

Data sheet

SONO 1500 CT

Ultrasonic flow sensor

Description/Application

MID examination certificate
no.: DE-09-MI004-PTB011



The SONO 1500 CT is an ultrasonic flow sensor especially designed for heating, cooling or combined heating/cooling application in local and district energy systems.

The SONO 1500 CT has been approved according to MID in class 2 and 3.

Features:

- 1st approval in Europe for ultrasonic flow sensor with dynamic range of q_v/q_p 1:250 in class 2 (q_p 1.5 / 2.5 / 6 / 10 / 15 / 25 / 40 / 60 m³/h)
- Complete dynamic range: $\geq 1:1500$
- Lithium battery with a lifetime of 11 years or external supply
- Temperature range: 5 - 90 °C / 130 °C / 150 °C
- Overload temperature up to 150 °C (sizes q_p 0.6 up to 2.5 m³/h)
- Available in nominal sizes: q_p 0.6 / 1.0 / 1.5 / 2.5 / 3.5 / 6 / 10 / 15 / 25 / 40 / 60 m³/h
- Unique free-beam principle
- Swirl-free flow around reflector
- Robust stainless steel reflector
- All sizes also available in PN 25
- No calming sections necessary in the inlet and/or outlet (standard installation)
- NOWA test capability
- Connection to calculator with pulse defined values
- Insensitive against magnetite
- Installation in any position
- Free selectable pulse values

Ordering:

The standard codes are used for ordering.

Heating application SONO 1500 CT standard codes¹⁾:

Code no.	Flow sensor	Nominal pressure	Cable length of flow sensor
087G1350	qp 0.6 m ³ /h / 110mm thread / DN 15 / G ³ / ₄ B / 1 liter/pulse	PN16	2.5m
087G1351	qp 1.5 m ³ /h / 110mm thread / DN 15 / G ³ / ₄ B / 1 liter/pulse	PN16	2.5m
087G1352	qp 1.5 m ³ /h / 130mm thread / DN 20 / G1B / 1 liter/pulse	PN16	2.5m
087G1353	qp 2.5 m ³ /h / 130mm thread / DN 20 / G1B / 1 liter/pulse	PN16	2.5m
087G1354	qp 3.5 m ³ /h / 260mm thread / DN 25 / G1 ¹ / ₄ B / 10 liter/pulse	PN25	2.5m
087G1355	qp 6 m ³ /h / 260mm thread / DN 25 / G1 ¹ / ₄ B / 10 liter/pulse	PN25	2.5m
087G1356	qp 10 m ³ /h / 300mm thread / DN 40 / G2B / 10 liter/pulse	PN25	2.5m
087G1357	qp 6 m ³ /h / 260mm flange DN 32 / 10 liter/pulse	PN25	2.5m
087G1358	qp 10 m ³ /h / 300mm flange DN 40 / 10 liter/pulse	PN25	2.5m
087G1359	qp 15 m ³ /h / 270mm flange DN 50 / 10 liter/pulse	PN25	5m
087G1360	qp 25 m ³ /h / 300mm flange DN 65 / 10 liter/pulse	PN25	5m
087G1361	qp 40 m ³ /h / 300mm flange DN 80 / 100 liter/pulse	PN25	5m
087G1362	qp 60 m ³ /h / 360mm flange DN 100 / 100 liter/pulse	PN25	5m

¹⁾ These codes are EN version flow sensor with external power supply. For more characteristics of each code, please contact Danfoss local sales company.

More standard codes are available regarding cooling application.

