



USER MANUAL

Gamma Counter 5 / 10

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1.3. 제품용도 및 기능

제품 용도 및 기능

본 장비는 핵의학의 한 분야인 방사선 면역진단의학에 사용되는 장비로 항원, 항체 반응 표지로 동위원소를 사용하는 Tube 의 방사능을 측정하여, 정성검사, 정량검사, 반정량 검사의 결과를 계산하여 결과를 하여준다.

10 개의 Detector 를 이용하여 동시에 10 개의 시료를 동시 계수할 수 있으며, 정성검사, 정량검사, 반정량 검사, Dual Label Assay 등의 검사를 수행할 수 있다..

정량검사는 Point to Point, Linear Regression, Second Order Polynomial Regression, Third Order Polynomial Regression, Cubic Spline, Smoothing Cubic Spline, Pour Parameter Logistic 등의 다채로운 그래프 연산을 지원하며, Linear, Log, Logic 의 Scale 을 지원한다.

Touch Screen 을 이용한 User Interface 는 이용자를 보다 편리하게 기기를 운영할 수 있도록 도와주며, Multi Thread 로 운영되는 Gamma-10 Manager 는 장비 운영 중에도 이용자가 원하는 작업을 동시에 수행할 수 있도록 하여준다.

또, 장비에 설치된 Magnetic Sensor 는 시료의 존재 여부를 자동 확인하여, 시료가 존재하지 않는 경우 제외시킬 수 있어 Network Interface 를 통한 자동화에 보다 편리하다.

RIA 종합 운영 시스템인 RALS(RIA Automatic Laboratory System)에 함께 이용되며, 이 경우 전 RIA 검사시스템을 자동화 할 수 있다.

본 장비는 CE 의 전기 안전성 검사를 통과하여 장비의 전기적 안전성이 이미 검증되었으며, 최근에 ISO-13485 인증을 획득하여 품질 안정성을 인정받았다.

2 장 사용자 매뉴얼 설명

목적 본 사용자 매뉴얼은 Gamma Counter 의 사용에 있어서 안전성과 편리성을 제공하고자 하는 목적으로 작성 되었습니다.

2.1. 대상 장비

대상장비 Gamma 5 / 10

3. 안전 준수사항

3.1. 주요 표기사항



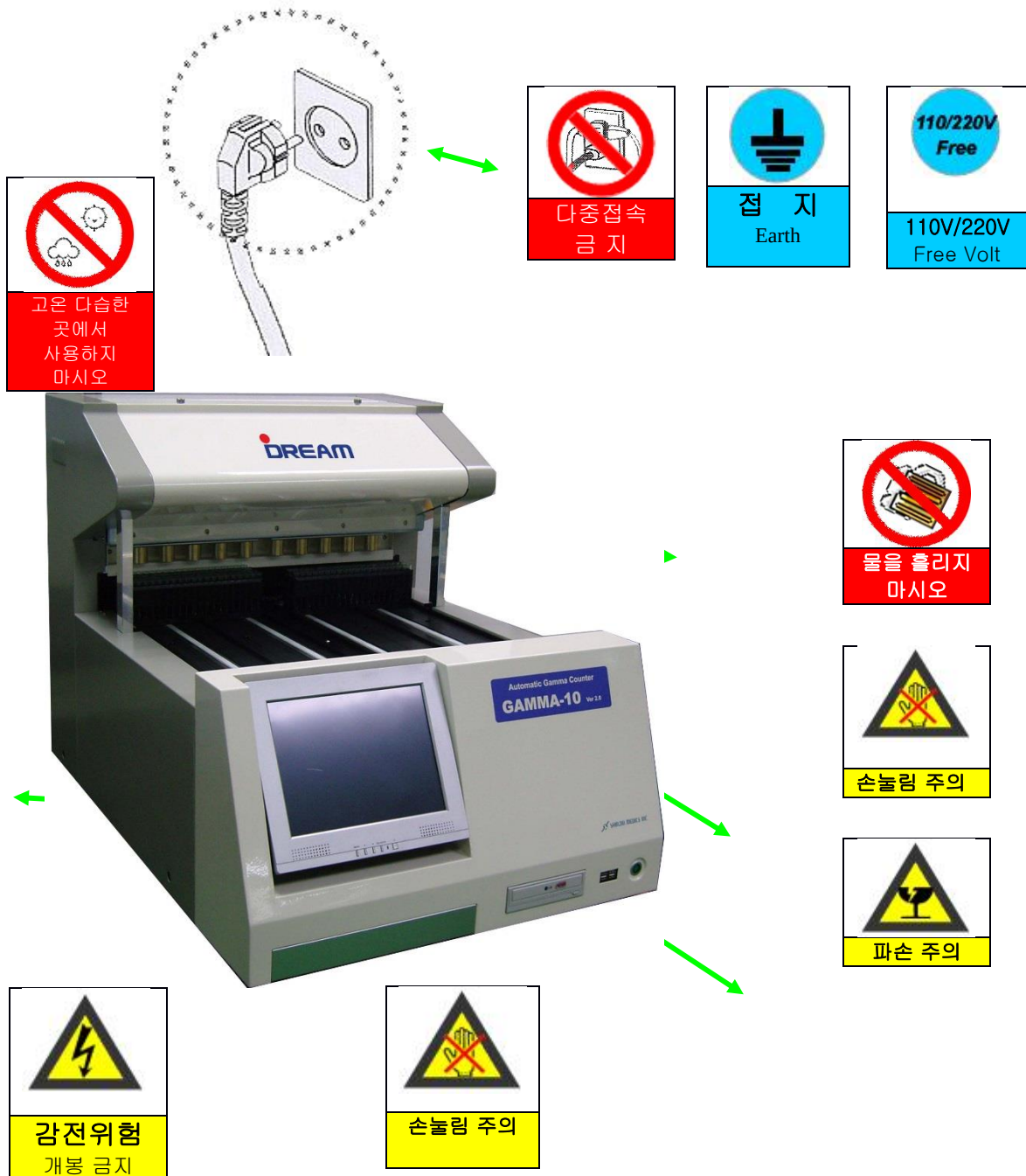
금지표시



위험/주의표시



지시표시



3.2. 사용자 안전 사항

설치 시 주의사항

- 직사광선을 피하고, 습하지 않은 곳에 설치 (습도 80%이하)
- 장비가 고중량 임으로 이를 지지할 수 있는 튼튼한 책상위에 설치
- 전압변동률이 안정적인 곳에 설치(+/- 10%), 불안정한 경우 AVR 설치
- 컴퓨터 바이러스 위험이 있으므로, 백신을 반드시 설치하며, WINDOW UPDATE 를 필수적으로 한다.
- 콘센트는 반드시 접지용 콘센트를 사용한다.
- 벽이나 주변 장비로부터 20Cm 이상 간격을 두고 설치한다.

사용 시 주의 사항

- 제품 고장 시 임의로 제품 내부를 개봉하지 마세요.
- 장비의 정면 좌측부 개봉 시 700~800V 고전압이 흐르는 장치가 있으므로 반드시 서비스 요원에게 연락하여 수리하세요.
- 장비 운영 중에 장비의 DESK 안쪽 Tube 계수부에는 손을 넣지 마세요.
(서비스 요원의 작업요령 교육에 내용 포함)
- 오염 제거를 위해 추를 빼서 세척 후 다시 삽입 할 경우 추의 급격한 하락으로 장비의 손상을 줄 수 있으므로 서비스 요원에게 작업 요령을 교육받은 후 이용하세요.
- 사용 중 이상한 냄새와 연기 등이 발생하면 MAIN 전원을 차단하시고 당사에 연락주세요.
- 정전이나 기타 사유로 전원이 갑자기 끊긴 경우, 장비를 바로 동작시키지 마시고, 일정시간(1 분) 이후에 동작시키세요.
- USB 소켓에 메모리나 기타 주변기기를 설치하여 이용하는 경우 사람의 보행으로 인한 손상이 있을 수 있으므로, 이용 후 바로 제거하세요.

3.3. 제품 안전 사항

사용조건

- 가용 온도: 15~32°C
- 가용 습도: 20~80%
- 수평이 잘 맞고 흔들림에 영향이 없는 튼튼한 테이블 사용
- 주위 환경에 영향을 받지 않는 밀폐된 공간에 설치해야 함.
- 직사광선 노출금지
- 먼지 등에 영향을 받지 않는 깨끗한 주변 환경

보관 및 관리

- 고온 다습한 곳에 보관하지 마십시오.
- 장비 상단에 무거운 물건을 얹어두지 말 것

3.4. 운반 시 주의사항

주의사항

- 장비는 반드시 상하가 뒤집혀지지 않는 상태로 운반합니다.
- 장비 외관 보호를 위해 외관을 포장할 것을 권장합니다.

4. 유지보수

제공되는 Maintenance Manual 을 참고하시기 바랍니다.

