

Language Manual

HQ Mandarin Chinese

Language Manual: HQ Mandarin Chinese

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1 General

This document discusses certain aspects of text-to-speech processing for the Mandarin Chinese text-to-speech system, in particular the different types of input characters and text that are allowed.

This version of the document corresponds to the High Quality (HQ) voice(s).

Please note that the *User's Guide*, mentioned several times in the manual, is called *Help* in some applications.

2 Characters in orthographic text

Both simplified Mandarin Chinese characters and traditional Mandarin Chinese characters may constitute a word. Characters from A-Z and a-z may also constitute a word (see chapter *Foreign words*).

Characters outside of these ranges (i.e. numbers, punctuation characters and other non-alphanumeric characters) are not considered as letters.

3 Punctuation characters

Punctuation marks appearing in a text affect both the rhythm and the intonation of a sentence. The following punctuation characters are permitted in the normal input text string:

, : ; , () [] {} -- '' "" $\langle \rangle$ «» …… !?

3.1 Comma, colon, Mandarin Chinese serial comma and semicolon

Comma ', ', colon ': ', Mandarin Chinese serial comma ', ' and semicolon '; ' cause a brief pause to occur in a sentence.

3.2 Quotation arks and title marks

Quotes '''', '""', and title marks ' $\langle \rangle$ ', ' $\langle \rangle$ ', appearing around a single word or a group of words cause a brief pause before and after the quoted text.

3.3 Full stop

A full stop '. ' is a sentence terminal punctuation mark which is accompanied by a longer pause.

3.4 Parentheses, brackets and braces

Parentheses '()', brackets '[]', and braces ' $\{\}$ ' appearing around a single word or a group of words cause a brief pause before and after the bracketed text.

3.5 Double dash

Double dash '-----' causes a longer pause to occur in a sentence.

3.6 Suspension points

Suspension points '.....' which indicates the omitted or unfinished part of a quoted passage, or an intermittent pause in a speech, is accompanied by a longer pause.

4 Other non alphanumeric characters

4.1 Non-punctuation characters

The characters listed below are processed as non-letter, non-punctuation characters. Some are pronounced at all times and others are only pronounced in certain contexts, which are described in the following sections of this chapter.

Table: Non-punctuation characters

	Symbol	Reading	
	F(X)	yuan2	
	\$	mei3yuan2	
	£	ying1bang4	
	€	ou1yuan2	
	0	du4	
	2	de5ping2fang1	
	3	de5li4fang1	
	@	ei5t	
	#	jing3hao4	
	=	deng3yu2	
	≤	xiao3yu2deng3yu2	
	≥	da4yu2deng3yu2	
	~	yue1deng3yu2	
	≠	bu4deng3yu2	
	<	xiao3yu2	
	>	da4yu2	
	÷	chu2yi3	
	×	cheng2yi3	
		xing1hao4 (in normal text)	
	×	cheng2yi3 (in arithmetic operators, see section Arithmetic operators)	
	/	xie2gang4 (in normal text)	
		chu2yi3 (in arithmetic operators, see section Arithmetic operators)	
	0/	qian1fen1hao4 (in normal text)	
	700	qian1fen1zhi1 (in arithmetic operators, see section Arithmetic operators)	
	%	bai3fen1hao4 (in normal text)	
		bai3fen1zhi1 (in arithmetic operators, see section Arithmetic operators)	
	+	(see below)	
	•	(see below)	

Symbol	Reading
~	(see below)
-	(see below)

4.2 The 2 and 3 signs

The reading of expressions with 2 and 3 is:

Expression	Reading
mm²	ping2fang1hao2mi3
cm²	ping2fang1li2mi3
m²	ping2fang1mi3
km²	ping2fang1gong1li3
mm³	li4fang1hao2mi3
cm³	li4fang1li2mi3
m³	li4fang1mi3
km³	li4fang1gong1li3

4.3 Symbols whose pronunciation varies depending on the context

4.3.1 Plus

In the arithmetic operators, the plus '+' may have two pronunciations:

- 1. if followed by a digit and no other digit is found in front of the plus, it is pronounced *zheng4*.
- 2. if enclosed by digits, i.e. as in the patterns X+Y, X+Y=Z, Z=X+Y, the plus is pronounced *jia1*. Space is allowed between digits, plus and equals sign.

