

## 13.2 The Serial Output / Hardware Connections

The CA620-CellGuard has an output for connection to a computer (network). The serial output has a male 9 pin DSUB. It fulfils the RS232 specifications.

The pinning of the male 9-PIN-DSUB is as follows:

1. N. C.
2.  $\overline{\text{TX}}$ -OUTPUT
3.  $\overline{\text{R X}}$ -INPUT
4. N.C.
5. GND
6. N.C.
7. CTS-INPUT
8. RTS-OUTPUT
9. N.C.

Use a correct cable that is specified for RS232 data transmission and don't use unnecessary high-speed set-ups on the output. This to avoid checksum errors and to secure a correct data transfer. Enter the ' Set-up Menu 2 ' and select the proper data transmission speed and protocol.

### IMPORTANT

*Please note that to enable the serial output of the CA620-CellGuard, the Print functions in point 2 and/or 3 of the main-menu must be set properly.*

#### Connections:

PC Computer using a 25 pin RS232

Cable end CA620-CellGuard	Cable end PC
9 Pin Female DSUB	25 Pin Female DSUB

2-----	3
3-----	2
5-----	7
7-----	4
8-----	5

PC Computer using a 9 pin RS232

Cable end CA620-CellGuard	Cable end PC
9 Pin Female DSUB	9 Pin DSUB

2-----	2
3-----	3
5-----	5
7-----	7
8-----	8

### 13.3 The Serial Output Format

The data format is of such an extent that the connected computer system also can trace abnormalities in samples or instrument.

Below an example is given of a typical sample including some error marks. Note that the parameter transmission is independent on language settings. The data transmission is always in English. Use a computer in terminal mode to visualise the output as shown below.

```
+++++
INSTR= CA620-0
DATE= 13/01/2001-10:29
MODE= OT-B0-A1-U0-P1-D151
DISC= 15-30-30
ID= C2033820A
SEQ= 2402
RBC=          3.00   O-SE-L
MCV=          90.0   O-OK-O
HCT=          27.0   O-OK-L
PLT=          250    O-SE-O
MPV=           8.6   O-OK-O
WBC=           7.7   O-OK-O
HGB=           9.5   O-OK-L
MCH=          31.6   O-OK-O
MCHC=         35.2   O-OK-O
TRBC=         12.9   O-OK-O
TWBC=         12.2   O-OK-O
LYMF=          0.0   N-OK-O
GRAN=          0.0   N-OK-O
MID=           0.0   N-OK-O
LPR=           0.0   N-OK-O
GPR=           0.0   N-OK-O
MPR=           0.0   N-OK-O
RDW%=         13.5   O-OK-O
RDW=           25    O-OK-O
PDW=           20    O-OK-O
PCT=           0.22  O-OK-O
LPCR=          10.2  O-OK-O
```

```

CRBC=
:27:3E:36:28:16:12:0F:0D
:0B:0A:09:09:0A:0D:15:23
:38:53:6F:8B:A2:B2:BC:BF
:C1:BF:BA:AF:A1:93:87:7C
:71:66:5C:52:4A:43:3C:36
:30:2C:28:25:21:1E:1B:19
:16:14:11:0F:0C:0A:09:08
:07:06:05:04:03:02:02:02
:01:01:00:00:00:00:00:00
:00:00:00:00:00:00:00:00
CPLT=
:00:01:06:0B:11:17:1E:24
:2B:2F:2D:2A:25:20:1B:15
:0F:0B:09:08:07:07:07:07
:07:07:07:07:07:07:07:07
:07:07:07:07:06:06:06:06
:05:05:05:05:05:05:05:04
:04:04:04:04:04:04:04:04
:04:04:04:04:04:04:04:04
:04:04:03:03:03:03:03:03
:03:03:02:02:02:02:02:02
CWBC=
:00:00:00:00:00:01:02:04
:06:08:0A:0C:0F:10:12:12
:12:12:12:11:10:10:10:11
:12:14:15:17:18:1A:1B:1B
:1C:1C:1C:1C:1C:1B:1B:1A
:19:18:17:16:15:14:13:12
:11:10:10:0F:0E:0D:0C:0B
:0A:09:08:07:06:06:05:04
:04:03:02:02:02:01:01:01

:00:00:00:00:00:00:00:00
#####
CRC-16

```

An explanation of the above transmission format follows below:

+++++

Five + signs are given to indicate a start of transmission. The connected software should use these 5 signs to trigger the data reception.

