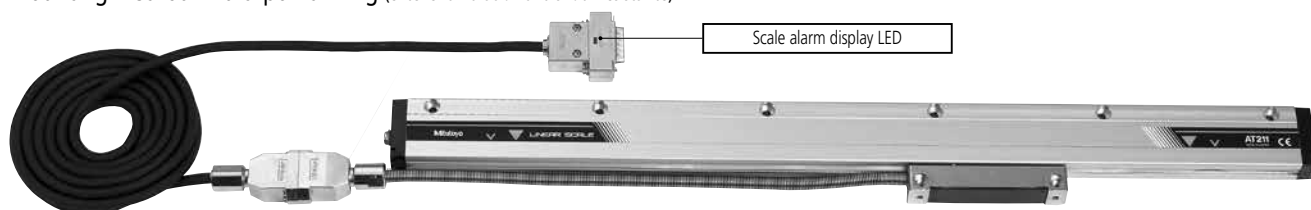


# Assembly Type AT Series

## Square-Wave Signal Output Type Scale Unit (Slim / High-speed types)

# AT211

Mounting method: Multi-point fixing (excellent vibration and shock resistance)

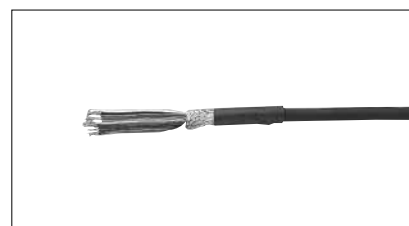


Mounting method: Double-end fixing (space-saving type)



### Features

- This is a slim, sealed scale that can be directly connected to the control unit.
- High speed response up to 2000 mm/s, making it compatible with a wide range of resolutions from 0.1 to 5  $\mu\text{m}$ .
- The multi-point fixing type has excellent vibration resistance.
- Scale alarm display makes for easy maintenance.
- Wide range of specifications enables easy choice to best suit your application.



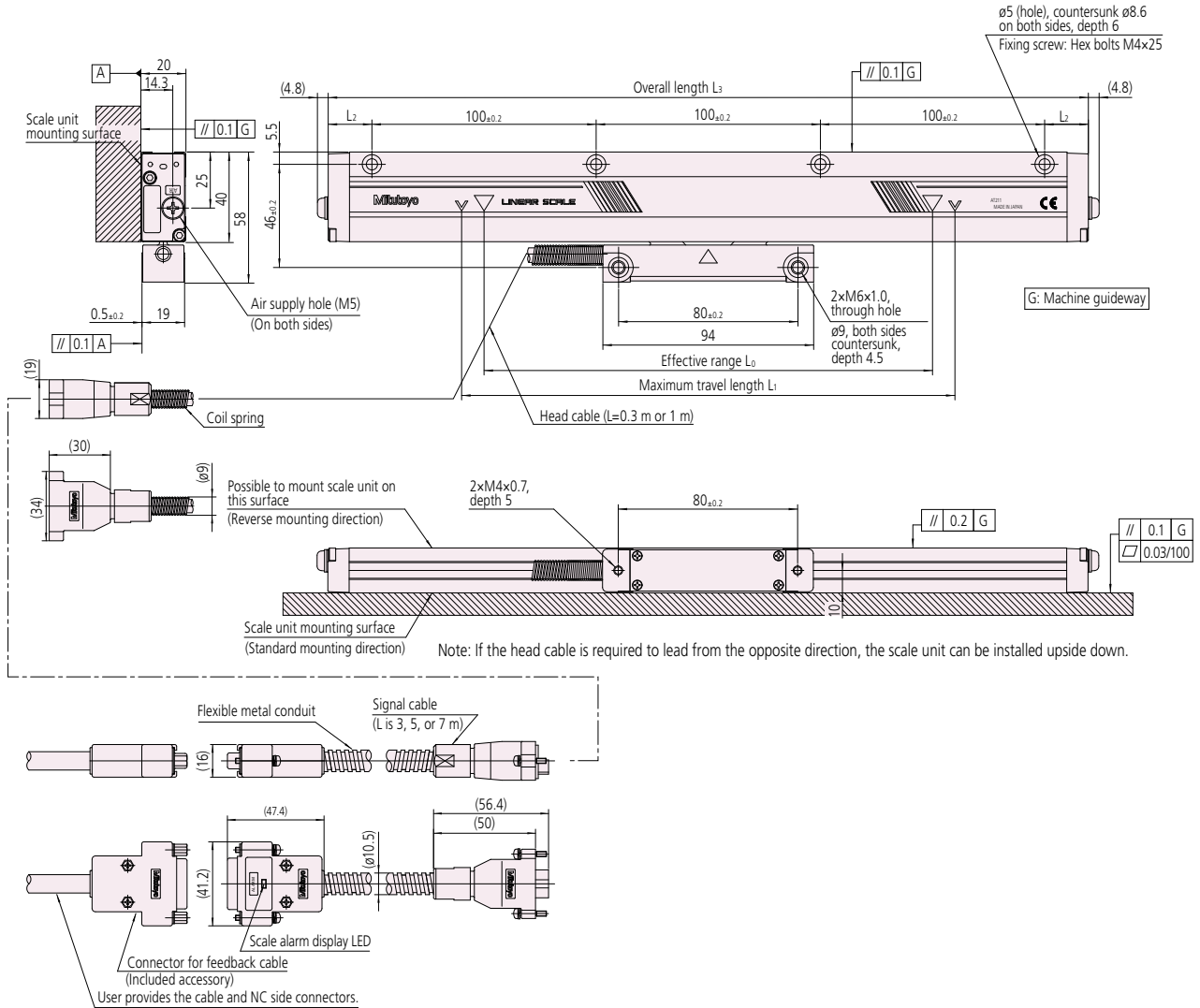
Single head cable type (no connector)