The plus is not pronounced in the phone number formats. In other cases it is pronounced *jia1*.

Expression	Reading
-3	zheng4san1
44+3 (or 44 + 3)	si4shi2si4jia1san1
44+3=47 (or 44 + 3 = 47)	si4shi2si4jia1san1deng3yu2si4shi2qi1
47=44+3 (or 47 = 44 + 3)	si4shi2qi1deng3yu2si4shi2si4jia1san1
+861058336023	ba 1 liu 4 ya o 1 ling 2 u 3 ba 1 sa n 1 sa n 1 liu 4 ling 2 er 4 sa n 1

4.3.2 **Point**

Point '.' is pronounced as *dian3* in the decimal numbers and in the web-addresses and email. In other cases it is considered as punctuation and is never pronounced.

Expression	Reading
2.50	er4dian3wu3ling2
www.10774.com	san1da5bliu5dian3yao1ling2qi1qi1si4dian3kam5
wang_peng@hotmail.cn	wang5xia4hua2xian4peng5eit5 hot5 meir5dian3si5en5

4.3.3 Dash "∼"

Between the time or between the dates, the dash ' \sim ' is pronounced *zhi4*:

Expression	Reading
09:30~12:00	jiu3dian3san1shi2fen1zhi4shi2er4dian3
前 476 年~前 221 年	qian2si4bai3qi1shi2liu4nian2zhi4qian2er4bai3er4shi2yi1nian2

In other cases, the dash ' \sim ' is not pronounced.

4.3.4 Dash "-"

A dash '-' is pronounced *zhi4* in three cases:

- 1. between days or years.
- 2. between the time of day.
- 3. if enclosed by digits and there is no equal signs, i.e. as in the patterns X-Y.

If the dash '-' is enclosed by digits and there is an equals sign '=', i.e. as in the patterns X-Y=Z, Z=X-Y, it is pronounced *jian3*. Space is allowed between digits, dash and equals sign.

When the dash '-' is followed by a digit, and:

- 1. one or more Roman letters (capital or lower case) are found in front of it, it is pronounced *gang4*.
- 2. no other digit or Roman letter is found in front of it, it is pronounced *fu4*.

In the web-addresses and email, the '-' is pronounced *zhong1hua2xian4*.

In other cases, the dash '-' is not pronounced.

Expression	Reading
前 476 年-前 221 年	qian2si4bai3qi1shi2liu4nian2zhi4qian2er4bai3er4shi2yi1nian2
09:30-12:00	jiu3dian3san1shi2fen1zhi4shi2er4dian3
44-3	si4shi2si4zhi4san1
44-3=41 (or 44 - 3 = 41)	si4shi2si4jian3san1deng3yu2si4shi2yi1
41=44-3 (or 41 = 44 - 3)	si4shi2yi1deng3yu2si4shi2si4jian3san1
CX-7	si5eiks5gang4qi1
-3	fu4san1
www.acapela-group.be	san1da5bliu5dian3a5ke5pe5le5zhong1hua2xian4grup5dian3bi5i5

5 Number processing

Note: The number processing described in this chapter doesn't apply to all the Acapela Group products. For efficiency reasons the processing of numbers, phone numbers, dates and time has been simplified in the Acapela Mobility products.

Strings of digits that are sent to the text-to-speech converter are processed in several different ways, depending on the format of the string of digits and the immediately surrounding punctuation or non-numeric characters. To familiarize the user with the various types of formatted and non-formatted strings of digits that are recognized by the system, a brief description of the basic number processing is provided below, along with examples.