5. 기술 자료

5.1 장비 구성품

Component	Code	Quantity	Image
본체 (Detector -10 EA Magnetic Weight - 10 EA Shield Tube - 10EA ADC Board - 10EA)	DG02	1EA	
Cassette Rack	LI01-00261	30 EA	
RF CLIP	DG02-00179	1SET (80EA)	
Magnetic Weight(Spare)	DG02-00154	2EA	
Shield Tube(Spare)	DG02-00152	10EA	
Window XP-Home Edition Or Windows 7	DG02-00057	1EA	
User Manual		1EA	
Service Manual		1EA	
Driver CD		1EA	
G10 Manager Installation CD		1EA	

5.2 장비 외관

1) Front View



2) Right Side View



Main Power Switch

USEB Port

Serial Port

Ethernet Port

Cooling Fan

3) Top View



Top Cover

Desk Panel

Cassette Rack Guide

5.3 Specification

1) Hardware

Component	Feature
Detector	Nal(Tl) : 1.5" * 1.5" Through Hole Type Hole Size : 6 mm ~ Max 12.5mm
ADC (Analog Digital Converter)	Analogue Convert Rate : 12 Bit Channel : 4000 Control Processor : 5MHz
Embedded Processor	ARM9 (OS Linux)
Dimension	730(W)*1000(D)*820(H)
Weight	240Kg (납차페-96Kg 포함)
Power	110~220V (40~50Hz) –Require Setting
Power Consumption	Max 150 Watt
Deck Capacity	27Rack(540 Tubes) *Include Counting Tube
ID System	RF-ID 13.56MHz (ISO15693) 1024 bit memory
PMT High Voltage	700 ~ 1000V
Gain	Electrical : 0.15 ~ 150
Network Interface	RS-232, TCP/IP
Void Tube Check	Magnetic Sensor
Computer	Processor : P4 또는 이상 Memory : 512 ~ 2 Mbyte 또는 이상 Hard Disk : 60 Gbyte 또는 이상 Human Interface : Mouse, Touch Screen, Keyboard
Human Interface	Mouse, Touch Screen, Keyboard
Countable Isotope Energy	User Define (Channel/Energy : 2~10)
Compatibility	TW20, TW300+, SI-600, DS Series

2) SOFTWARE

구분		Feature
OS		Windows XP Home Edition or Windows 7
Supported Test Type		1. Quantitative (RIA,IRMA) Test 2. Qualitative Test 3. Semi-Quantitative Test 4. Dual Label(I-125, Co-57)
Channel/1KeV		2, 3, 4, 5, 6, 7, 8, 9 Channel / 1 KeV
Quantitative Test	Standard Curve	1. Point to Point 2. Linear Regression, 3. 2'nd Order Polynomial Regression, 4. 3'nd Order Polynomial Regression, 5. Cubic Spline, 6. Smoothing Cubic Spline. 7. Lagrange (Interpolation) 8. Four Parameter Logistic (We will continue to add mathematical logic)
	Graph Scale	X Scale : Linear, / Log Y Scale : Linear / Log / Logit
	Procedure Q.C	ED20, ED50, ED80, Controls
Qualitative Test	Verify Formula	Formula Wizard
	Procedure Q.C	N/P Ratio
Preset Isotope		I-129,I-125,Co-57,Cs-137
Correction		Crosstalk Correction Spill up/down Correction
No. of Procedure		1~70 : Normal Assay Procedure 71~80 : Device Q.C.

3) Performance (at Delivery Time)

*100,000 CPM 이상의 시료로 측정

Component	Feature
Difference of Each Detector	Under 1 %
Efficiency	I-125 > 70% I-129 > 55% Co-57 > 85% Cs-137 > 26%
Resolution	I-125 < 32% I-129 < 30% Co-57 < 17% Cs-137 < 15%
Background	I-125 < 150 Co-56 < 150

6 장 장비 운영

6.1 용어 정리

1) Statistics

Terms	Mean
Mean : 평균	$\text{Mean} = \frac{(A1 + A2 + A3.... + An)}{n}$
SD (Standard Deviation) : 표준 편차	$S.D. = \sqrt{\frac{\sum(X_i - \text{Mean})^2}{(n - 1)}}$
CV(Coefficient of Variation) : 변위 계수	$C.V. = \frac{SD}{\text{Mean}} \times 100$
Logit (Logistic)	$\text{Logit}(X) = \ln\left(\frac{X}{1-X}\right)$
ED20 (Estimated Concentration at 20% Bound)	0.2*CPM of Reference 에서의 농도값 * Reference Tube 가 설정된 경우 이를 100% Binding 으로 사용하며, 이것이 없는 경우 STANDARD 중 가장 높은 CPM 을 가진 STANDARD 를 100% Binding 으로 사용한다.
ED50 (Estimated Concentration at 20% Bound)	0.5*CPM of Reference 에서의 농도값
ED80 (Estimated Concentration at 20% Bound)	0.8*CPM of Reference 에서의 농도값

2) Radiation Spectroscopy

a. SCA(single channel analyzer) : 단일 채널 분석기

단일채널파고분석기는 하한준위(lower level discriminator; LLD)와 상한준위(upper level discriminator; ULD) 반동시회로를 이용하여 펄스 크기의 분포를 측정하는 기법으로, 증폭기에서 나온 펄스 중 하한선별준위와 상한선별준위 사이(window 폭)에 있는 것만을 계수하여 기록장치에 전달한다.

때문에, 스펙트럼 분석은 불가능하다.

b M.C.A (Multi Channel Analyzer) : 다중 채널 분석기

선형증폭기로부터 부터 출력되는 펄스신호를 펄스의 높이(pulse height)별로 분류수집 및 기억하고 필요에 따라 출력하기 위한 장치이다.

c. Efficiency : 계수 효율

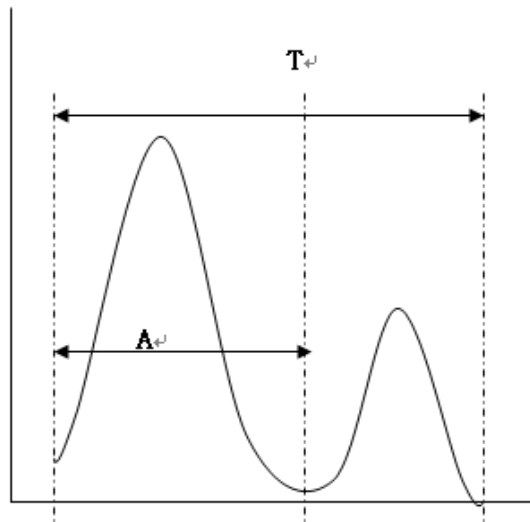
실제 동위원소에서 방사되는 방사능량과 측정기로 측정되는 계수한 값의 비율

$$\text{Eff}() = \frac{\text{CPM}}{\text{DPM}} \times 100$$

CPM : Count Per Minute

DPM : Disintegration Per Minute

I-125 의 경우 Edridge Equation (I-125 Efficiency)을 사용하여 효율을 계산하며, 그 식은 다음과 같다



$$\text{Efficiency}(\%) = 4(1 - A/T) / (2 - A/T)^2 \times 100$$

d. Energy Resolution

근접한 에너지를 분석할 수 있는 능력. (Fig 2.1)

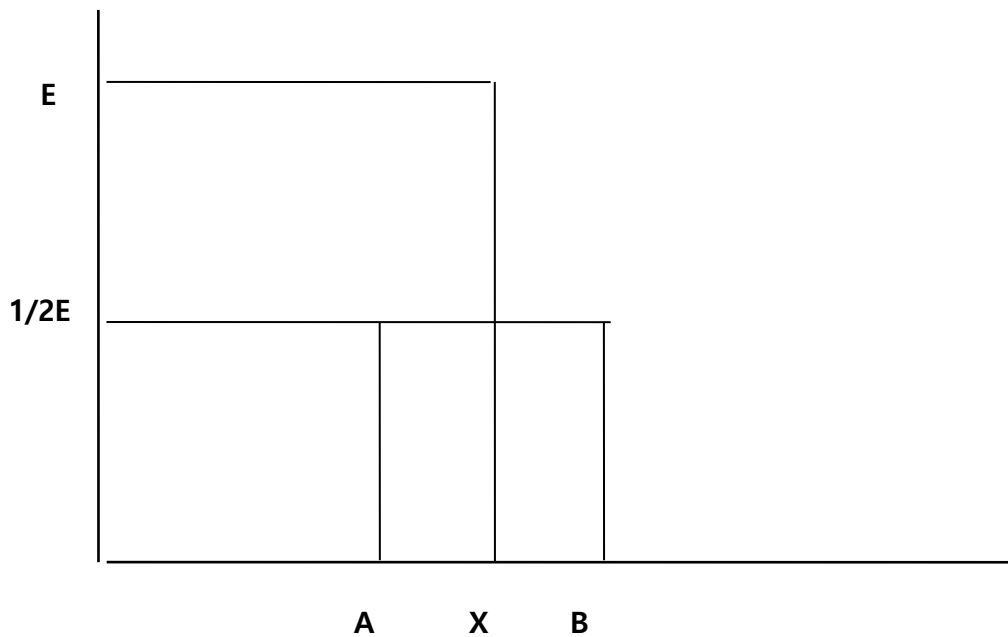
Gamma-Ray 의 경우 원래는 선 스펙트럼이나, 방사선 검출기에 동일한 에너지의 방사선이 입사하더라도 이것이 전기신호로 변환되는 과정에서 통계적 요동이나, 검출기 동작특성의 변화, 전자회로의 잡음 등의 영향 때문에 관측된 에너지 스펙트럼은 어느 정도의 퍼짐을 갖게 된다. 따라서 단일 에너지 방사선에 대한 스펙트럼의 모양은 Gaussian 분포와 같이 형성된다.