Accessories
Tailpieces

	Threaded	Dimension (AGV x AGZ)	Set	Code No.
		R 1/2" x G 3/4 B	1 pc	087G6071
R 3/4" x G 1 B	1 pc	087G6072		
R 1" x G 1 1/4 B	1 pc	087G6073		
R 1 1/2" x G 2 B	1 pc	087G6074		

Technical data

Flow rate	Nominal	q_p [m ³ /h]	0.6		1.5		2.5		3.5		6		
	Maximum	q_s [m ³ /h]	1.2		3		5		7		12		
	Standard minimum	q_i [l/h]	6		15		25		35		60		
	Extended minimum ⁵⁾	q_i [l/h]	-		6		10		-		24		
	Starting	[l/h]	1		2.5		4		7		7		
Diameter	Nominal	DN [mm]	15	20	15	20	20	25	32	25	32		
Operating pressure	Maximum	PN [bar]	16 / 25	25	16 / 25	25	16 / 25	25	16 / 25	25	16 / 25	25	
Temperature range heating - battery supplied	[°C]	5 ... 90 / 5 ... 105 ¹⁾											
Temperature range heating - external supplied		5 ... 130						5 ... 150					
Temperature range cooling - battery supplied		5 ... 90 / 5 ... 105 ¹⁾											
Temperature range cooling - external supplied		5 ... 120											
Medium	circulation water (pH: 7 - 10); if additives are used, it must meet AGFW FW510 specifications												
Pressure loss	At q_p	Δp [mbar]	85		75		100		44		128		
Overall length	[mm]		110	130	190	110	130	190	130	190	260	260	
Pulse value	Volume ⁶⁾	[l/imp.]	1									10	
	Test mode	[ml/imp.]	5		10		20		20		50		
Supply voltage	Operating	[U _N]	battery supply: 3.0 V DC external supply: 3.0...5.5 V DC ²⁾										
Environmental class	EN 1434 class C / MID class E2 + M2												
Protection class	IP 54 (heating) / IP 65 (cooling)												
Ambient operating temperature	+5...+55 °C												
Ambient storage temperature	-25...+55 °C												
Max ambient humidity	93% rel. humidity												

 Continued Q_p 10 - 60 m³/h:

Flow rate	Nominal	q_p [m ³ /h]	10		15		25		40		60		
	Maximum	q_s [m ³ /h]	20		30		50		80		120		
	Standard minimum	q_i [l/h]	100		150		250		400		600		
	Extended minimum ⁵⁾	q_i [l/h]	40 ⁴⁾ / 100		60 ⁴⁾ / 150		100 ⁴⁾ / 250		160 ⁴⁾ / 400		240 ⁴⁾ / 600		
	Starting	[l/h]	20		40		50		80		120		
Diameter	Nominal	DN [mm]	40		50		65		80		100		
Operating pressure	Maximum	PN [bar]	25										
Temperature range heating - battery supplied	[°C]	5 ... 90 / 5 ... 105 ¹⁾											
Temperature range heating - external supplied		5 ... 150											
Temperature range cooling - battery supplied		5 ... 90 / 5 ... 105 ¹⁾											
Temperature range cooling - external supplied		5 ... 120											
Medium	circulation water (pH: 7 - 10); if additives are used, it must meet AGFW FW510 specifications												
Pressure loss	At q_p	Δp [mbar]	95		80		75		80		75		
Overall length	[mm]		300		270		300		300		360		
Pulse value	Volume ⁶⁾	[l/imp.]	10									100	
	Test mode	[ml/imp.]	100		150		250		250		500		
Supply voltage	Operating	[U _N]	battery supply: 3.0 V DC external supply: 3.0...5.5 V DC ²⁾										
Environmental class	EN 1434 class C / MID class E2 + M2												
Protection class	IP 54 (heating) / IP 65 (cooling)												
Ambient operating temperature	+5...+55 °C												
Ambient storage temperature	-25...+55 °C												
Max ambient humidity	93% rel. humidity												

¹⁾ Only in rising or falling pipes or tilted installation.

²⁾ For medium temperatures above 90°C, the flow sensor must be equipped with an external supply.