Number processing is subdivided into the following categories:

- Full number pronunciation
- Leading zero
- Decimal numbers
- Currency amounts
- Arithmetic operators
- Mixed digits and letters
- Time of day
- Dates
- Phone numbers

5.1 Full number pronunciation

Full number pronunciation is given for the whole number part of the digit string.

Expression	Reading
2425	full number
2,425	full number
2.425	2 is a full number, 425 is the decimal part
2 425	2 is a full number, 425 is a full number

Numbers denoting thousands, millions and billions (numbers larger than 999) may be grouped using comma (not full stop or space). In order to achieve the right pronunciation the grouping must be done correctly.

The rules for grouping of numbers are the following:

- Numbers are grouped in groups of three starting from the end.
- The first group in a number may consist of one, two, or three digits.

- If a group, other than the first, does not contain exactly three digits, the sequence of digits is not interpreted as a full number.

Number	Reading
2580	liang3qian1wu3bai3ba1shi2
2,580	liang3qian1wu3bai3ba1shi2
2,58	er4_wu3shi2ba1
2 580	er4_wu3bai3ba1shi2
25800	liang3wan4wu3qian1ba1bai3
25,800	11
2580350	er4bai3wu3shi2ba1wan4ling2san1bai3wu3shi2
2,580,350	п
100000000	shi2yi4
12345678901234	yi1er4san1si4wu3liu4qi1ba1jiu3ling2yi1er4san1si4

"百(hundred)", "千(thousand)", "万(ten thousand)" and " 亿(hundred million)" are expanded in agreement with the preceding number.

Number	Reading
1.2 万	yi1dian3er4wan4
1亿2千万	yi1yi4liang3qian1wan4
7650 万	qi1qian1liu4bai3wu3shi2wan4

5.2 Leading zero

Digit strings that begin with *O* (zero) are not considered as whole numbers, they are read as separate digits.

Number	Reading
09253	ling2jiu3er4wu3san1
020	ling2er4ling2

5.3 Decimal numbers

Only full stop '.' is used when writing decimal numbers.

The full number part of the decimal number (the part before full stop) is read according to the rules in the section *Full number pronunciation*. The decimal part (the part after full stop) is read as separate digits.

Number	Reading
2.50	er4dian3wu3ling2
3.141	san1dian3yi1si4yi1
1251.04	yi1qian1er4bai3wu3shi2yi1dian3ling2si4
1,251.04	yi1qian1er4bai3wu3shi2yi1dian3ling2si4

5.4 Currency amounts

The following principles are followed for currency amounts:

- Numbers preceded or followed by the currency markers ¥(¥), \$, €, £,
 RMB, USD, EUR, GBP, JPY are read as currency amounts.
- In currency amounts, the full numbers are read according to the rules in the section *Full number pronunciation*, and the decimal numbers are read according to the rules in the section *Decimal numbers*.

Expression	Reading
\$15.00	shi2wu3mei3yuan2
15.00 \$	shi2wu3mei3yuan2
€ 200.50	er4bai3dian3wu3ling2ou1yuan2
RMB600	liu4bai3ren2min2bi4
1,000,000GBP	yi1bai3wan4ying1bang4

5.5 Arithmetic operators

Numbers together with arithmetical operators are read according to the examples below.