### Specifications

Item	Model	AT211
Effective range (L <sub>0</sub> )		100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 750, 800, 900 1000, 1100, 1200, 1300, 1400, 1500 mm
Scale reference point		50 mm pitch, center point, left end, right end (fixed when shipped)
Accuracy (20 °C)		(3 + 3L <sub>0</sub> /1000) $\mu\text{m}$ (For L <sub>0</sub> $\geq$ 500 mm, we can also fabricate a high-accuracy type: (2 + 2L <sub>0</sub> /1000) $\mu\text{m}$ ) L <sub>0</sub> : Effective range (mm)
Thermal expansion coefficient		$\approx 8 \times 10^{-6}/\text{K}$
Vibration resistance		200 m/s <sup>2</sup> (Conditions: 55 to 2000 Hz) (Multi-point fixing type)
Shock resistance		250 m/s <sup>2</sup> (Conditions: half-sine, 11 ms) (Multi-point fixing type)
Air supply hole		With air supply hole (Multi-point fixing type)
Output signal	Type	PA/P $\bar{A}$ , PB/P $\bar{B}$ , PZ/P $\bar{Z}$
	Electrical specifications	Conforms to RS422
Main scale grating pitch		20 $\mu\text{m}$
Minimum resolution		0.1, 0.2, 0.5, 1, 2.5, 5 $\mu\text{m}$ (fixed when shipped)
Minimum edge interval		125, 250, 333, 500, 1000 ns (fixed when shipped)
Maximum response speed		90 to 2000 mm/s (Determined by minimum resolution and minimum edge interval)
Power supply voltage		5 VDC $\pm$ 5%
Maximum current consumption		200 mA
Sliding force		5 N max.
Operating temperature		0 to 45 °C
Storage temperature		-20 to 70 °C
Operating/storage humidity		20 to 80% RH (no condensation)
Direction switching		Standard / Reverse (set when shipped)
Alarm function	Alarm detection	Over-speed, scale signal error
	Alarm output	Output for PA/P $\bar{A}$ , PB/P $\bar{B}$ , and PZ/P $\bar{Z}$ are all high-impedance
	Alarm display	Red LED on NC side connector of signal cable turns on (this does not include single head cable types)