$$\text{Resolution}() = \frac{\text{FWHM}}{E} \times 100$$

e. FWHM

최고 계수값에서 1/2 되는 지점의 에너지 간격 (Fig 2.1)

$$\text{FWHM}() = \frac{B-A}{X}$$



f. Crosstalk

에너지가 높은 동위원소(>200 KeV)의 경우 계수 시 Source 가 주변의 Detector 에도 영향을 줄 수 있는데,

그 정도를 측정하여 보정해야 한다. 이를 Crosstalk Correction Factor 라 한다.

g. Spill Up/Down

방사성 동위원소가 2 이상 혼합된 물질을 계수할 경우, 한 원소에 의해서 다른 원소들의 계수 치에

영향을 주는 것을 말하며, I-125 와 Co-57 의 동시 계수 시 I-125 의 경우 15~75 KeV(혹은 15~80 KeV) 에서

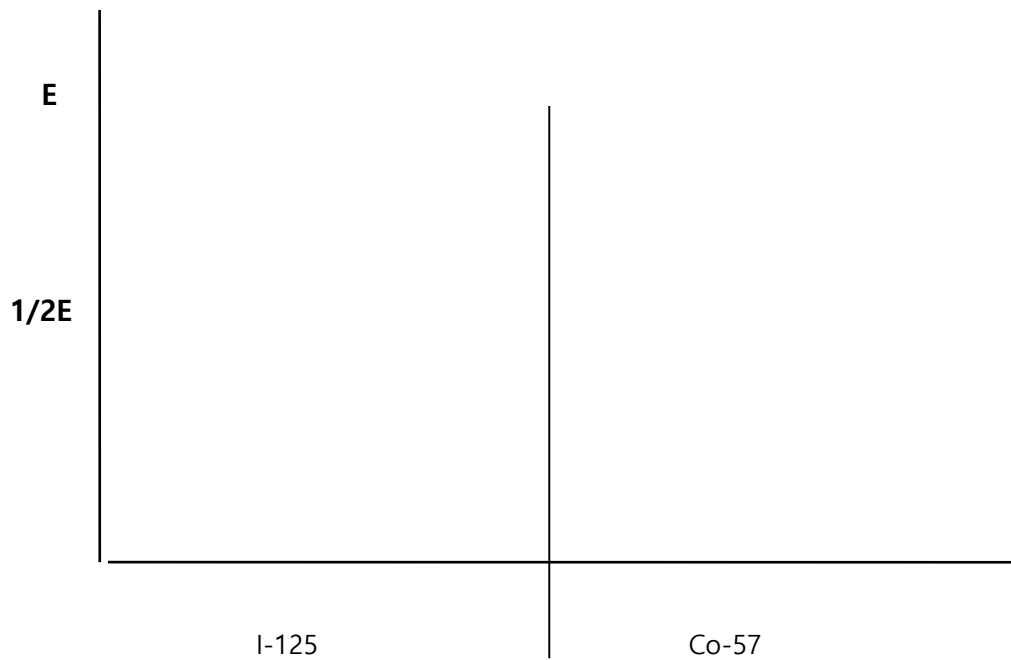
계수되고 Co-57 은 75~165 KeV 에서 계수되지만, 각각의 동위원소가 실제로는 계수영역 밖으로도

일정부분 데이터가 있으며, 단일 동위원소 측정 시에는 관계없으나, 복합 동위원소를 측정 시에는

타 동위원소의 계수치에 영향을 주게 되어 이를 보정해야 한다.

Co-57 방사능 계수값이 I-125 의 측정구역으로 넘어오는 것을 Spilldown 이라 하고, I-125 의 측정구역이

Co-57 의 측정구역으로 넘어가는 것을 Spillup 이라 한다.



h. Gain/Zero Point

항목	설명
GAIN (증식이득)	신호의 증폭률로서 허용치는 0~255 까지 이다. 값을 높이면 증폭률이 높아져 Spectrum 의 Scale 이 커지게 된다. (예)
Zero Point (영점)	Spectrum 의 영점 조정으로 값을 높이면 Spectrum 은 높은 방향으로 이동한다.

i. Isotope Energy

실제로 gamma-Ray 는 선스펙트럼 이지만, Scintillation Detector 의 측정방식 한계로 인해

선스펙트럼 처럼 관측되게 되며, 때문에 LLD 와 ULD 는 Detector 의 Resolution 따라 좌우된다.

아래의 High-Energy 와 Low-Energy 는 Dream Gamma-10 의 권장값을 기술하였다.

Isotope	Name	Energy(KeV)	Half-Life	Low-E	High-E
I-125	Iodine	29	60.14 hr	15	75
Co-57	Cobalt	122	270 day	75	160
Cr-51	Chromium	320	22.7 day		
I-129	Iodine	31	15,700,000 yr	19	55
F-18	Fluorine	511	1.83 hr		
Cs-137	Cesium	662	30.1 yr		
Ba-133	Barium	356	10.7 yr		

3) Radioactive Immuno-Assay

1) Total Tube

반응에 사용되는 Trace 를 넣은 시료로, 이를 100 결함으로 보고 다른 시료의 항원/항체

결합률을 확인하기 위해 사용된다.

2) NSB(Non Specification Binding), Blank

NSB 란 검사에 Serum 을 넣지 않고 나머지는 모두 다른 Tube 와 동일하게 반응시킨 Tube 를 의미하며, Blank 라고도 한다.

3) Control

검사의 유효성을 평가하기 위해 사용하는 미리 정의된 농도나 결과를 가진 시료

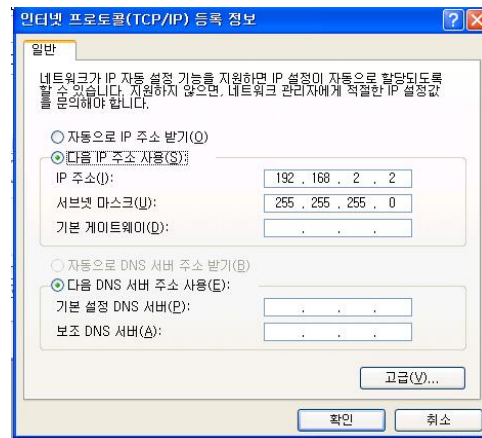
6.2 Installation

6.2.1 설치 환경

OS	WINDOW XP, WINDOW 2000, WINDOW 2003
HARD DISK	1 Gbyte 이상의 여유 공간 (권장: 10 Gbyte 이상의 여유 공간)
MEMORY	(최소) 256 Mbyte 이상, (권장) 512 Mbyte 이상

6.2.2 Gamma-10 Manager 설치하기

- 1) 제어판->네트워크 연결->로컬영역연결(장비와 연결된 Ethernet Card)에서 IP 설정을 다음과 같이 설정 한다.



- 2) GAMMA-10 설치 CD 를 GAMMA-10 의 CD-ROM 에 장착한다.
 3) G10ManagerInstall.exe 를 실행한다.
 4) 설치할 폴더를 선택한다



5) 단축아이콘이 설치될 Group Folder 를 선택한다.

(Default: C:\Program Files\DREAM \WG10 Manager 3)



6) Install 이 완료되면 Finish 버튼을 눌러 설치를 완료한다.

6.2.3 장비의 기동 및 프로그램 실행

1. 장비의 우측 측면에 설치된 Main Power Switch 를 ON 시킨다
2. 우측 전면에 설치된 PC Power Switch 를 ON 시킨다.
3. OS 가 부팅된 후 바탕화면에 생성된 G10 Manager 3.0 을 실행한다.
4. G10 Manager 3.0 는 자동으로 DREAM SERVER 에 접속하여, 설치된 프로그램의 버전을 확인 후, 업그레이드가 필요하다면 자동으로 필요한 파일을 서버에서 수신하여 설치한다.

실행 후 에러 발생경우의 대처 요령

실행 후 만약, "Device Connect Fail" 메시지가 뜨는 경우

- A- 장비와 연결된 Ethernet Card 의 설정이 위 그림과 같이 되어 있는지 확인하다.
- B- Ethernet Card 설정에 이상이 없다면, 장비의 주 전원을 OFF 시킨 상태로 5 분 경과 후 다시 장비에 전원을 넣은 후 프로그램을 실행해본다.
- C- 그래도, 연결에 실패하는 경우 본사에 연락하여 조치를 취한다.