Reading
fu4shi2er4
shi2si4jian3er4deng3yu2shi2er4
shi2er4deng3yu2shi2si4jian3er4
zheng4er4shi2si4
er4jia1san1
er4jia1san1deng3yu2wu3
wu3deng3yu2er4jia1san1
er4jia1san1
er4jia1san1deng3yu2wu3
wu3deng3yu2er4jia1san1
er4cheng2yi3san1
er4cheng2yi3san1deng3yu2liu4
liu4chu2yi3san1

Expression	Reading
6÷3=2	liu4chu2yi3san1deng3yu2er4
6/3	iu4chu2yi3san1
6/3=2	liu4chu2yi3san1deng3yu2er4
3=3	san1deng3yu2san1
4-1>2	si4jian3yi1da4yu2er4
4÷3≈1.33	si4chu2yi3san1yue1deng3yu2yi1dian3san1san1
25%	bai3fen1zhi1er4shi2wu3
3.4‰	qian1fen1zhi1san1dian3si4
2 ²	er4de5ping2fang1
2 ³	er4de5li4fang1

5.6 Mixed digits and letters

If letters or Mandarin Chinese characters appear within a sequence of digits, the groups of digits will be read as numbers according to the rules above. The letters or the Mandarin Chinese characters mark the boundary between the numbers. The letters and the Mandarin Chinese characters will also be read.

Expression	Reading
77B84D3	qi1shi2qi1bi5ba1shi2si4di4san1
0092В87-В	ling2ling2jiu3er4bi5ba1shi2qi1_bi5
波音 787 客机	bo1yin1qi1bai3ba1shi2qi1ke4ji1
马自达 CX-7	ma3zi4da2si5ei5ksgang4qi1
京 ICP 证 000022 号	jing1ai5si5pi5zheng4ling2ling2ling2ling2er4er4hao4

5.7 Time of day

The colon is used to separate hours, minutes and seconds.

Possible patterns are:

- a) hh:mm or h:mm
- b) *hh:mm:ss* or *h:mm:ss*

h = hour, *m* = minute, *s* = second.

In patterns a:

If the *mm*-part is equal to 00, this part will not be read. If the *mm*-part is equal to 0X (X=1, 2, 3...9), the zero 0 will be read.

Expression	Reading
9:00	jiu3dian3
09:30	jiu3dian3san1shi2fen1
09:05	jiu3dian3ling2wu3fen1
12:00	shi2er4dian3
18:00	shi2ba1dian3
0:00	ling2dian3
00:00	"

In patterns b:

If the *ss*-part is equal to *00*, this part will not be read. If the *ss*-part is equal to 0X (X=1, 2, 3...9), the zero *0* will be read.

Expression	Reading
9:30:00	jiu3dian3san1shi2fen1
09:05:05	jiu3dian3ling2wu3fen1ling2wu3miao3
18:00:15	shi2ba1dian3shi2wu3miao3
00:00:00	ling2dian3
0:00:15	ling2dian3shi2wu3miao3

Time range is also supported.

Expression	Reading
09:30:00-12:00	jiu3dian3san1shi2fen1zhi4shi2er4dian3
09:05~18:00	jiu3dian3ling2wu3fen1zhi4shi2ba1dian3

5.8 Dates

The valid formats for dates are:

- 1. yyyy-mm-dd, yyyy.mm.dd, and yyyy/mm/dd
- 2. yy-mm-dd, yy.mm.dd, and yy/mm/dd

yyyy is a four-digit number, yy is a two-digit number, *mm* is a month number between 1 and 12 and *dd* a day number between 1 and 31.

Hyphen, full stop or slash may be used as delimiters. In all formats, one or two digits may be used in the *mm* and *dd* part. Zeros may be used in front of numbers below 10.

Examples of valid formats and their readings:

Type 1:	Reading
2003-02-10 or 2003-2-10	er4ling2ling2san1nian2er4yue4shi2ri4
2003.02.10 or 2003.2.10	11
2003/02/10 or 2003/2/10	п

Type 2:

03-02-10 or 03-2-10 03.02.10 or 03.2.10 03/02/10 or 03/2/10

Reading

er4ling2ling2san1nian2er4yue4shi2ri4

In addition, the format $mm \cdot dd$ is valid for commemoration days. mm is a month number between 1 and 12, dd is a day number between 1 and 31, they are delimited by the symbol '.'. When the number is below 10, only one digit can be used in the mm and dd part. The numbers will be read as separate digits.