## Mounting dimensions for multi-point fixing type

Unit: mm

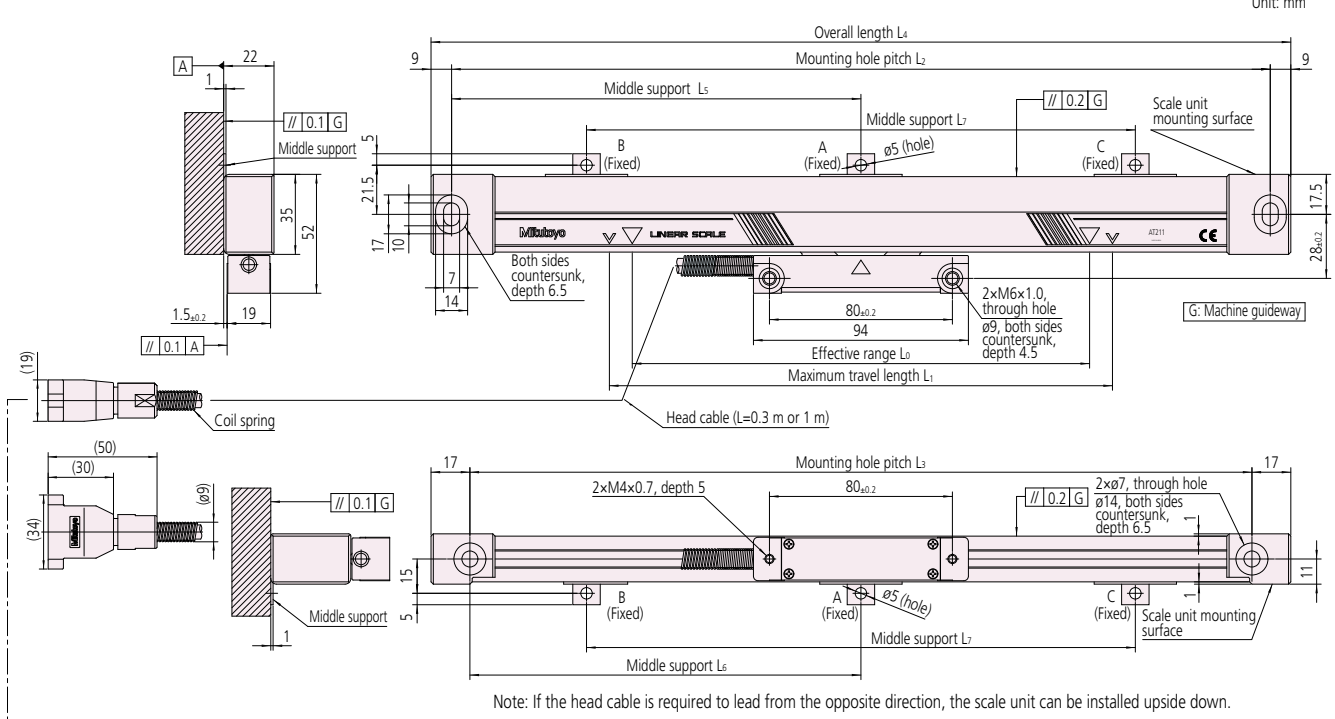


## Mounting dimensions for multi-point fixing type

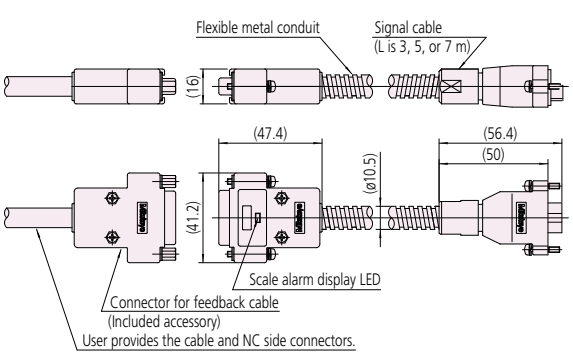
Scale unit	Effective range $L_0$ (mm)	Maximum travel length $L_1$ (mm)	End surface dimensions $L_2$ (mm)	Overall length $L_3$ (mm)	No. of mounting holes on scale unit (pcs.)
AT211- 100A	100	120	19.5	239	3
AT211- 150A	150	170	44.5	289	3
AT211- 200A	200	220	19.5	339	4
AT211- 250A	250	270	44.5	389	4
AT211- 300A	300	330	24.5	449	5
AT211- 350A	350	380	49.5	499	5
AT211- 400A	400	430	24.5	549	6
AT211- 450A	450	480	49.5	599	6
AT211- 500A	500	540	29.5	659	7
AT211- 600A	600	640	29.5	759	8
AT211- 700A	700	740	29.5	859	9
AT211- 750A	750	780	49.5	899	9
AT211- 800A	800	840	29.5	959	10
AT211- 900A	900	940	29.5	1059	11
AT211-1000A	1000	1040	29.5	1159	12
AT211-1100A	1100	1140	29.5	1259	13
AT211-1200A	1200	1240	29.5	1359	14
AT211-1300A	1300	1340	29.5	1459	15
AT211-1400A	1400	1440	29.5	1559	16
AT211-1500A	1500	1540	29.5	1659	17

