	Remarks
1	Total length of weapon	cm	123.6 to 131.1	Retractable stock
2	Total mass of weapon	kg	8.2	
3	Mass of recoil parts	kg	9.6	Mass of complete system to consider (incl. scope)
4	Barrel life	# rounds	2500	
5	Barrel condemnation criteria	mm	8.41	Max. acceptable bore dia. over lands
6	Barrel length	mm	690	Chamber end to muzzle
7	Chamber volume	mm	N/A	
8	Bore land diameter	mm	8.38	
9	Bore groove diameter	mm	8.58	
10	Groove width	mm	2.79	
11	Land width	mm	1.7	
12	No. of lands or grooves	-	6	
13	Initial rifling twist	mm/turn	280	
14	Exit rifling twist	mm/turn	280	
15	Chamber wall thickness	mm	tbd	
16	Chamber wall specific heat	J/kg-K	N/A	
17	Chamber wall density	kg/m^3	N/A	
18	Free corrective heat transfer coefficient for air in gun tube	W/m^2-K	N/A	

9. Accessories

9.1 Soft Case

a. The range bag is a compact and lightweight soft case for transport to the shooting range.
b. When packing the rifle, point the scope to the carrying handles (as shown in fig. 5.1).

Fig. 9.1

c. The range bag features:
- Shoulder strap and carrying handles
- modular straps with Velcro to fix the rifle
- modular pouch system with Velcro attachment
- 1 bolt pouch
- 1 suppressor pouch
- 1 cartridge pouch
- 1 accessory pouch
- 1 double magazine pouch
- integrated sleeve for fix cleaning rod
- compartment for manual and log book

d. Mfr reference:
BT-SCASE338BLK for black
BT-SCASE338ODG for OD green

9.2 Triple Rail Interface

a. The triple rail interface fits to the weapon without any modification.
b. It provides three Picatinny Mil-Std 1913 rails as interface for accessories as
- Night Vision Devices (as shown, others than Simrad)
- Laser aiming/designation devices
- Illumination tools

c. Part number of triple rail interface: BT-ALM23

Fig. 9.2

10. Warranty Information and Disclaimer

10.1 Manufacturer's Warranty Information

a. The manufacturer's warranty covers the complete system with all components and accessories.
b. The warranty is valid three years from the date of acceptance of the weapon system by the customer's authority.
c. The warranty period for wearing out parts as well as the parts themselves are stated below:

barrel:	5'000 rounds
suppressor:	5'000 rounds

d. The warranty is applicable on all non-conformities in material or workmanship detected during the period.

10.2 Manufacturer's Disclaimer

a. The manufacturer is not responsible for improper usage of this potentially dangerous product - it is the users responsibility to understand and implement its proper use.
b. The manufacturer is not responsible for defects which result from non-observance of the operation and maintenance procedures as outlined in the manufacturer's manuals. If descriptions of procedures are not understandable or seem to be missing, contact the manufacturer for further clarification.
c. Technical specifications may be subject to modifications according to the manufacturer's quality management system.