Expression	Reading
3.19	san1yi1jiu3
12.8	yi1er4ba1

Ranges of days and years are also supported.

Expression	Reading
1773-1824 年	yi1qi1qi1san1nian2zhi4yi1ba1er4si4nian2
公元 8 年-公元 23 年	gong1yuan2ba1nian2zhi4gong1yuan2er4shi2san1nian2
前 476 年~前 221 年	qian2si4bai3qi1shi2liu4nian2zhi4qian2er4bai3er4shi2yi1nian2

Other possible formats include:

Expression	Reading
2009年12月7日	er4ling2ling2jiu3nian2shi2er4yue4qi1ri4
1357 年	yi1san1wu3qi1nian2
1月16、17日	yi1yue4shi2liu4_shi2qi1ri4
04年04日	ling2si4nian2si4ri4
09 年(度)	ling2jiu3nian2(du4)
公元前 473 年	gong 1yuan 2qian 2si 4bai 3qi 1shi 2san 1nian 2
公元 473 年	gong1yuan2si4bai3qi1shi2san1nian2

5.9 Phone numbers

In this section the patterns of digits that are recognized as phone numbers are described. In the pronunciation of phone numbers, all numbers are read out digit by digit.

5.9.1 Ordinary phone numbers

Fixed phone numbers follow the pattern below:

Regional number + Local number.

Regional number: 3 or 4 digits with or without parentheses

Local number: 7 or 8 digits

The Regional number and the Local number can be separated by a space or a hyphen.

Examples (010)52679582 01052679582 010 52679582 010-52679582 (0793)7433201 07937433201 0793 7433201 0793-7433201

Sequences of 11 digits in the following formats are treated as mobile phone numbers:

13xxxxxxxxx

150xxxxxxxx

151xxxxxxxx

152xxxxxxxx

153xxxxxxxx

155xxxxxxxx

156xxxxxxxx

157xxxxxxxx

158xxxxxxxx

159xxxxxxxx

The mobile phone numbers can also be preceded by zero *0* (with or without parentheses):

Examples

(0)13821942580

013821942580

5.9.2 International phone numbers

International phone numbers follow the patterns below:

International prefix + Country code + Regional number + Local number.

Examples	Comment
Local number:	6-8 digits
Regional number:	1-4 digits with or without parentheses (see below for exact formats)
Country code:	1-3 digits
International Prefix:	<i>00</i> or <i>+</i>

0086(010)52679582	
00861052679582	
0086(0)1052679582	
+861052679582	
+86(0)1052679582	
0086 (0)10 52679582	can also be separated by a hyphen rather than a space
0086-010-52679582	
0086-10-52679582	
0086-0791-5267958	
+86 791 5267958	
0033 (0)3 12345678	
+33 3 12345678	

All the preceding formats for Chinese mobile phone numbers can be recognised if preceded by 0086 or +86.

Examples Comment

008613xxxxxxxx

Examples

Comment

+86156xxxxxxxx

0086 13xxxxxxxcan also be separated by a hyphen rather than a space0086-156xxxxxxxx

6 How to change the pronunciation

Phonetic transcriptions can be entered directly in the text, using the PRN tag (see *User's guide*).

7 Mandarin Chinese phonetic text

The Mandarin Chinese text-to-speech system uses symbols based on the PINYIN system. Symbols are written with a space between each phoneme.

Only the symbols listed here may be used in phonetic transcriptions. Symbols not listed here are not valid in phonetic transcriptions and will be ignored if included in a PRN tag.

7.1 Consonants

The table below lists the phonetic symbols used for the Mandarin Chinese consonants along with example words and their transcriptions.