## Mounting dimensions for double-end fixing type

Unit: mm



Note: If the head cable is required to lead from the opposite direction, the scale unit can be installed upside down.



User provides the cable and NC side connectors.

## Mounting dimensions for double-end fixing type

Scale unit	Effective range L <sub>0</sub> (mm)	Maximum travel length L <sub>1</sub> (mm)	Mounting hole pitch (mm)		Overall length L <sub>4</sub> (mm)	Middle support (mm)		
			L <sub>2</sub>	L <sub>3</sub>		L <sub>5</sub>	L <sub>6</sub>	L <sub>7</sub>
AT211- 100B	100	120	258	242	276			
AT211- 150B	150	170	308	292	326			
AT211- 200B	200	220	358	342	376			
AT211- 250B	250	270	408	392	426			
AT211- 300B	300	330	468	452	486			
AT211- 350B	350	380	518	502	536			
AT211- 400B	400	430	568	552	586			
AT211- 450B	450	480	618	602	636			
AT211- 500B	500	540	678	662	696	339	331	
AT211- 600B	600	640	778	762	796	389	381	
AT211- 700B	700	740	878	862	896	439	431	
AT211- 750B	750	780	918	902	936	459	451	
AT211- 800B	800	840	978	962	996	489	481	
AT211- 900B	900	940	1078	1062	1096	539	531	
AT211-1000B	1000	1040	1178	1162	1196	589	581	
AT211-1100B	1100	1140	1278	1262	1296			430
AT211-1200B	1200	1240	1378	1362	1396			460
AT211-1300B	1300	1340	1478	1462	1496			490
AT211-1400B	1400	1440	1578	1562	1596			530
AT211-1500B	1500	1540	1678	1662	1696			560

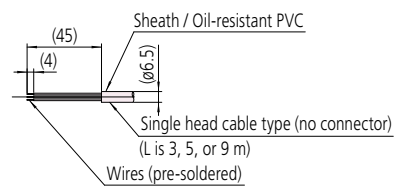
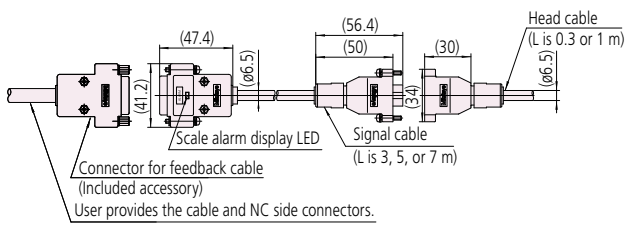
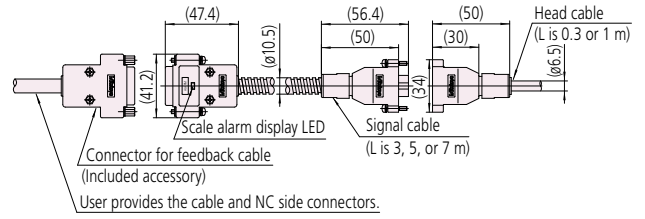
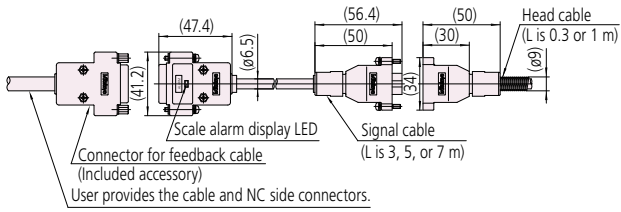
The number of middle supports attached depends on the effective range.

