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Traditional Chinese medicine — Pulse waveform format

Médecine traditionnelle chinoise — Format de la forme d'onde de pouls

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Foreword

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This document was prepared by Technical Committee ISO/TC 249, *Traditional Chinese medicine*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Traditional Chinese medicine — Pulse waveform format

1 Scope

This document specifies the application, in the context of traditional Chinese medicine practice, of medical waveform format encoding rules (MFER) to pulse condition waveform as measured in physiological laboratories, hospitals, bed-wards, pharmacies, clinics, community health centres and home care check-ups using pulse condition devices.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19614, *Traditional Chinese medicine — Pulse graph force transducer*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19614 and the following apply.

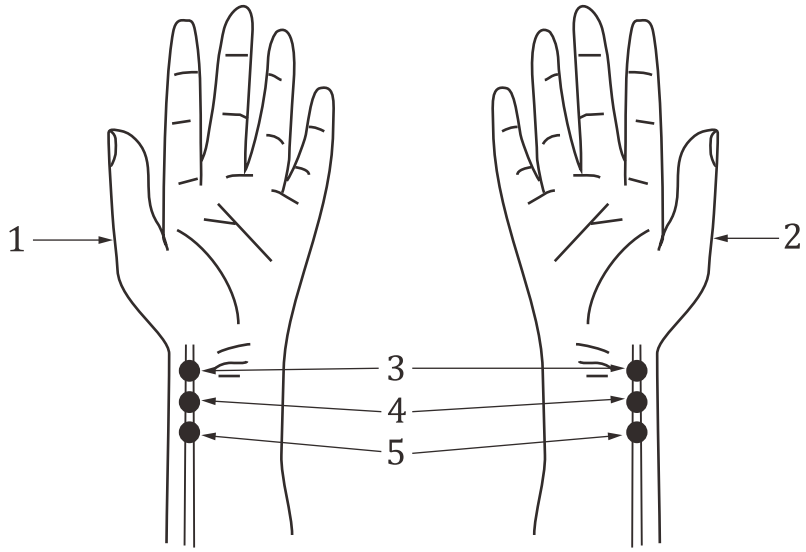
ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
pulse-taking location
place on the radial artery where the pulse condition is measured

Note 1 to entry: According to traditional Chinese medicine theory, there are three such places (cun/inch, guan/bar and chi/cubit) all over the radial artery, see Figure 1.



Key

1 left hand
2 right hand
3 cun/inch
4 guan/bar
5 chi/cubit

Figure 1 — Pulse-taking location

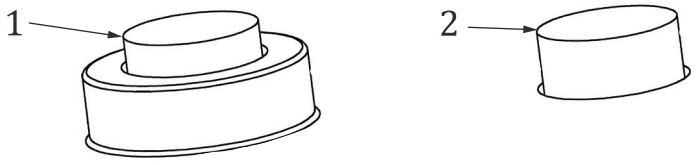
3.2
channel
individual waveform data group from the *pulse graph force transducer* (3.3)

3.3
pulse graph force transducer
device that can detect pulsation of the radial artery and its peripheral tissues as a mechanical quantity and convert it into an electrical signal output according to a certain pattern for the purpose of traditional Chinese medicine pulse condition acquisition

Note 1 to entry: Transducers involved in this document only refer to pressure or force transducers.

[SOURCE: ISO 19614:2017, 3.1]

3.4
one signal transducer
pulse graph force transducer (3.3) with only one channel (see Figure 2)



Key

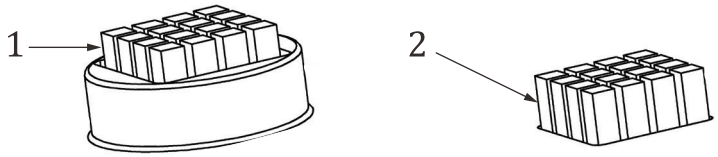
1 signal transducer with auxiliary plan
2 signal transducer without auxiliary plan

Figure 2 — One signal transducer

3.5
array signal transducer
pulse graph force transducer (3.3) with multi-channel (see Figure 3)

Note 1 to entry: Array signal transducer can be further divided into line array transducer and cross array transducer.

Note 2 to entry: Line array transducer can be further divided into horizontal parallelism line array transducer and vertical parallelism line array transducer.