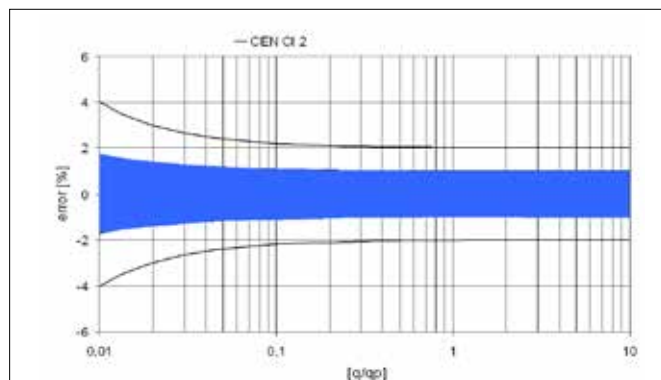
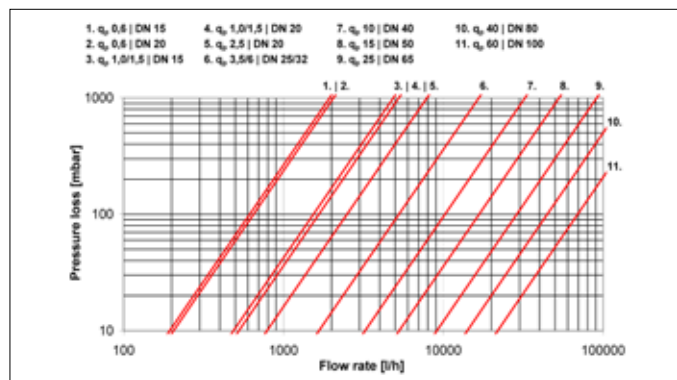
⁴⁾ Only for horizontal installation.

⁵⁾ Extended minimum flow rate for dynamic range of 1:250. Available on request.

⁶⁾ Standard pulse values

Pressure loss graph

Measuring accuracy Class 2



Function

Power supply

The standard version contains a 3.0 VDC lithium battery (max. 90 °C) with a lifetime of 11 years (depends on configuration). It's also possible to use an external supply e.g. from a calculator.

Characteristic for ext. power supply:

- Power supply 3.0 ... 5.5 V DC;
- Power consumption < 130 mAh per year;
- Impulse current < 10 mA.

Pulse output

The flow sensor has two pulse output.

- Volume pulse output;
- Output for testing (high resolution pulse output for test laboratories, temporary limited) and for communication.

The output for testing is a combined impulse output. That means the flow sensor can emit a high resolution test impulse or the flow sensor can communicate via the same output.

By using an adapter the flow sensor can be read out via the IZAR@SET Software.

The electrical information for the volume pulses of the model for heating is described as follows: The pulse output is by default not galvanic. A galvanic pulse output is as an option available. The flow sensor has, by default, a 4-pin impulse cable with a length of 2.5 m. The maximal length is 10 m.

Specification of the pulse output:

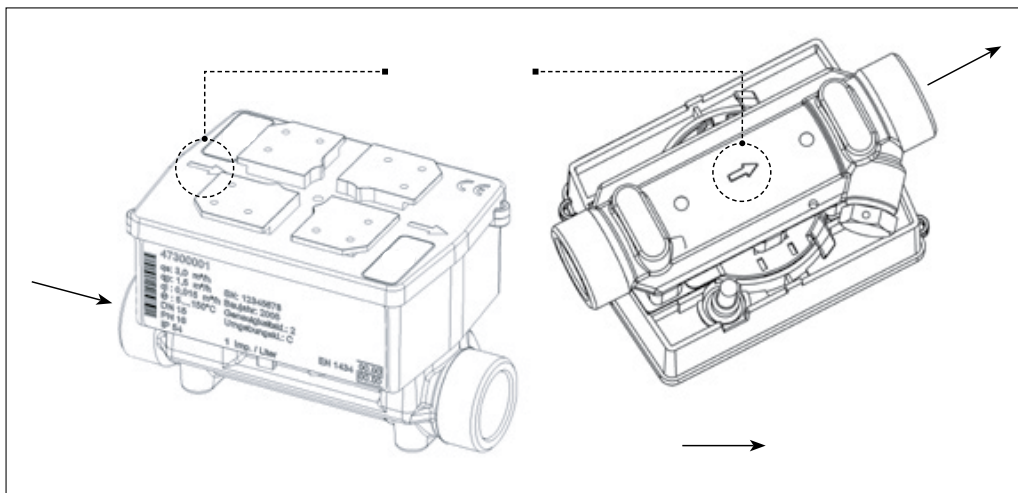
	Battery supply		External supply
	No galvanic insulation (standard)	Galvanic insulation	No galvanic insulation
Volume impulse output	No galvanic insulation (standard)	Galvanic insulation	No galvanic insulation
Power Supply	3.0 V DC battery		3.0 – 5.5 V DC external supply
Contact load	UCE ≤ 30 V IC ≤ 20 mA with residual voltage of ≤ 0.5 V	UCE ≤ 30 V IC ≤ 1 mA with residual voltage of ≤ 0.5 V	UCE ≤ 30 V IC ≤ 20 mA with residual voltage of ≤ 0.5 V
Output frequency	≤ 20 Hz	*	≤ 150 Hz
Pulse description	Open Collector		
Pulse values	1 ml ... 5000 l (depends on qp)	*	1 ml ... 5000 l (depends on qp)
Pulse duration	1 ... 250 ms ± 10% pulse duration ≤ pulse pause	*	1 ... 250 ms ± 10% pulse duration ≤ pulse pause
Cable allocation			
White core	+ volume impulse		
Yellow core	test impulse / communication		
Blue core	GND		
Brown core	reserved	- volume impulse	+ power supply