Effective range (mm)	Middle support
500 - 1000	A (1 place)
1100 - 1500	B, C (2 places)



## Cable pattern

Unit: mm



# Specification Selection Method

- There is an extensive selection of specifications for the AT211.
  - Choose the appropriate numbers and letters below according to specification required.
- If you don't have a specification in mind, choose the option with the ●.
- Note: For special applications not shown in the specifications, please contact us. Additionally, we are also able to meet the 1 Vpp Sinusoidal signal output specification. Special specification code is Z. (Except effective range)

## Meaning of Model No.

AT211 - [ ] [ ] [ ] [ ] [ ] [ ] - [ ] [ ] - [ ] [ ]

### Effective range list

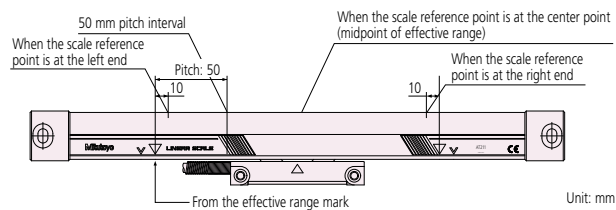
Code	Effective range (mm)	Code	Effective range (mm)	Code	Effective range (mm)
0100	100	0450	450	1000	1000
0150	150	0500	500	1100	1100
0200	200	0600	600	1200	1200
0250	250	0700	700	1300	1300
0300	300	0750	750	1400	1400
0350	350	0800	800	1500	1500
0400	400	0900	900		

### Mounting method

Code	
A	Multi-point fixing
B	Double-end fixing

### Scale reference point

Code	
● 1	50 mm pitch
2	Center point
3	Left end
4	Right end



### Accuracy (20 °C)

Code	
● S	$(3 + 3L_0/1000) \mu\text{m}$
H	$(2 + 2L_0/1000) \mu\text{m}$

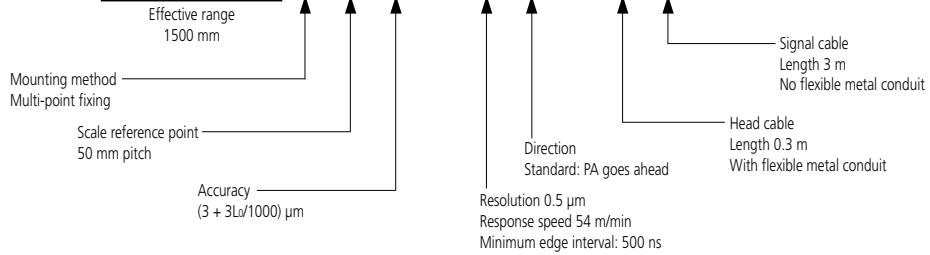
Note 1:  $L_0$  is the effective range (mm).  
 Note 2: Type H is used for effective ranges of 500 mm or less.

### Specification combination table (resolution, response speed, and minimum edge interval)

Resolution ( $\mu\text{m}$ )	Minimum edge interval (ns)*	Resolution ( $\mu\text{m}$ )					
		125	250	333	500	1000	
0.1		A: 710	B: 360	C: 260	D: 180	E: 90	
0.2		F: 1400	G: 710	H: 530	J: 360	K: 180	
0.5		L: 2000	M: 1800	N: 1300	P: 900	Q: 450	
1.0		—	● R: 2000	S: 2000	T: 1800	U: 900	
2.5		—	—	—	W: 2000	X: 2000	
5.0		—	—	—	—	Y: 2000	

\* Codes A to Y show the maximum response speed in m/min, values in ( ) are mm/s.  
 Note: The minimum edge interval varies 0 to -10% based on the operating environmental conditions.