Key
1 array signal transducer with auxiliary plan
2 array signal transducer without auxiliary plan

Figure 3 — Array signal transducer

4 Encoding format

4.1 Primary description

4.1.1 General

This document provides encoding rules for pulse waveform. In addition, together with encoding of information of recognition for waveform, measurement information and interpretation information is provided, but these are all optional functions and are dependent on each implementation concept.

NOTE Interpretation code or measurement value might be described by other standards such as HL7 or XML.

All the symbols and their tags used in this document are specified in ISO 22077-1.

4.1.2 Sampling attributes

4.1.2.1 General

Sampling attributes, including sampling rate and resolution, are given in Tables 1 to 4. An example of the encoded data and its explanation can be found in Annex A, Table A.1.

4.1.2.2 MWF_IVL (0Bh): Sampling rate

This tag indicates the frequency or sampling interval for the medical waveform sampled (see Table 1).

Table 1 — Sampling rate

Symbol	Tag	Length Bytes	Value
MWF_IVL	11d/0Bh	≤ 6	Unit (1)
			Exponent (1)
			Mantissa (≤4)

The units may be frequency in hertz or time in seconds (see Table 2).

Table 2 — Sampling rate unit

Unit	Code	
Frequency	Hz	0d
Time interval	s	1d

EXAMPLE If the code is 0B 04 01 FD 00 01, that means the sampling rate is equal to 1*10^−3 and the units are 1 ms.

4.1.2.3 MWF_SEN (0Ch): Sampling resolution

This tag indicates the resolution, minimum bits, for the medical waveform sampled (see Table 3).

Table 3 — Sampling resolution

Symbol	Tag	Length Bytes	Value
MWF_SEN	12d/0Ch	≤ 6	Unit (1)
			Exponent (1)
			Mantissa (≤4)

The units should be force in newtons, mass in kilograms, pressure in Pascals and voltage in volts (see Table 4).

Table 4 — Sampling resolution units

Unit		Code	Default
Voltage	V	0d	None
Force	N	6d	None
Pressure	Pa	2d	None
Mass	kg	16d	None

4.1.3 Frame attributes

4.1.3.1 General

A frame is composed of data blocks, channels and sequences.

4.1.3.2 MWF_BLK (04h): data block

This tag indicates the number of data sampled in a block. The number of data blocks in pulse condition waveform coding is defined as 01, namely one data block in one sequence (see Table 5).

Table 5 — Data block

Symbol	Tag	Length Bytes	Value
MWF_BLK	04d/04h	1	01

4.1.3.3 MWF_CHN (05h): quantity of channels

This tag indicates the amount of channels. This tag should be specified before each definition of the channel attribute (see Table 6).

Table 6 — Quantity of channels

Symbol	Tag	Length Bytes	Value
MWF_ CHN	05d/05h	≤ 4	Based on pulse-taking location and the type of the transducer

4.1.3.4 MWF_SEQ (06h): sequences

This tag indicated the quantity of sequences (see Table 7). The sequence amount should be fixed as 01 in this document.

Table 7 — Sequences

Symbol	Tag	Length Bytes	Value
MWF_SEQ	06d/06h	1	01

4.1.4 Waveform

4.1.4.1 General

The waveform class and type, waveform attributes and waveform data are encoded as follows.

4.1.4.2 MWF_WFM (08h): waveform class

This tag indicates the type of waveform encoding rule (see Table 8). The value should be fixed as “pulse condition waveform” in this document.

Table 8 — Pulse condition waveform

Symbol	Tag	Length Bytes	Value
MWF_WFM	08d/08h	24	Pulse condition waveform

4.1.4.3 MWF_LDN (09h): waveform attributes

This tag indicates the attributes of waveform (see Table 9).

Table 9 — Definition of waveform attributes

Symbol	Tag	Length Bytes	Value
MWF_LDN	09d/09h	4	Waveform code

The waveform code in the waveform attribute definition consists of four bytes, as shown in Figure 4. Among them, the coding and description of each byte is shown in Tables 10 to 13.

