

RS 232C Interface Manual for HLM machine

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1. Introduction

In order to transmit the measured data with HLM machines to the other equipment or the external computer, HLM are provided with RS-232C interface as the standard function. HLM machines are provided with two communication protocol. One is called one-sided direction's protocol, it is LMTORK(OLD) in HLM's MENU item, the other is called both-sided direction's protocol, it is LMTORK(V2) in HLM's MENU item. This manual provides the way to receive the measured data from HLM machines at the desktop computer or other equipments.

2. Basic Hardware Configuration of RS-232C Interface

	One-sided direction's (OLD)	Both-sided direction's(V2)
Action	After printing	After printing
Boudrate	9600,19200,38400,57600,115200	9600,19200,38400,57600,115200
Data Bit	8 Bit	8 Bit
Parity	No	No
Stop Bit	1 Bit	1 Bit

3. Data Format

3.1 One-sided direction's protocol(=LMTORK(OLD))

In our HLM machines, basically they sends one-directionally their data. Their communication isn't mutual. In other words, there is no the confirming action for the packet which they sent. In addition, there are no the conventional terms like 'ark', 'nak', 'stx' and so on.

The transmitted data format in LMTORK(OLD) item is as following :

```

$ln
LM2RK No=00002 R: S=+00.00 C=+00.00 A=180 PX=+00.00
PY=-00.00 PD=00.0 ADD=+0.00 UR=100
L: S=+00.00 C=+00.00 A=180 PX=000.00
PY=+00.00 PD=00.0 ADD=+0.00 UL= 40 Eln
$ln

```

(^ : the space character, \n: the carriage return)

The first and the last word, '\$\n's represent the start-up and the close-up of a packet. The total size of the data is always same. In the single measurement mode, the 'R' character is replaced by 'S'. The meanings of every word are as followings in the next page:

Word	Meaning
\$\n	the character for the start-up
LM2RK	Just starting word of the content
No=00001	Customer's serial number
R:	The data of the right glass
S=+00.00	Spherical power
C=+00.00	Cylindrical power
A=180	Cylindrical axis
PX=+00.00	X-directional prism power
PY=+00.00	Y-directional prism power
PD=00.0	Right pupil distance
ADD=+0.00	Addition power
UR=045	UV transmission ratio of the right lens
L:	the data of the left glass
-----	-----
\$\n	the character for the close-up

< Example >

DNW v0.50I - For WinCE [COM1,115200bps][USB:x][ADDR:0xc000000]

Serial Port USB Port Configuration Help

```

$
LM2RK No=00009 R: S=-02.75 C=+00.00 A=000 PX=-00.01 PY=-00.01 PD=00.0
ADD=+0.00 UR= 0 L: S=+00.00 C=+00.00 A=000 PX=+00.00 PY=-00.00 PD=00.0
ADD=+0.00 UL= 0 E
$

```

3.2 Both-sided direction's protocol(=LMTORK(V2))

LMTORK(V2) item is new added in our HLM machines, they sends both-directionally their data. Their communication is mutual. In other words, there is the confirming action for the packet which they sent. It is possible to synchronize the other equipment or the external computer in a different LMTORK(OLD) way.

The transmitted data format in LMTORK(OLD) item is as following :

[ENQ][CR]	... (Wait [ACK])
[SOH] \$HEADER [CR]	... (Wait [ACK])
[STX] \$PRT_HEADER [CR]	... (Wait [ACK])
[STX] \$DATA_NO [CR]	... (Wait [ACK])
[STX] \$SCA_DATA_RIGHT [CR]	... (Wait [ACK])
[STX] \$SCA_DATA_LEFT [CR]	... (Wait [ACK])
[STX] \$PRISM_DATA_RIGHT [CR]	... (Wait [ACK])
[STX] \$PRISM_DATA_LEFT [CR]	... (Wait [ACK])
[STX] \$ADD_DATA_RIGHT [CR]	... (Wait [ACK])
[STX] \$ADD_DATA_LEFT [CR]	... (Wait [ACK])
[STX] \$UV_DATA [CR]	... (Wait [ACK])
[STX] \$PD_DATA [CR]	... (Wait [ACK])
[EOT][CR]	

The meanings of every word are as followings :

\$HEADER = {Company Name, Model Name, Date, .. }, content is not limited
\$PRT_HEADER = { Shop Name, etc}, this optional item should start with a white space
\$DATA_NO = {No=#####}, Customer's serial number
\$SCA_DATA_RIGHT = {SRS=\$SPH_DATAC=\$CYL_DATAA=\$AXS_DATA},
\$SCA_DATA_LEFT = {SLS=\$SPH_DATAC=\$CYL_DATAA=\$AXS_DATA}
\$PRISM_DATA_RIGHT = {PRX=\$PRISM_XY=\$PRISM_Y}
\$PRISM_DATA_LEFT = {PLX=\$PRISM_XY=\$PRISM_Y}
\$ADD_DATA_RIGHT = {ARA1=\$ADD_1A2=\$ADD_2}
\$ADD_DATA_LEFT = {ALA1=\$ADD_1A2=\$ADD_2}
\$UV_DATA = {UR=\$UVL=\$UV}
\$PD_DATA = {DA=\$RL_PDR=\$R_PDL=\$L_PD}