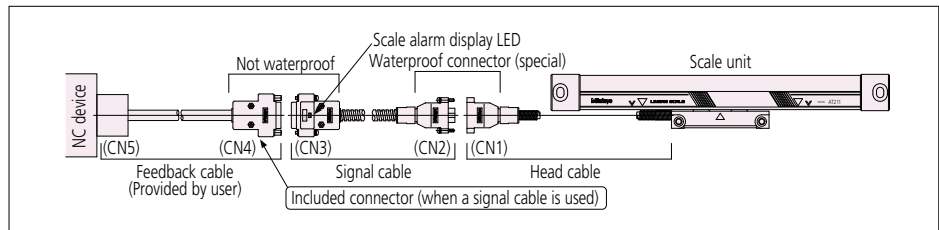
# (Example) AT211 - 1500A1S - P1 - AB



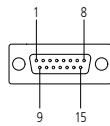
## Signal cable

Code	Length (L)	Flexible metal conduit*1
<b>A</b>	3 m	Yes
<b>B</b>	3 m	No
<b>C</b>	5 m	Yes
<b>D</b>	5 m	No
<b>E</b>	7 m	Yes
<b>F</b>	7 m	No
<b>G*2</b>	3 m	No
<b>H*2</b>	5 m	No
<b>J*2</b>	7 m	No
<b>X</b>	No signal cable	

\*1 The cable is enclosed in a flexible metal conduit or else is PVC sheathed.  
 \*2 The connector (CN3) for signal cables G, H, and J are half-pitch connectors.



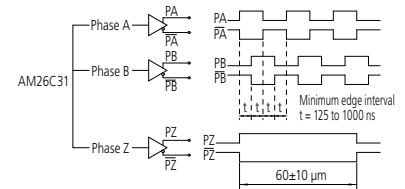
### Connector for signal cable (CN3) (pin type)



Pin No.	Signal	Pin No.	Signal
1, 2, 13	0 V	8	PB
3, 4, 11	+5 V	9	PZ
5	PA	10	PZ
6	PA	12, 14	Not used
7	PB	15	F.G

Applicable connector (CN4):  
 HDAB-15S (Hirose Electric or equivalent product (D-sub series) may be used)

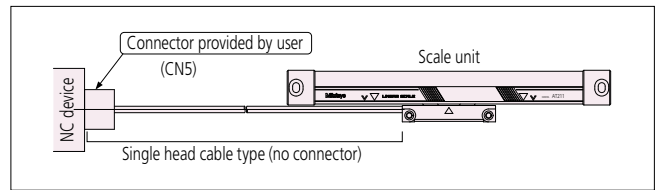
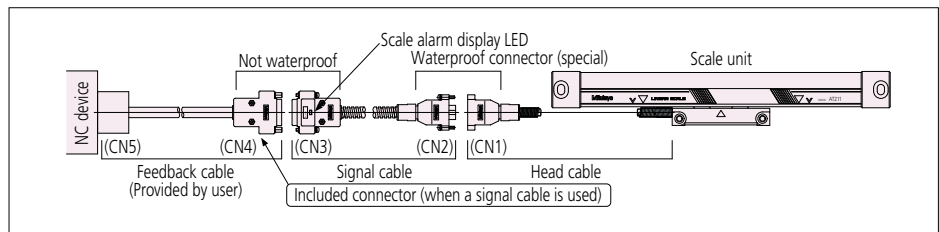
### Output circuit specification



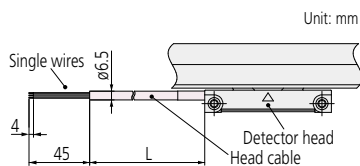
## Head cable

Code	Length (L)	Flexible metal conduit	Connector (CN1)
<b>A</b>	0.3 m	Yes	Special waterproof
<b>B</b>	0.3 m	No	Special waterproof
<b>C</b>	1 m	No	Special waterproof
<b>D</b>	3 m	No	No
<b>E</b>	4 m		
<b>F</b>	5 m		
<b>H</b>	7 m		
<b>J</b>	8 m		
<b>K</b>	9 m		

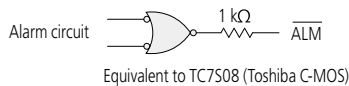
Note: The cable is enclosed in a flexible metal conduit or else is PVC sheathed.



### Single head cable type (no connector)



### ALM signal for single head cable type (no connector)



Wire color	Signal	Wire color	Signal
White, black	0 V	Blue	PB
Brown, red	+5 V	Purple	PZ
Orange	PA	Gray	PZ
Yellow	PA	Pink	ALM
Green	PB		

## Direction

Code	
<b>1</b>	Standard: PA goes ahead
<b>2</b>	Reverse: PB goes ahead