#### ***INSTR= CA620-0***

The instrument identification is transmitted. The instrument identification (SSID = Secondary Station ID) is a digit between 0 and 9 and can be set within the Setup-Menu2 within this range. It is only used in the serial output format.

***DATE= 17/12/1993-10:29***

The date and time when the sample was analysed. Note that the date is always in the format DD/MM/YYYY (DAY/MONTH/YEAR) and the time in 00-24 hours.

***MODE= OT-B0-A1-U0-P1-D151***

The MODE is expressed as AA-BB-CC-DD-EE-FFFF and represents the following:

**AA= How the sample was measured**

OT= open tube

PD= pre-diluted sample

CT= cap piercing device

MC= capillary blood ( MPA )

**BB= Bottle status**

B0= All bottles (containers) OK

B4= Haemolyzer container empty

B2= Diluent container empty

B6= Diluent AND hemolyzer container empty

B7= All bottles (containers) empty

**CC=Aspiration status**

A0= No blood detected

A1= Blood detected

**DD= Used parameter units**

U=0 Corresponds to section 7.6 selection 1

U=1 Corresponds to section 7.6 selection 2

U=2 Corresponds to section 7.6 selection 3

U=3 Corresponds to section 7.6 selection 4

**EE= PROG**

P1 = PROG1 used. EE = P1-P9

**FFFF= Reagent package ID**

D151= Reagent package Diluent610/Cymet610-CellGuard mode , WBC Diff

Mode=1

***DISC= 15-30-30***

The discriminator settings. The first digits represent the MIN level, the second the ACTUAL setting and the third the MAX setting. In this case the minimum level of the RBC discriminator was at 15 fl, the actual setting of the floating discriminator was at 30 fl and the MAX discriminator level was at 30 fl.

***ID= C2033820A***

The sample identification. As alphabetic keyboard entries are not possible with the CA620-CellGuard; it is obvious that a bar-code reader entered the above ID number.

***SEQ= 2402***

The sequential number of the sample.

***RBC= 3.00 O-SE-L***

The parameter values has a field width of 5 digits, justified to the right and a line has a total width of 40 characters

The flagging system is in the format X-YY-Z

**X= Value status**

O= OK digit value is available

N= N/A No value available, transmitted as zero (0.00 for RBC)

L= LOW Under range

H= HIGH Over range

**YY= Sample flags**

OK= OK , no sample errors

SE= Statistical error

DE= Distribution error

FD= Floating discr. warning

TU= Counting time error ( high)

TD= Counting time error (low)

OF= Offset error in HGB photometer

LO= Blanking error HGB photometer

HI= Blanking error HGB photometer

NG= Negative HGB error

NM=No significant mode in WBC diff.

OM=One mode in WBC diff.

TM=More than 2 main modes in WBC diff.

BD=Bad Size-Distribution in WBC-diff.

RP= Red cells present

**Z= Sample abnormalities**

O= OK , sample value within parameter limits

L= Sample value LOW

H= Sample value HIGH

***TRBC and TWBC***

These 2 'parameters' are the actual counting times for the RBC and the WBC process.

**CRBC=**  
**:27:3E etc..**

Here the size distribution curves are transmitted. 80 numerical HEXADECIMAL values are given. Note that the size distribution curve for the RBC values ALSO includes the PLT curve. As the total scale is 250 fl; each 'channel' represents a value of  $250/80 = 3.1$  fl.

**CPLT=**

See CRBC above. Note that 80 'channels' are transmitted and that the maximum channel represents 30fl. A channel represents therefore  $30/80$  fl

**CWBC=**

See CRBC above. For WBC the maximum scale is 400 fl. As 80 'channels' are transmitted, this corresponds to  $400/80 = 5$  fl / 'channel'. In case of a 2-part diff.; CWBCL and CWBCG are transmitted which are the LYMF and GRAN curves. In case of a 3-part differential, the CWBCM (MID) curve is also transmitted.

The cell differential curves, like the other curves, always have a max. channel value of 400fl. This means that each channel always represents  $400/80 = 5$  fl.

NOTE that in all cases, the first transmitted channel represents channel number 0. The channel values are always in hexadecimal form proceeded with a ':' sign.

**#####**

The end of a transmission is always marked with 5 '#' signs, followed by a CR and 4 x LF.

**CRC-16**

A CRC16 is sent on all data between the +++++ and ##### marks, excluding all CR and LF.