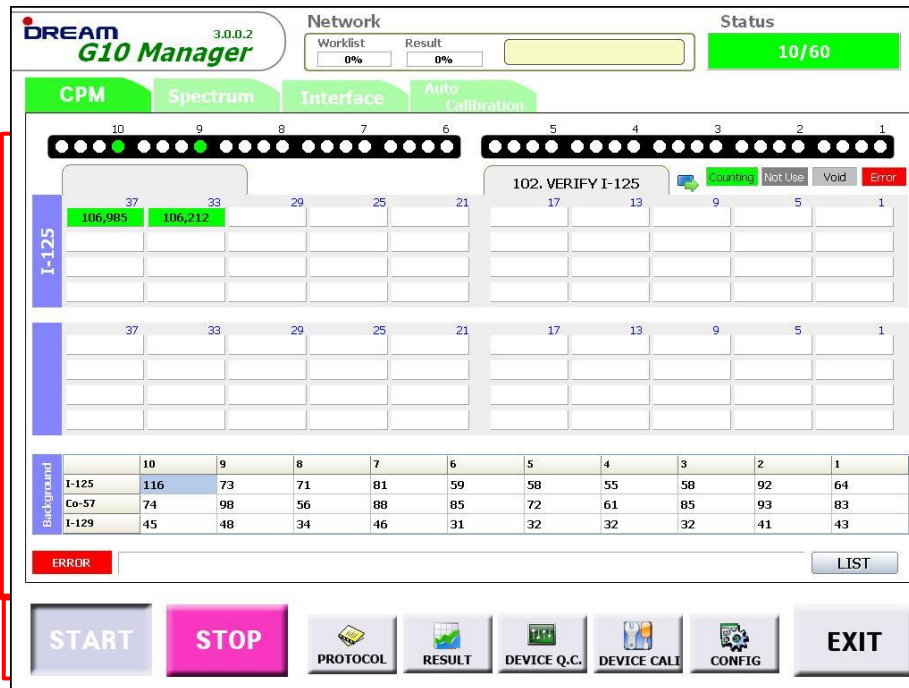
6.3 Main Control Panel

6.3.1 Main View

Interface Status

Main Display TAB

Status



Main Display

Command Button

- 1) START
- 2) STOP
- 3) PROTOCOL
- 4) RESULT
- 5) DEVICE Q.C.
- 6) DEVICE CALI
- 7) CONFIG
- 8) EXIT

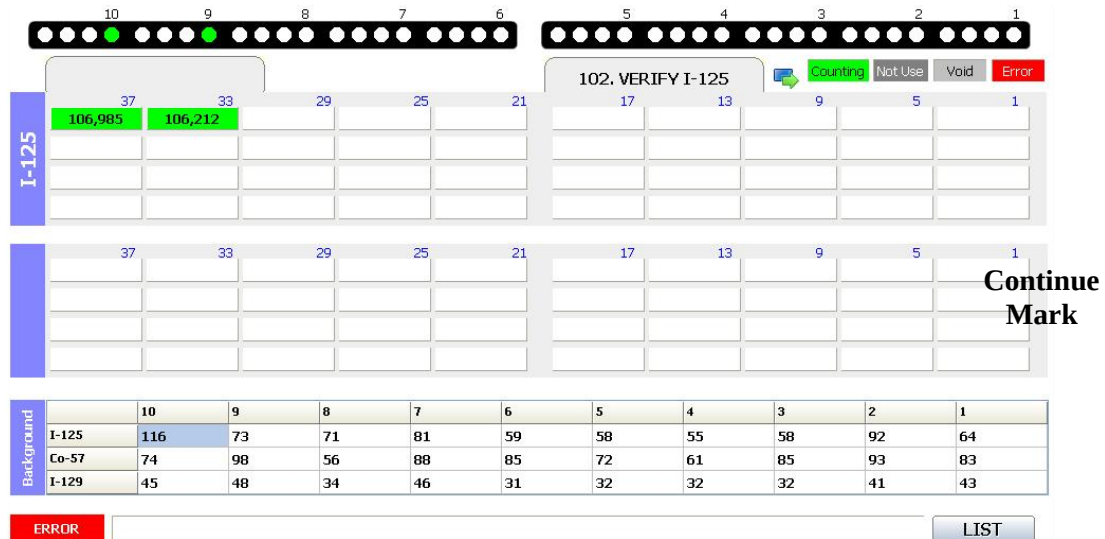
Interface	Network Interface 즉 worklist 수신상태, 결과 전송 상태 등을 확인할 수 있다.	
Status	장비의 동작 상태 및 계수시간을 확인 할 수 있다.	
Main Display Tab	CPM, Spectrum, Interface, Auto-Calibration 중에 원하는 정보를 선택할 수 있다.	
Main Display	사용자가 Main Display tab 에서 선택한 항목정보를 Display 한다.	
Command Button	Start	장비를 가동시킨다.
	Stop	장비를 정지시킨다.
	Protocol	검사 Protocol 을 생성/수정/삭제한다.
	Result	검사결과를 확인한다.
	Device Q.C	장비의 Q.C 이력을 확인한다.
	Device Cali	장비동작 테스트 및 미세조정을 한다.
	Config	환경설정
	Exit	프로그램 종료

6.3.2 CPM Info

Tube Layout

Working Protocol

Legend



Error List

Background

Working Isotope

CPM

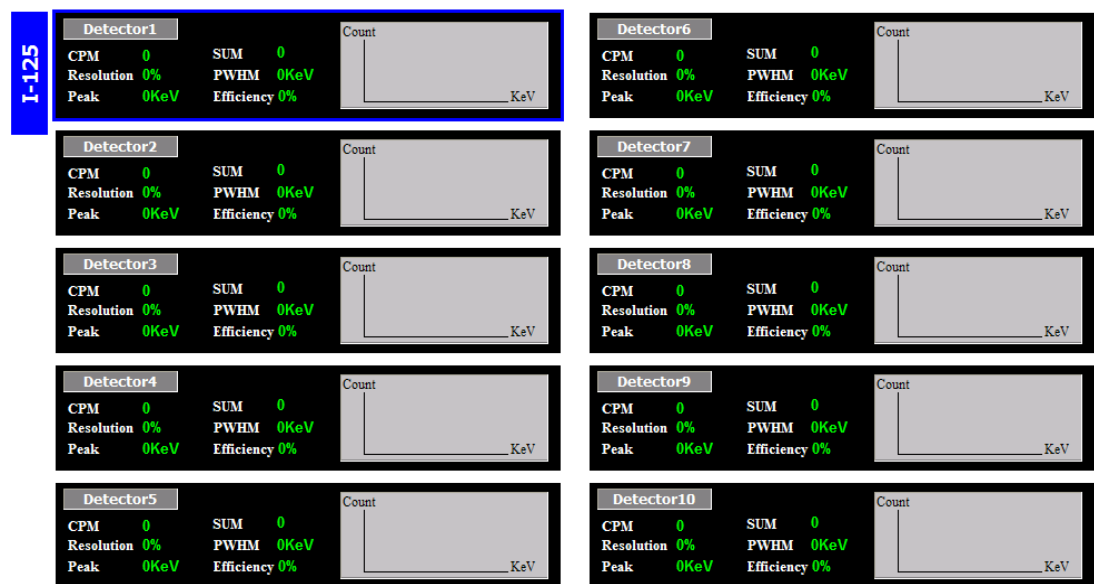
Tube Layout	Cassette Rack 에 Tube 의 장착상태를 쉽게 확인할 수 있도록 하여주며 Tube 가 존재할 경우 녹색으로, 없는 경우에는 회색으로 표시된다. 상태에 따른 표시 색은 Legend 를 참조한다.
Working Protocol	좌우측 Tab 에 각각 표시되며 장비의 좌우측면에서 작업중인 Cassette Rack 의 Protocol 을 표시한다.
Continue Mark	작업중인 Cassette Rack 에는 RF-Clip 이 장착되지 않았으며, 이전의 프로토콜을 계속 진행함을 의미한다.
CPM	계수된 CPM 값을 표시한다. 색은 Tube Layout 과 동일한 색이 적용된다. CPM 정보는 장비운영에 맞추어 보다 직관적으로 구성하기 위하여 우측으로부터 시작하며 가장 우측의 4 개 Panel 은 Detector 1 번에서 계수된 CPM 정보이다. 이는 장비를 정면에서 보았을 때 놓이게 되는 Cassette Rack 의 Layout 과 일치한다. 만약 Dual Label Assay 의 경우 하단부의 Panel 에 표시한다.
Working Isotope	계수중인 Tube 의 측정 동위원소를 Display 한다.
Background	Mail 동위원소인 I-125, Co-57, I-129 의 Background 정보를 Display 한다.
Error List	장비에 에러 발생시 빨간색 글씨로 에러가 점등되며, 이를 해지하기 위해서는 에러 Text 를 클릭하여준다.

6.3.3 Spectrum Info: Brief

Working Isotope

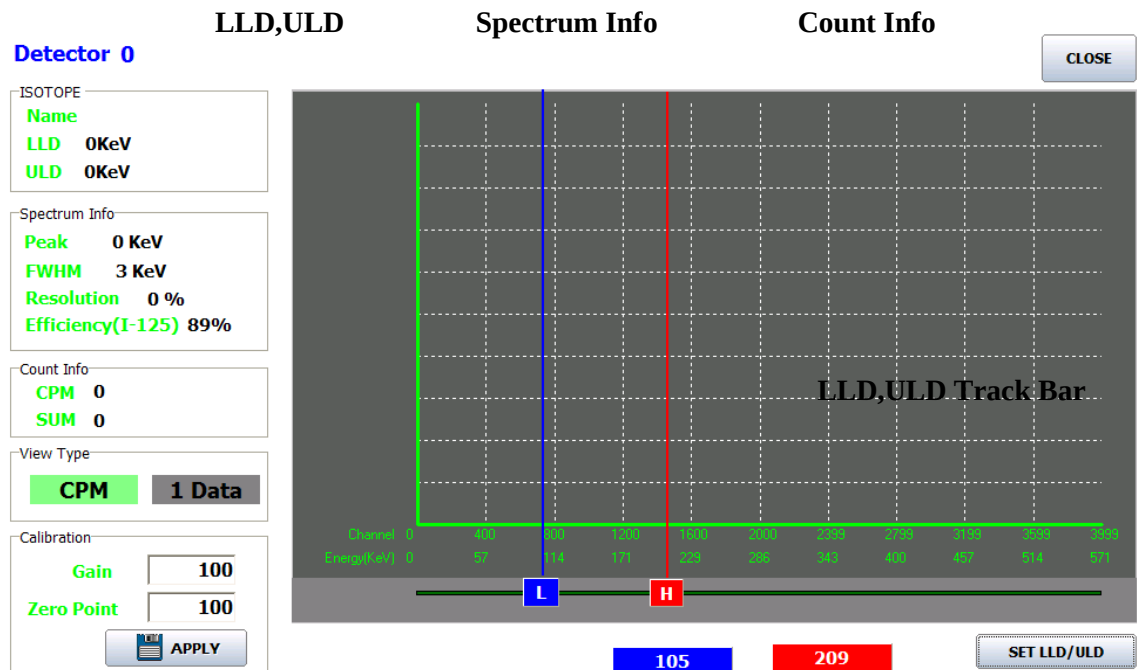
Mini Spectrum

Spectrum Information



Working Isotope	현재 Display 되고 있는 Spectrum 의 동위원소
Mini Spectrum	Spectrum Shape 를 확인할 수 있으며 만약 더욱 자세한 Spectrum 을 보고 싶을 경우 Mini Spectrum 을 1 초동안 누르고 있으면 Detail Spectrum 정보가 Display 된다.
Spectrum Information	CPM, SUM, Resolution, FWHM, Peak, Efficiency (I-125 만 적용)를 동시에 확인할 수 있다.