* depends on the average flow during the lifetime of the flow sensor, on the pulse duration and on the pulse value.

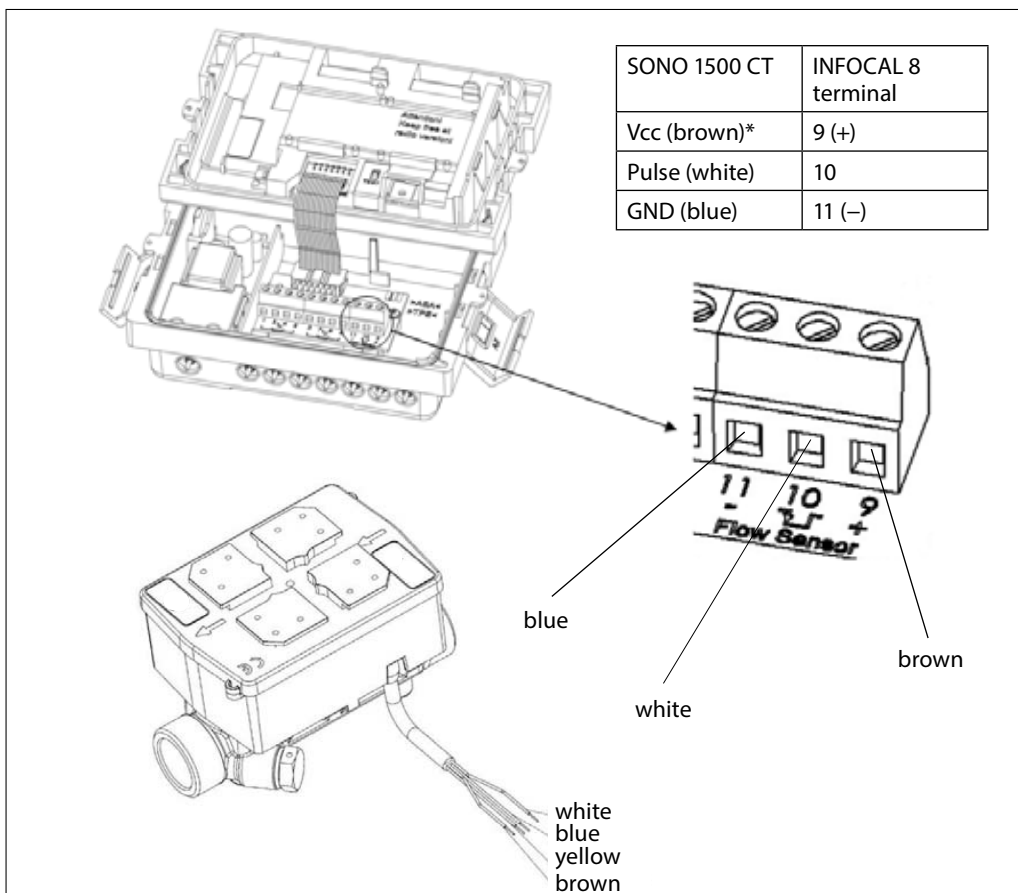
Mounting

The flow sensor is installed either in the high temperature pipe or low temperature pipe as indicated on the data plate. The flow sensor has to be installed so that the direction of flow corresponds to the direction of the arrow on the flow sensor housing. Ensure that the flow sensor is always filled with liquid after installation. Calming sections before and after the flow sensor are not necessary. The flow sensor can be installed in both horizontal and vertical pipe sections, but always so, that air bubbles cannot collect in the flow sensor. We recommend installing the flow sensor in a tilted position (45°).