Symbol	Word	Phonetic Text
b	八	b a1
р	片	p ian4
m	米	m i3
f	分	f en1
z	在	z ai4
С	Ж	c ong2
S	Ξ	s an1
d	的	d e5
t	他	t a1
n	年	n ian2
	六	l iu4
zh	这	zh e4
ch	出	ch u1
sh	+	sh sh_i2
r	人	r en2
j	九	j iu3
q	七	q i1
х	些	x ie1
g	个	g e5
k	可	k e3
h	和	h e2

Table: Symbols for the Mandarin Chinese consonants

7.2 Vowels

Mandarin Chinese tones are represented with the PINYIN convention, using digits 1 2 3 4.

Table: Symbols for the Mandarin Chinese vowels

Symbol	Word	Phonetic Text
а	I际	а
0	哦	0
е	恶	е
ai	爱	ai
ei	被	b ei4
ao	澳	ao4 m en2
ou	欧	ou1 zh ou1
an	按	an4
en	恩	en1
ang	让	r ang4
eng	能	n eng2
ong	Ж	c ong2
i	-	i1
ia	压	ia1
iao	要	iao4
ie	也	ie3
iu	有	iu3
ian	言	ian2
in	因	in1
iang	羊	iang2
ing	英	ing1
iong	用	iong4
u	五	u3
ua	挖	ua1
uo	我	uo3
uai	外	uai4
ui	为	ui2
uan	Л	uan4
un	文	un2
uang	往	uang3
ueng	富	f u4 ueng1
u:	于	u:2
u:e	月	u:e4
u:an	元	u:an2
u:n	云	u:n2
er	=	er4

7.3 Pause

An underscore /_/ in a phonetic transcription generates a small pause.

8 Abbreviations

In the current version of the Mandarin Chinese text-to-speech system, the abbreviations in the table below are recognized in all contexts. These abbreviations are mostly case-insensitive (except for those indicated below by '*') and require no full stop in order to be recognized as an abbreviation.

As previously mentioned, there are also abbreviations for the days of the week and the months.

Abbreviation	Reading
km	gong1li3
m	mi3
cm	li2mi3
mm	hao2mi3
I	sheng1
ml	hao2sheng1
kg	qian1ke4
g	ke4
mg	hao2ke4
°C	she4shi4du4
°F	hua2shi4du4
RMB*	ren2min2bi4
USD*	mei3yuan2
EUR*	ou1yuan2
GBP*	ying1bang4
JPY*	ri4yuan2

Table: Abbreviations

The abbreviations for measurements m, I and g are only expanded when appearing after a number.

Expression	Reading
25 m	er4shi2wu3mi3
31	san1sheng1
2 g	liang3ke4

9 Foreign words

Any sequence of Roman characters is pronounced in Mandarin Chinese as closely as possible to an English word. E.g., the word *"example"*, is pronounced /i5 g z a5 m p e5 l/

10 Web-addresses and email

Web-addresses and email-addresses are read as follows:

- www is read as san1da5bliu5.
- Full stops '.' are read as dian3, hyphens '-' as *zhong1hua2xian4*, underscore '_' as *xia4hua2xian4*, colons ':' as *mao4hao4*, and slash '/' as *xie2gang4*.
- Country codes (e.g. *cn*, *us*, *fr*) are spelled out letter by letter.
- The @ is read eit5.
- Words/strings (including *org*, *com*, and *edu*) are pronounced according to the normal rules of pronunciation in the system and in accordance with the lexicon.

String	Reading
www.acapela-group.com	san1da5bliu5dian3a5ke5pe5le5zhong1hua2xian4grup5 dian3kam5
http://blog.sina.com.cn	eich5ti5ti5pi5mao4hao4xie2gang4xie2gang4blog5dian3 si5ne5dian3kam5 dian3si5en5
yy2005@163.com	wai5wai5er4ling2ling2wu3eit5yao1liu4san1dian3kam5
wang_peng@hotmail.cn	wang5xia4hua2xian4peng5eit5hot5meir5dian3si5en5