6.3.4 Spectrum Info: Detail



Gain, Zero Point

User Define LLD/ULD

Detail Spectrum

LLD/ULD	현재 측정중인 동위원소의 LLD/ULD
Spectrum Info	FWHM, Peak, Resolution Efficiency (I-125 만 적용)를 표시한다. 만약, 이용자가 LLD/ULD 를 수정하였다면 해당 범위의 Spectrum 정보를 표시한다.
Count Info	CPM 과 SUM 을 표시한다. 만약, 이용자가 LLD/ULD 를 수정하였다면 해당범위의 정보를 표시한다.
User Define LLD/ULD	현재 측정중인 LLD 와 ULD 를 표시한다. 만약, 이용자가 이를 변경하고 싶다면 LLD/ULD Track Bar 를 Drag 하여 원하는 범위를 설정한다.
Detail Spectrum	Brief Spectrum 보다 확대된 Display 를 확인할 수 있다.
Gain, Zero Point	Spectrum 정보를 보면서 만약 Gain, Zero Point 정보를 수정하고 싶다면 변경하기 원하는 값을 기입 후 Apply Button 을 Click 한다. 해당 Gain, Zero Point 가 적용되는 지점은 바로 다음 Spectrum 정보 수집을 할 때 임의로, 만약 Config 에서 Count Data Receive Time 이 너무 길게 설정될 경우 5 sec 이나 10sec 으로 설정하여 수정하면 편리하다.

6.4 Test Procedure (Protocol)

6.4.1 Procedure List

Select the protocol number

Virtual Standard Button

Virtual Data Button

ASSAY PROTOCOL LIST

Virtual Standard Virtual Data

	NO.	PROTOCOL	INFORMATION
1~10	1	25-OH-Vit.D	60(Sec) ,Last Edit Time :2009-12-02 09:34:23 < ,STD(0.00/5.00/10.00/20.00/40.00/100.00)
11~20	2	GAD	60(Sec) ,Last Edit Time :2009-12-03 14:53:43 < ,STD(0.0/1.0/3.0/10.0/30.0/300.0)
21~30	3		
31~40	4	T4	60(Sec) ,Last Edit Time :2009-12-03 14:54:06 < ,STD(0.00/1.00/4.00/8.00/12.00/20.00)
41~50	5	ft4	60(Sec) ,Last Edit Time :2009-12-03 14:54:21 < ,STD(0.00/0.10/0.80/1.90/4.60/10.00)
51~60	6	TSH	5(Sec) ,Last Edit Time :2009-12-03 16:25:16 < ,STD(0.020/0.145/0.313/1.220/4.900/19.300/76.900)
61~70	7	SM-C	60(Sec) ,Last Edit Time :2009-12-03 14:54:53 < ,STD(0.0/9.0/19.0/57.0/205.0/514.0)
	8		
	9	LH	60(Sec) ,Last Edit Time :2009-12-04 16:19:37 < ,STD(0.00/0.60/3.10/10.00/30.00/96.00/193.00)
Q.C.	10	FSH	60(Sec) ,Last Edit Time :2009-12-03 14:55:19 < ,STD(0.00/1.10/2.20/5.50/11.00/22.00/44.00)

Protocol List

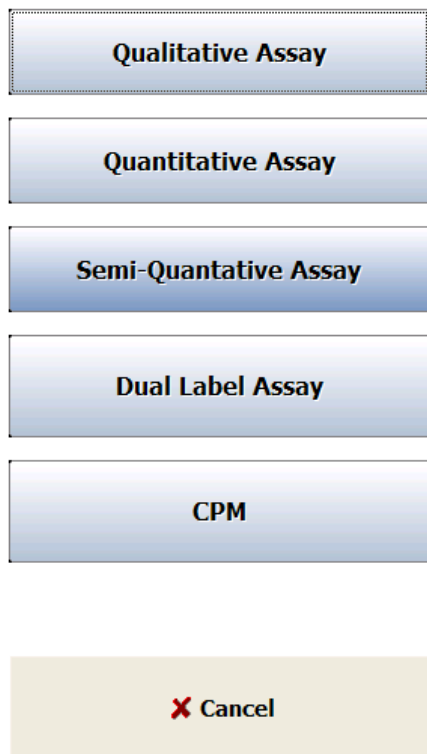
Protocol Edit

Protocol Tool

Previous COPY EXCHANGE DELETE Assay Q.C Edit

Select the Protocol number	Select the Protocol band by 10 units
Protocol List	Display the simple information of each Protocol and select and modify it and delete it. Provide the method pf Half Life, One Point, Two Point.
Virtual Standard Button	Use this function when the standard information of the previous test needs to be applied to the new standard test.
Virtual Data Button	Provide the function to input and edit data virtually without conducting the test.
Protocol Tool Button	Provide copy, move and delete functions of Protocol.
Protocol Edit Button	Modify the protocol and create it if not specified.

6.4.2 New Protocol



Dialog Box pops up when pressing Edit button after choosing the empty Protocol grid (as left picture). Select a test method according to test characteristic.

1) Qualitative Assay :

Through using Standard, it is the test to obtain the concentration as a result.

2) Quantitative Assay :

Through using Control, it is the test to obtain the negative/positive information.

3) Semi-Quantative Assay :

Through using Control, it is the test to obtain the concentration or other calculated value as a result.

4) Dual Label Assay

Through using tube all labeled I-125 and Co-57, it is the test to obtain the concentration as a result.

5) CPM: Measure CPM of isotope of other than I-125 or Co-57.

6.4.3 Qualitative Assay

Protocol #3

Main Information

Name		Interface Id		Add
Count Time	60 Sec (5~600)			Delete
Isotope	☒ I-125 ☐ Co-57	Lot Number		

Tube Configuration

BLANK	None		
Total	None		
Neg Control	None	Pos Control	None
Control	Single - 0		
Sample	Single		

Cut off

Formula	>=	Check Validation
N : Negative Control P:Positive Control Example : 1) $\geq (N+P)/2$ 2) $\leq N*3$		

Report

	Edit	Report Template
----------------------	-------------------------------------	--

Main Information

Name	Protocol name
Count Time	Coefficient time
Isotope	Isotope
Interface ID	Protocol ID from Network Interface
Lot Number	Lot Number of reagents (Only enter the Lot number when QC tests are required by each Lot)

Tube Configuration

Blank	In case of using blank, calculate the value after subtracting the blank value from all other reagents.
Total Tube	100% binding Tube
Neg/Pos Control	Negative, Positive Control
Control	A reagents that already knows the results. In case that select Verify Control Range, set the range of control concentration and display the warning message on comment if the test result is out of range.
Sample	A sample specified from patients. Display the warning message on comment if the test result is out of the specified normal Range.
Formula	Cut-off Formula. Negative is written as 'N', Positive is written as 'P'. After completion, check validation by pressing Check Validation button.

Report	Set the printing format of test result. Select the already created format using Template.
--------	---

6.4.4 Quantitative Assay

PROTOCOL #1

Main Information

Name	Qunati-Assay	Interface Id		Add
Count Time	60 Sec (5~600)			Delete
Isotope	☒ I-125 ☐ Co-57	Lot Number		
Unit	iu/ml	Decimal places	3	

Tube Configuration

BLANK	Single							
Total	Single							
Standard	Single	- 5						
	STD1	STD2	STD3	STD4	STD5	STD6	STD7	STD8
CONC	30.000	100.000	200.000	300	500			
Control	Single	- 2	☒ Verify Control Range	EDIT				
Sample	Single	☒ Verify Normal Range	10.000	~	200.000			

Standard Graph

X-Scale	LINEAR	Y-Scale	LINEAR	CPM
Numerical Method	Point to Point			

Report Tube Position(10)/Sample Order(10)/Sample Id(20)/Sample Name(15)/CPM(15)/MEAN OF CPM(1... Edit Report Template

Main Information

Name	Protocol name
Count Time	Coefficient time
Isotope	Isotope
Interface ID	Protocol ID from Network Interface

Lot Number	Lot Number of reagents (Only enter the Lot number when QC tests are required by each Lot)
Unit	Unit of concentration (Not included calculation)
Decimal Places	Determine the number of decimal places

Tube Configuration

Blank	In case of using blank, calculate the value after subtracting the blank value from all other reagents.
Total Tube	100% binding Tube
Standard	Set the number and concentration of Standard
Control	A reagents that already knows the results. In case that select Verify Control Range, set the range of control concentration and display the warning message on comment if the test result is out of range.
Sample	A sample specified from patients. Display the warning message on comment if the test result is out of the specified normal Range.