Make sure the flow sensor is installed sufficiently far away from possible sources of electromagnetic interference (switches, electric motors, fluorescent lamps, etc.). It is recommended that stop valves are fitted before and after the flow sensor to simplify dismantling. The flow sensor should be installed in a convenient position for service and operating personnel.

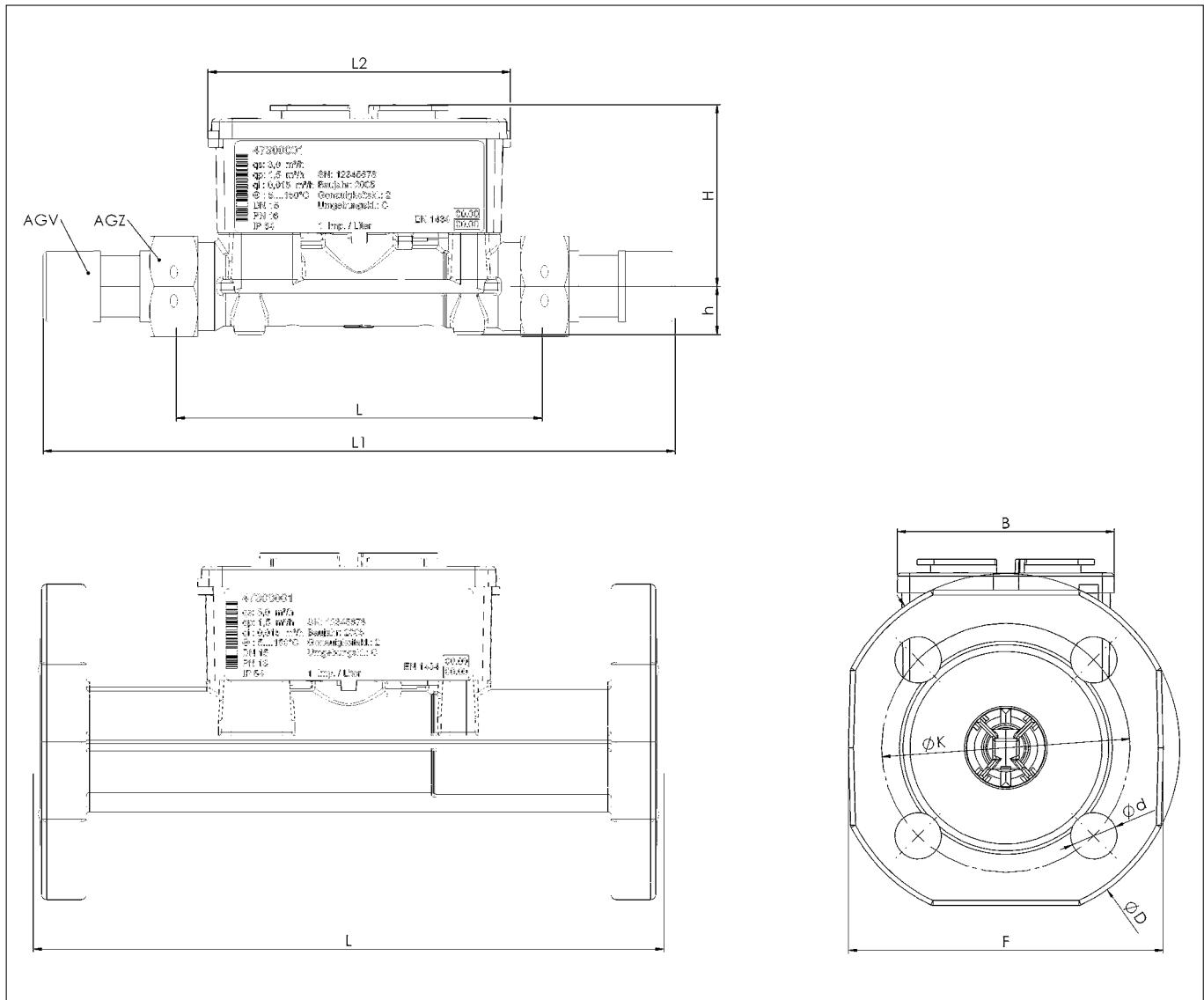


Wiring energy calculator type INFOCAL8



* Connect only if SONO 1500 CT with external supply

Dimensions



Nominal size	$q_p = 0.6 \text{ m}^3/\text{h}$				$q_p = 1.5 \text{ m}^3/\text{h}$				$q_p = 2.5 \text{ m}^3/\text{h}$			$q_p = 3.5 \text{ m}^3/\text{h}$			$q_p = 6 \text{ m}^3/\text{h}$			$q_p = 10 \text{ m}^3/\text{h}$		$q_p = 15 \text{ m}^3/\text{h}$		$q_p = 25 \text{ m}^3/\text{h}$		$q_p = 40 \text{ m}^3/\text{h}$		$q_p = 60 \text{ m}^3/\text{h}$	
	L [mm]	110	130	190	190	110	130	190	190	130	190	190	260	260	260	260	260	260	300	300	270	300	300	300	360	360	
L1 [mm]	180	225	285	190	180	225	285	190	225	285	190	355	260	260	355	260	260	434	300	270	300	300	300	360	360		
L2 [mm]	150								150								150										
B [mm]	100								100								100										