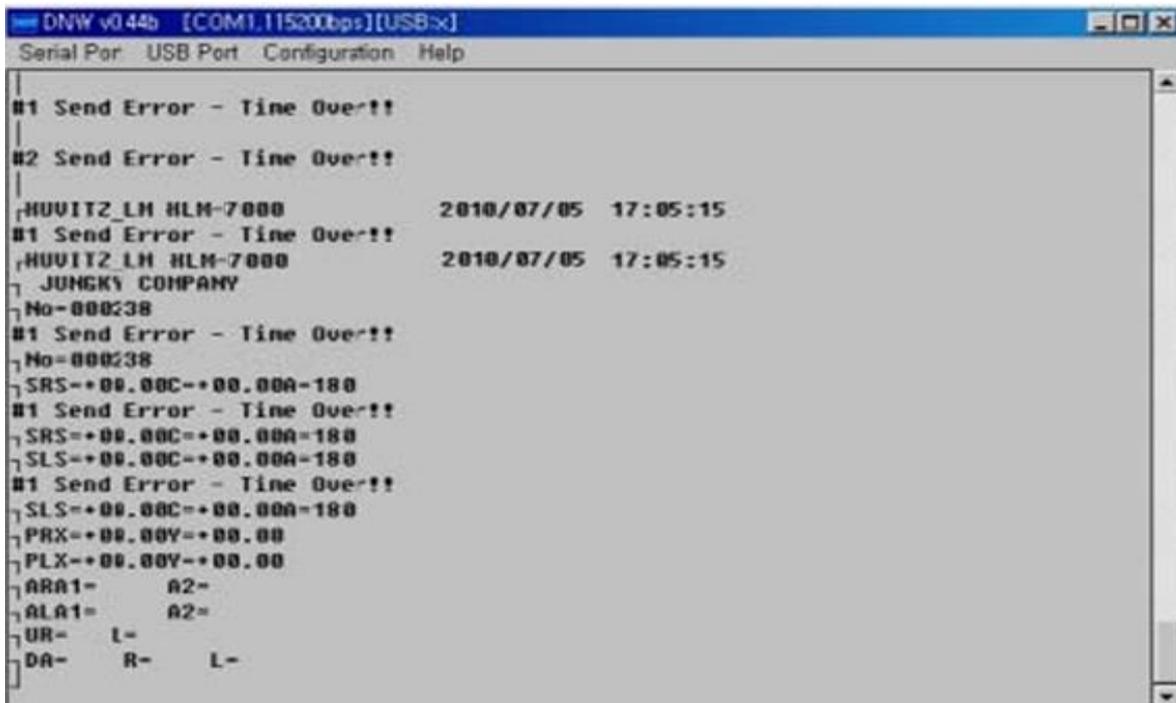
- \$SPH_DATA = {+##.##} : Spherical power
- \$CYL_DATA = {+##.##} : Cylindrical power
- \$AXS_DATA = {###} : Cylindrical axis
- \$ADD_1 = \$ADD_2 = {+#.##} : Addition power
- \$PRISM_X = {+##.##} : X-directional prism power
- \$PRISM_Y = {+##.##} : Y-directional prism power
- \$UV = {###} : UV transmission ratio
- \$RL_PD = \$R_PD = \$L_PD = {##.##} : Pupil distance
- In \$PRISM_X where + = Base In, - = Base Out
- In \$PRISM_Y where + = Base Up, - = Base Down
- (# : the space character)

Signal	Control Code	Description
ENQ	0x05	Send start
SOH	0x01	Header Packet transmit
STX	0x02	Packer transmit
ACK	0x06	Positive response
CR	0x0d	Carriage return
EOT	0x04	Send end

Each line should be less than 80 bytes. After transmitting each line, it should wait a [ACK] from other equipment or external PC except for the last line. If HLM machine is received [ACK] from the other equipment or the external PC, it transmits next line. But, if HLM machine is not received [ACK], it should wait for 3 times(3 seconds per a time = total 9 seconds) until receives [ACK]. In the Single measurement mode, the measurement data of Left glass are replaced by space character. and also, if ADD, UV, PD is no measurement data, they are replaced by space character.

<Example>

```
[ENQ][CR]
[SOH] HUVITZ_LM HLM-7000 2010/07/05 17:05:15[CR]
[STX] JUNGKY Clinic[CR]
[STX]No=000238[CR]
[STX]SRS=+00.00C=+00.00A=000[CR]
[STX]SLS=+00.00C=+00.00A=000[CR]
[STX]PRX=+00.00Y=+00.00[CR]
[STX]PLX=+00.00Y=+00.00[CR]
[STX]ARA1=    A2= [CR]
[STX]ALA1=    A2= [CR]
[STX]UR=    L= [CR]
[STX]DA=    R=    L= [CR]
[EOT][CR]
```



<Flow Chart>