Standard Graph & Report

X-scale	Set the scale of concentration value. Choose between Linear and Log.
Y-scale	Set the scale of CPM or other measured values. Choose among Linear, Log or Logit and select the measured value: 1. CPM 2. B/Bmax : $\text{CPM} / \text{the highest CPM among standards} \times 100 (\%)$ 3. B/T : B/Total Tube
Numerical Method	Choose Algorithm to draw graphs.
Report	Set the printing format of test result. Select the already created format using Template.

6.4.5 Dual Label Assay

The input method is the same as the qualitative test, but it is the test to use the tube all labeled I-125 and Co-57 like as Vitamin B12/Folate. The difference from the quantitative test is that enters the information of Co-57 after inputting the test information of I-125 and clicking the save button.

6.5 Test Result

6.5.1 Quantitative Test

1. Main Screen

Test info
Blank/Total
Standard
Control

INFORMATION

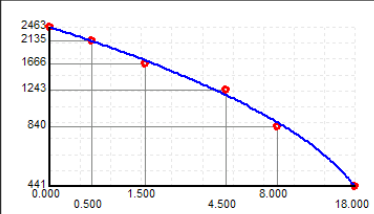
Assay Name 1,Quanti-Assay

Execute Time 2010-01-19 22:29:28 Isotope I-125

Counting Time 60 Sec Unit iu/ml

Tube 20 Sample 10

Graph



ED20
16.480

ED50
4.084

ED80
0.813

[10-01-18]
15.350
3.840
0.780

ALGORITHM 2'nd Order Polynomial

X-AXIS Log

Y-AXIS Log CPM

BLANK/TOTAL

	CPM1	CPM2	CPM3	MEAN	CV(%)	COMMENTS
BLANK(NSB)	0			0	0.00	
TOTAL	200			200	0.00	

STANDARD

	CPM1	CPM2	CPM3	MEAN	CV(%)	CONC	COMMENTS
STD1	2463			2463	0.00	0.000	
STD2	2135			2135	0.00	0.500	
STD3	1666			1666	0.00	1.500	
STD4	1243			1243	0.00	4.500	
STD5	840			840	0.00	8.000	
STD6	441			441	0.00	18.000	
STD7							
STD8							

Virtual Standard

Methods None View

Half-Life CPM

STD1

STD1

Validation Check Result

CONTROL

	CPM1	CPM2	CPM3	MEAN	CV(%)	CONC	COMMENTS
CTRL1	200			200	0.00	20.677	[R][C<N]
CTRL2	200			200	0.00	20.677	[R][C<N]
CTRL3							
CTRL4							

◀ Previous

Sample Info Update

Protocol Edit

Assay Q.C

Next ▶

Virtual Standard

Standard Graph

Network Sample Info Update

Protocol Edit

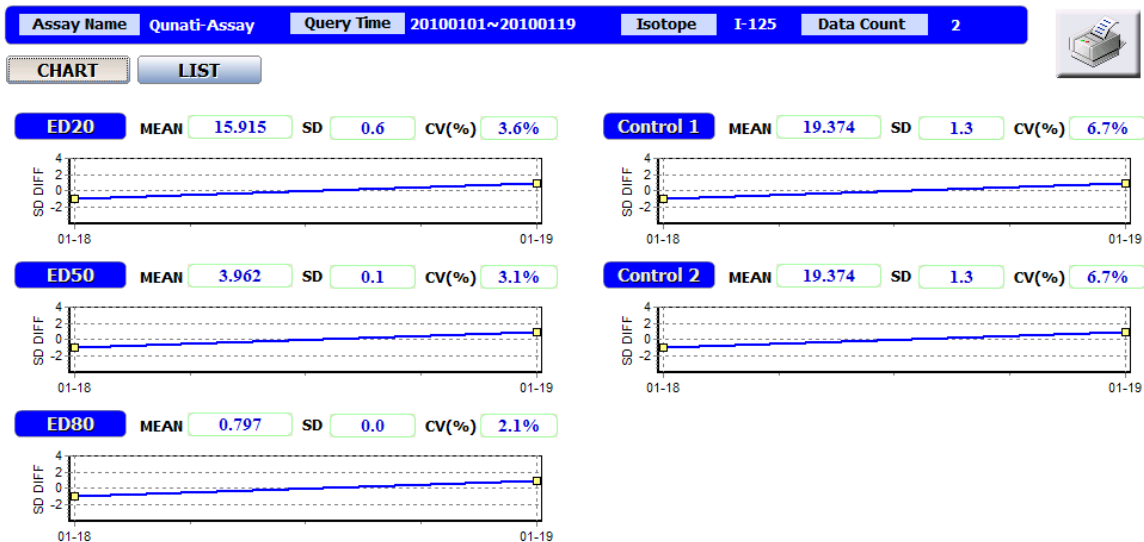
Assay Q.C

35

Test information	Show the basic information of the test such as protocol name, execute time, counting time, unit, the number of Tube and sample. The number of Sample is only the sample tube except for other reagent Tubes (Standard, Control, Total, Blank, etc.) and shows the number based on the number of patients even if it is set to single, double, triple, etc.
Graph	Draw graphs using Standard and automatically apply to and redraw graphs when data is changed. Evaluate the validity of the current test by comparing with ED20, ED50 and ED80 which are calculated from the same protocol tests previously performed.
Blank, Standard, Control Tube	Display the measured CPM and the calculated concentration and automatically calculate the concentration when the CPM is modified.
Virtual Standard	In Virtual Standard Mode, check the Method, Half-Life CPM (CPM calculated only by half-life) and Validation Check Result.
Network Sample Info Update	Use this function when applying the information to Network Interface after tests are completed. To do this, click this button after sending the network information of the corresponding protocol firstly and select the list that can be specified.
Protocol Edit	Modify tube information or other test results after tests are completed. But, the revised protocol information applies only to this test result.
Assay Q.C.	Check the QC information of test results. Also find the QC history information such as ED20, ED50, ED80 and Control on one screen. In Dialog Box after pressing Assay Q.C button, specify the date directly or by month by pressing Month button. Check the QC information by Lot number which is specified when entering the Protocol. If all applications are complete, press the Ok button to check the Q.C information.

2) Q.C List

a. Chart



Check the QC information about ED20, ED50, ED80 and each Controls on the chart at a glance and find the details information about Mean values, SD(Standard Deviation) and CV(Coefficient of Variation).

b. List

No	Time	ED20		ED50		ED80		CTRL1		CTRL2		CTRL3		CTRL4	
		Conc	SD Diff	Conc	SD Diff	Conc	SD Diff	Conc	SD Diff	Conc	SD Diff	Conc	SD	Conc	SD Diff
1	2010-01-18 17:57:26	15.350	-1.00	3.840	-1.00	0.780	-1.00	18.070	-1.00	18.070	-1.00				
2	2010-01-19 22:29:28	16.480	1.00	4.084	1.00	0.813	1.00	20.677	1.00	20.677	1.00				

Display the detailed QC results by test date.

3) Result

Print

Network

Result



	SAMPLE ID	NAME	CPM1	CPM2	CPM3	MEAN	CV(%)	B/Bmax(%)	CONC	COMMENT
1	0922480808	유두암	1708			1708	0.00	5.64	10.67	
2	0911561617	신부검	5436			5436	0.00	17.96	36.79	
3	0911562314	김교준	1614			1614	0.00	5.33	10.22	
4	0911561125	오승원	11586			11586	0.00	38.27	88.75	
5	0911563035	조나연	941			941	0.00	3.11	4.61	
6	0911562409	이승현	1752			1752	0.00	5.79	10.89	
7	0911561670	이경희	2264			2264	0.00	7.48	13.75	
8	0911561947	고안하	1523			1523	0.00	5.03	9.49	
9	0911561667	이정연	521			521	0.00	1.72	1.65	
10	0911562785	윤성호	3135			3135	0.00	10.36	20.29	
11	0922472580	홍사공	977			977	0.00	3.23	4.83	
12	0911561610	김보원	987			987	0.00	3.26	4.90	
13	0922472581	홍사공	4145			4145	0.00	13.69	30.51	
14	0911562696	권순희	12447			12447	0.00	41.12	100.13	
15	0911561648	이수진	563			563	0.00	1.86	2.13	
16	0911562179	이동환	2289			2289	0.00	7.56	13.91	
17	0911561480	권순희	2633			2633	0.00	8.70	16.23	
18	0911561757	김태근	509			509	0.00	1.68	1.53	
19	0911562921	원가영	2923			2923	0.00	9.66	18.47	
20	0911561124	오승원	15818			15818	0.00	52.25	123.30	
21	0911560972	김이준	5150			5150	0.00	17.01	35.30	
22	0922467904	유원석	2218			2218	0.00	7.35	13.47	

Previous

Save

Print	Print test results (Caution: Print out after saving)	
Network	Send test results through Network (Caution: Print out after saving)	
Save Button	Save modified results	
Result	Sample Id	Sample ID
	Name	Name of samples
	CPM	Measured CPM (Triple info is also registered in 1 line)
	Mean	Average value of CPM
	CV	CV between CPMs in Dupli or more
	B/Bmax	CPM / the highest CPM among standards x 100 (%)
	CONC	Calculated concentration
	COMMENT	Precautions on results 1. [<N] : CPM is below the lowest CPM among standards

		2. [$>M$] : CPM is above the highest CPM among standards 3. [N] : CPM is out of Normal Range 4. [$CC \leq 0$] : Concentration is below zero
--	--	---

6.5.2 Qualitative Test

1) Main Screen

Test info.