R [mm]	54								54								54										
H [mm]	82	84	84	84	82	84	84	84	84	84	84	88.5	88.5	88.5	88.5	88.5	88.5	94	94	99	106.5	114	119	119			
h [mm]	14.5	18	18	47.5	14.5	18	18	47.5	18	18	47.5	23	50	62.5	23	50	62.5	33	39	73.5	85	92.5	108	108			
AGZ	G3/8B	G1B	G1B	FL	G3/8B	G1B	G1B	FL	G1B	G1B	FL	G1/4B	FL	FL	G1/4B	FL	FL	G2B	FL	FL	FL	FL	FL	FL			
AGV	DN 15	DN 20	DN 20	DN 20	DN 15	DN 20	DN 20	DN 20	DN 20	DN 20	DN 20	DN 25	DN 25	DN 32	DN 25	DN 25	DN 32	DN 40	DN 50	DN 50	DN 65	DN 80	DN 100	DN 100			
D [mm]	R1/2	R3/4	R3/4	-	R1/2	R3/4	R3/4	-	R3/4	R3/4	-	R1	-	-	R1	-	-	R1/2	-	-	-	-	-	-			
d [mm]	-	-	-	105	-	-	-	105	-	-	105	-	114	139	-	114	139	-	148	163	184	200	235				
F [mm]	-	-	-	14	-	-	-	14	-	-	14	-	14	18	-	14	18	-	18	18	18	19	22				
K [mm]	-	-	-	95	-	-	-	95	-	-	95	-	100	125	-	100	125	-	138	147	170	185	216				
Weight [kg]	-	-	-	75	-	-	-	75	-	-	75	-	85	100	-	85	100	-	110	125	145	160	190				
Weight [kg]	0.76	0.85	0.96	2.75	0.76	0.85	0.96	2.75	0.85	0.96	2.75	1.5	3.5	4.8	1.5	3.5	4.8	3.1	6.4	7.0	8.9	10.9	16.4				

Dimensions, continued

Tailpieces

	Dimension AGV × AGZ	Length L (mm)	Overall length L ₁ (mm)
	R 1/2" × G 3/4 B	35	44,5
	R 3/4" × G 1 B	47,5	59
	R 1" × G 1 1/4 B	47,5	60,5
	R 1 1/2" × G 2 B	67	83