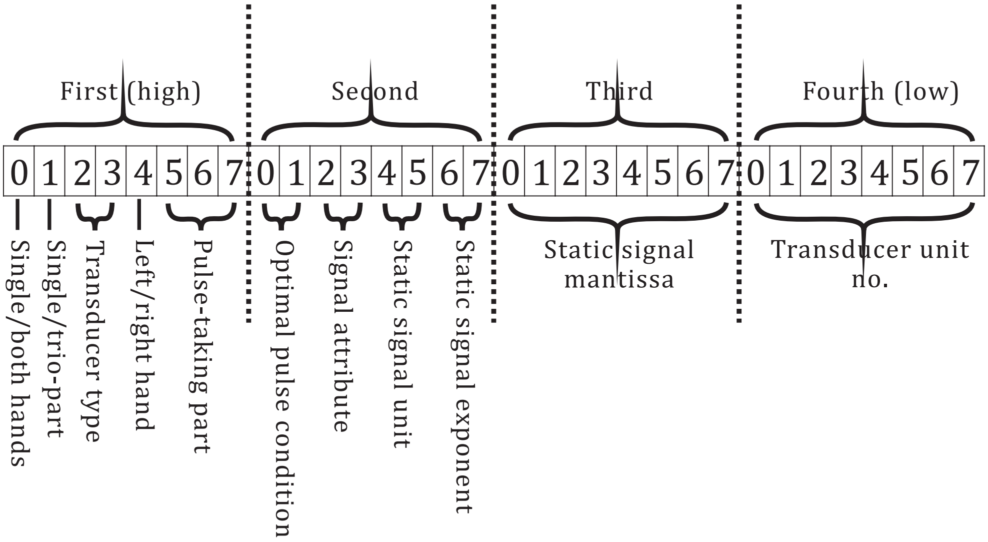


Figure 4 — Waveform code structures

Table 10 — The first byte (high)

<table>
<tr><th colspan="2">Single/both hands[a]</th><th colspan="2">Single part/ trio-part[b]</th><th colspan="3">Transducer type</th><th colspan="2">Left/right hand</th><th colspan="2">Pulse-taking location</th></tr>
<tr><th>Code</th><th>Explanation</th><th>Code</th><th>Explanation</th><th>Code</th><th colspan="2">Explanation</th><th>Code</th><th>Explanation</th><th>Code</th><th>Explanation</th></tr>
<tr><td rowspan="4">0</td><td rowspan="4">Single</td><td rowspan="4">0</td><td rowspan="4">Cun or guan or chi</td><td rowspan="2">00</td><td colspan="2" rowspan="2">One signal transducer</td><td rowspan="4">0</td><td rowspan="4">Left</td><td>000</td><td>Others</td></tr>
<tr><td>001</td><td>Cun</td></tr>
<tr><td rowspan="2">01</td><td rowspan="6">Array signal transducer</td><td rowspan="2">Horizontal parallelism line array</td><td>010</td><td>Guan</td></tr>
<tr><td>011</td><td>Chi</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Both</td><td rowspan="4">1</td><td rowspan="4">Cun and guan and chi</td><td rowspan="2">10</td><td rowspan="2">Vertical parallelism line array</td><td rowspan="4">1</td><td rowspan="4">Right</td><td>100</td><td>Above cun</td></tr>
<tr><td>101</td><td>Blow chi</td></tr>
<tr><td rowspan="2">11</td><td rowspan="2">Cross array</td><td></td><td></td></tr>
<tr><td></td><td></td></tr>
</table>

[a] Used to indicate whether the pulse-taking of a single hand or both hands.

[b] Used to indicate whether the pulse-taking of a single part or trio-part.

Table 11 — The second byte

Optimal pulse condition[a]		Signal attribute		Static signal unit		Static signal exponent	
Code	Explanation	Code	Explanation	Code	Explanation	Code	Explanation
00	No	00	Others	00	V	00	10^−2
		01	Static signal	01	G	01	10^−1
01	Yes	10	Dynamic signal	10	N	10	10^0
		11	Static and dynamic signal	11	Pa	11	10^1

[a] Optimal pulse condition means when the pulse waveform amplitude is maximum.

Table 12 — The third byte

Static signal mantissa
00000000 —— 11111111

Table 13 — The fourth byte (low)

Transducer unit no. (0–127)[a]
00000000—— 01111111
[a] The valid number range of the transducer unit specified in this document is 0–127.

4.1.5 Channel

4.1.5.1 Numbering method for pulse graph force transducer

When using a horizontal parallelism line array transducer (array parallel to the radial artery) for pulse-taking, the channel's serial number should be defined consecutively in the direction from thumb to little finger. The numbering rule is shown in Figure 5 a).

When using a vertical parallelism line array transducer (array vertical to the radial artery) for pulse-taking, the channel's serial number should be defined consecutively in the direction from top to bottom. The numbering rule is shown in Figure 5 b).

When using a cross array transducer for pulse-taking, the channel's serial number should be defined consecutively in the direction from thumb to little finger and then top to bottom. The numbering rule is shown in Figure 5 c).