INFORMATION

Assay Name

Assay Time Time(Sec)

Isotope Tube Sample

Cutoff

FORMUAL

CUT OFF

P/N RATIO

Blank/Total

BLANK/TOTAL

	CPM1	CPM2	CPM3	MEAN	CV(%)	INDEX	COMMENT
BLANK(NSB)	200			200	0.00	0.00	
TOTAL							

NEG/POS

	CPM1	CPM2	CPM3	MEAN	CV(%)	INDEX	COMMENT
NEG	400			400	0.00	0.33	
POS	700			700	0.00	0.83	

CONTROL

	CPM1	CPM2	CPM3	MEAN	CV(%)	INDEX	COMMENT
CTRL1	100			100	0.00	-0.17	[C=0]
CTRL2							

Cutoff info.

Network Sample Info Update

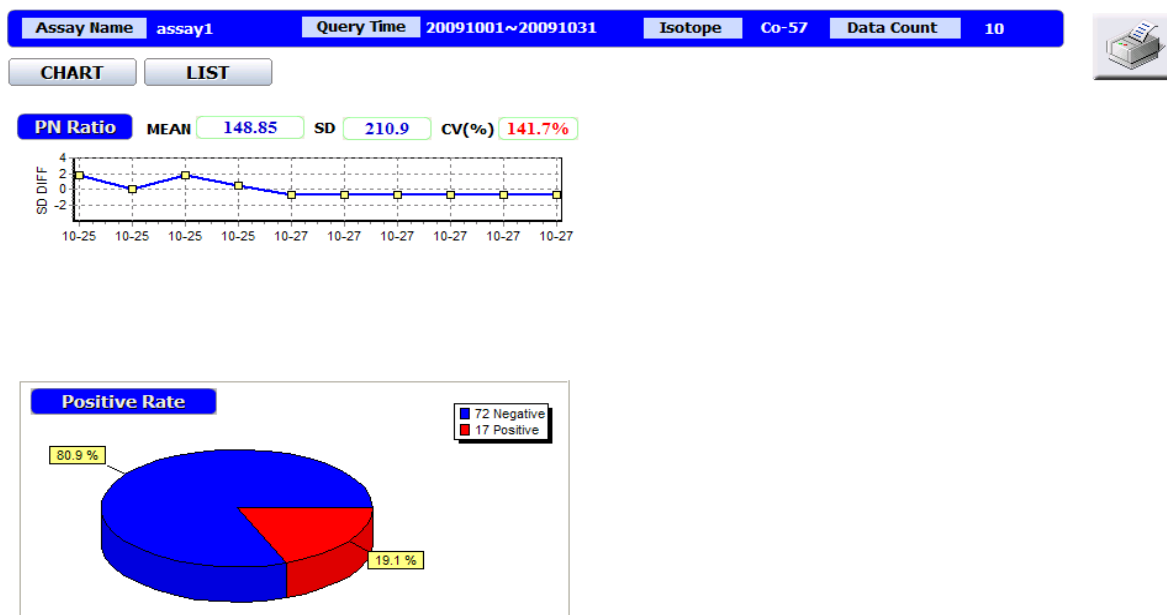
Protocol Edit

Assay Q.C

Test information	Show the basic information of the test such as protocol name, execute time, counting time, unit, the number of Tube and sample. The number of Sample is only the sample tube except for other reagent Tubes (Standard, Control, Total, Blank, etc.)
------------------	---

	and shows the number based on the number of patients even if it is set to single, double, triple, etc.
Cutoff	Display formulas, calculated Cutoff and P/N Ratio, which is one of QC information
Blank, Standard, Control Tube	Display the measured CPM and the calculated concentration and automatically calculate the concentration when the CPM is modified.
Network Sample Info Update	Use this function when applying the information to Network Interface after tests are completed. To do this, click this button after sending the network information of the corresponding protocol firstly and select the list that can be specified.
Protocol Edit	Modify tube information or other test results after tests are completed. But, the revised protocol information applies only to this test result.
Assay Q.C.	Check the QC information of test results. Also find the QC history information such as P/N Ratio and Positive Ratio on one screen. In Dialog Box after pressing Assay Q.C button, specify the date directly or by month by pressing Month button. Check the QC information by Lot number which is specified when entering the Protocol. If all applications are complete, press the Ok button to check the Q.C. information.

2) Q.C List Chart



Check the QC information about PN Ratio and Positive Ratio on the chart at a glance and find the detailed information about Mean values, SD(Standard Deviation) and CV(Coefficient of Variation).

List

Assay Name assay1 Query Time 20091001~20091031 Isotope Co-57 Data Count 10

CHART LIST

No	Time	P,N Ctrl		CTRL1		CTRL2							
		PN Ratio	SD Diff	Index	SD Diff	Index	SD Diff						
1	2009-10-25 18:19:02	538.50	1.85										
2	2009-10-25 18:20:56	168.54	0.09										
3	2009-10-25 18:22:23	538.25	1.85										
4	2009-10-25 18:24:47	241.78	0.44										
5	2009-10-27 14:30:46	0.50	-0.70										
6	2009-10-27 15:03:54	0.00	-0.71										
7	2009-10-27 22:52:09	0.96	-0.70										
8	2009-10-27 23:23:53	0.00	-0.71										
9	2009-10-27 23:26:52	0.00	-0.71										
10	2009-10-27 23:41:15	0.00	-0.71										

Display the detailed QC results by test date.

3) Result

Print

Network

Result



	SAMPLE ID	NAME	CPM1	CPM2	CPM3	MEAN	CV(%)	INDEX	RESULT	COMMENT
1	2009091600224	이한이	100			100	0.00	-0.17	Neg	[C=0]
2	2009091600226	송재서	200			200	0.00	0.00	Neg	[C=0]
3	2009091700029	박영일	200			200	0.00	0.00	Neg	[C=0]
4	2009091700030	노재성	200			200	0.00	0.00	Neg	[C=0]
5	2009091700031	서재석	200			200	0.00	0.00	Neg	[C=0]
6	2009091700032	박수완	200			200	0.00	0.00	Neg	[C=0]
7	2009091700034	정경호	200			200	0.00	0.00	Neg	[C=0]
8	2009091700037	유귀조	4000			4000	0.00	6.33	Pos	
9	2009091700039	위삼현	3000			3000	0.00	4.67	Pos	
10	2009091700040	김재웅	10000			10000	0.00	16.33	Pos	
11	2009091700043	김기덕	400			400	0.00	0.33	Neg	
12	2009091700044	김원상	100			100	0.00	-0.17	Neg	[C=0]
13	2009091700045	최종선	500			500	0.00	0.50	Neg	
14	2009091700046	방홍근	200			200	0.00	0.00	Neg	[C=0]
15	2009091700047	김영근	200			200	0.00	0.00	Neg	[C=0]
16	2009091700049	김광섭	200			200	0.00	0.00	Neg	[C=0]
17	2009091700050	윤성진	200			200	0.00	0.00	Neg	[C=0]
18	2009091700054	이노환	200			200	0.00	0.00	Neg	[C=0]
19	2009091700058	김동녕	200			200	0.00	0.00	Neg	[C=0]

Save Button

Previous

Save

Print	Print test results (Caution: Print out after saving)	
Network	Sent test results through Network (Caution: Print out after saving)	
Save Button	Save modified results	
Result	Sample Id	Sample ID
	Name	Name of Sample
	CPM	Measured CPM (Triple info is also registered in 1lin)
	Mean	Average value of CPM
	CV	CV between CPMs in Dupli or more
	Index	CPM / Cutoff value
	Result	Negative or Positive
	COMMENT	Precautions on results 1. [C=0] : CPM excluding value of Blank is below zero or equal to zero.

6.6 Instrument Q.C

6.6.1 Background

The meaning of background is the radiation levels in the air.

1. Measuring Method

A. Put clean tube into Cassette Rack

- Prepare 2 Cassette Rack and put 10 uncontaminated tubes in 1, 5, 9, 13 and 17 holes.

B. Start Background

- Place the Background Clip on the Cassette Rack in front and put it on the instrument and press the Start Button.

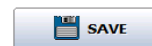
2. Results of measurement

Current Background

Information

CURRENT BACKGROUND

	1	2	3	4	5	6	7	8	9	10
I-125	152	123	117	151	123	154	99	112	117	140
Co-57	80	72	93	59	72	70	78	100	93	104
I-129	72	84	79	110	84	111	65	82	79	115



BACKGROUND HISTORY

	Test Time
1	2009-12-07
2	2009-12-07
3	2009-12-04
4	2009-12-04
5	2009-12-02
6	2009-12-02
7	2009-12-02
8	2009-12-02
9	2009-12-02
10	2009-12-01

Information

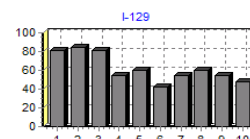
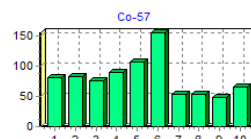
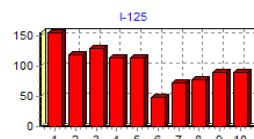
Test Time : 2009-12-07 23:48:05 Count Time : 60 (Sec)

	1	2	3	4	5	6	7	8	9	10
I-125	155	119	129	114	114	48	72	78	90	90
Co-57	81	83	76	90	108	156	54	54	48	66
I-129	81	84	81	54	60	42	54	60	54	48

Background Count



History List



Print

Background Count History	Background Count History Information
Current Background Information	The last counted background information is the currently applied value. It is possible to modify and to save the applied value when

	clicking the save button after modification.
Print	Print the selected Background Count information

6.6.2 Verify A, B, C

1) Measurement methods

Verity A measures I-125, Verity B measures Co-57, Verity C measures I-129. It ensures the performance of Detector such as Resolution, Spill Up/Down, Cross Talk, and Efficiency and corrects the difference between Detectors through Verify. In case of Efficiency, it is a principle to calculate CPM/DPM using a standard source knowing the radioactivity. However, only the I-125 in this case is calculated through the Edridge Equation.

And the purpose of measuring the radioactivity of I-129 through Verify C is that there was little change in radioactivity of I-129 over time because it is an isotope with very long half-life. Therefore, it is used to measure the change of the efficiency of the Detector over time.

2) Results of measurement

Print

I-125

	Execute Time
1	2009-12-17
2	2009-12-16
3	2009-12-16

Verify Count History List

DELETE



Information

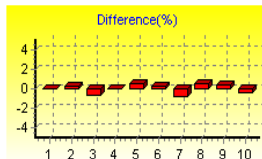
Infomtion

Protocol Verify[I-125] Execute Time 2009-12-17 10:23:38 Count Time 60(Sec)

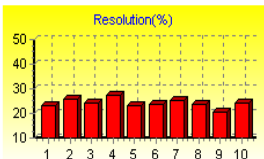
Mean of CPM 101480. SD of CPM 436.4 CV of CPM 0.4%

	CPM	Difference	Resolution	Spill Up	Crosstalk	Efficiency
Detector1	101473	0.0%	23.2%	0.2%	0.0%	81.3%
Detector2	101684	0.2%	25.8%	0.3%	0.0%	82.1%
Detector3	100873	-0.6%	24.3%	0.3%	0.0%	82.6%
Detector4	101478	0.0%	27.4%	0.6%	0.0%	82.6%
Detector5	101974	0.5%	23.2%	0.2%	0.0%	82.0%
Detector6	101728	0.2%	23.4%	0.1%	0.0%	81.6%
Detector7	100687	-0.8%	25.4%	0.2%	0.0%	82.3%
Detector8	101966	0.5%	23.6%	0.1%	0.0%	82.2%
Detector9	101875	0.4%	20.7%	0.2%	0.0%	81.1%
Detector10	101070	-0.4%	24.0%	0.3%	0.0%	82.5%

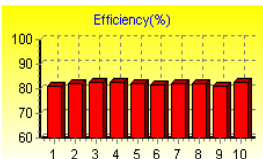
Difference(%)



Resolution(%)



Efficiency(%)



Verify Data

Verify Count History List	Verify Count History Information	
Information	Protocol	Protocol Name
	Execute Time	Verify implementation time
	Count Time	Coefficient time
	Mean of CPM	Average value of CPM measured by each Detector
	SD of CPM	SD of CPM measured by each Detector
	CV of CPM	CV of CPM measured by each Detector
Verify Data	CPM	Count value measured by Detector
	DIFF (Difference)	Difference between the average value of CPM and the count value measured by each Detector
	Resolution	Refer to 6.1 Definitions
	Spill Up/Down	
	Crosstalk	
	Efficiency	
Print	Print the selected Verify information	

6.7 Configuration

6.7.1 Configuration Session 1

CONFIG1
CONFIG2

NETWORK INTERFACE

HOST CONNECTION

☒ None

☐ RS232C COM1,9600,8,1,None ..

☐ NETWORK FILE

WORKLIST Z:\result.txt ..

RESULT D:\프로젝트 정리\GAMMA-10\SW\WDREAM\ ..

IF SAMPLE ID MISMATCHED

☒ Not Check

☐ Send Only Matched Data

☐ Send Only Matched Data + Alarm

Result Data

☐ SAMPLE

☐ CONTROL+SAMPLE

☒ ALL

REPORT

☐ New Page for Samle Data

☒ Print Preview

Page Size

☒ A4 ☐ LETTER

Report Template

	Form Name	Fields
1	Quantitative	Tube Position(10)/Sample Order(10)/
2	Qualitative	Tube Position(10)/Sample Order(10)/
3		
4		
5		
6		

AUTO PROCESS

☒ PRINT ☒ NETWORK INTERFACE

Date Format

☒ YYYY-MM-DD hh:mm:ss ☐ hh:mm:ss DD-MM-YYYY

☐ hh:mm:ss MM-DD-YYYY

Count Condition

1. Tube Check Last Tube Check

2. Count Data Receive Time : Each Per 30 Sec

3. Use Spill Up/Down Correction YES

4. Use Crosstalk Correction YES

Network Interface	Host Connection	None	Not used
		RS232C	Use RS232C Serial communication
		Network File	File transmission
	If Sample ID Mismatched	Not Check	No special processing
		Send Only Matched Data	Only the results as many as the number of information received in Worklist are sent to the server.
		Send Only Matched Data + Alarm	Only the results as many as the number of information received in Worklist are sent to the server. And Manager displays the path to Error List.
Auto Process	Print	Print completed test automatically	
	Network Interface	Send the completed test results to server. This function is only available when Network Interface is set to Network File.	
Report	New Page for Sample Data	The information about Standard and Control is displayed in first page and set whether to print patient sample information continuously or from next page.	
	Print Preview	Set a preview before printing	
	Paper	A4 or Letter Letter should be selected for serial paper printing.	
	Report Template	Up to 10 templates can be specified.	
Count Condition	Tube Check		Yes
	Data Receive Interval		It takes about 1 sec to collect and process the measured data. Therefore, if interval is set to 5 sec, it actually requires about 72 sec when counting 60 sec.
	Use Spill up/down Correction		Choose whether or not to use Spill Up/Down Correction
	Use Crosstalk Correction		Choose whether or not to use

Crosstalk Correction

6.7.2 Configuration Session 2

CONFIG1

CONFIG2

Data

☒ Check Max CV(%) for Duplication

10.0

☐ Use greater than sign, Less than sign

Sound

☐ When detect Error, Play Sound.

Detector

Channel / Energy 7 Channels

Count Mode

☒ For 10 Detector☐ For 5 Detector☐ For 1 Detector

	Enable	Gain	Zero Point	Multi F.	SpillUp(%)	SpillDn(%)	CrossT.(%)
Detector1	☒ Enabled	100	100	1.000	0.0	0.0	0.0
Detector2	☒ Enabled	100	100	1.000	0.0	0.0	0.0
Detector3	☒ Enabled	100	100	1.000	0.0	0.0	0.0
Detector4	☒ Enabled	100	100	1.100	0.0	0.0	0.0
Detector5	☒ Enabled	100	100	1.120	0.0	0.0	0.0
Detector6	☒ Enabled	100	100	1.000	0.0	0.0	0.0
Detector7	☒ Enabled	100	100	1.000	0.0	0.0	0.0
Detector8	☒ Enabled	100	100	1.000	0.0	0.0	0.0
Detector9	☒ Enabled	100	100	1.000	0.0	0.0	0.0
Detector10	☒ Enabled	100	100	1.000	0.0	0.0	0.0

User Define Isotope

No	Name	LLD(KeV)	ULD(KeV)
1	Cs-137	15	500
2	Ba-133	15	400

EDIT

ADD

Delete

Data	Check Max CV for Duplication	Not use of Network Interface
	Use greater than sign, less than sign	In the calculation of quantitative test, the value either over maximum CPM or under the minimum CPM should be decided whether to perform calculation by Extrapolation or to display the result with inequality sign.
Sound	When Error Detected, Play Sound	Choose whether or not to play the alarm when an error occurs during installation of the speaker.
Detector	Channel / Energy	Specify a designated channel by each 1 Kev. Maximum countable Energy can be determined depending on the value specified here because Gamma-10 has total 4000 channel.
	Count Mode	For 10 Detector 10 Detector is installed in equipment For 5 Detector 5 Detector is installed in equipment For 1 Detector 1 Detector is installed in equipment
Detector Parameter	Enable	Choose whether or not to use the Detector
	Gain	amplification factor to use for Detector
	Zero Point	Zero-point to use for Detector
	Multifactor	Multiplication Factor For example, When setting '1', the result is used as it is and when setting '1.1', the result is increased by 10%.
	Spill Up	Spill Up calibrating coefficient Only applied when measuring Dual Label Assay
	Spill Down	Spill Down calibrating coefficient Only applied when measuring Dual Label Assay
	Crosstalk	Crosstalk calibrating coefficient
User	User can add isotope when they want to measure other isotope.	

Define Isotope	Specify and save the name of Isotope, LLD and ULD. But, LLD can be specified from more than 15 KeV because 0-14 KeV is the range of Noise.
----------------	---

6.8 Network Interface

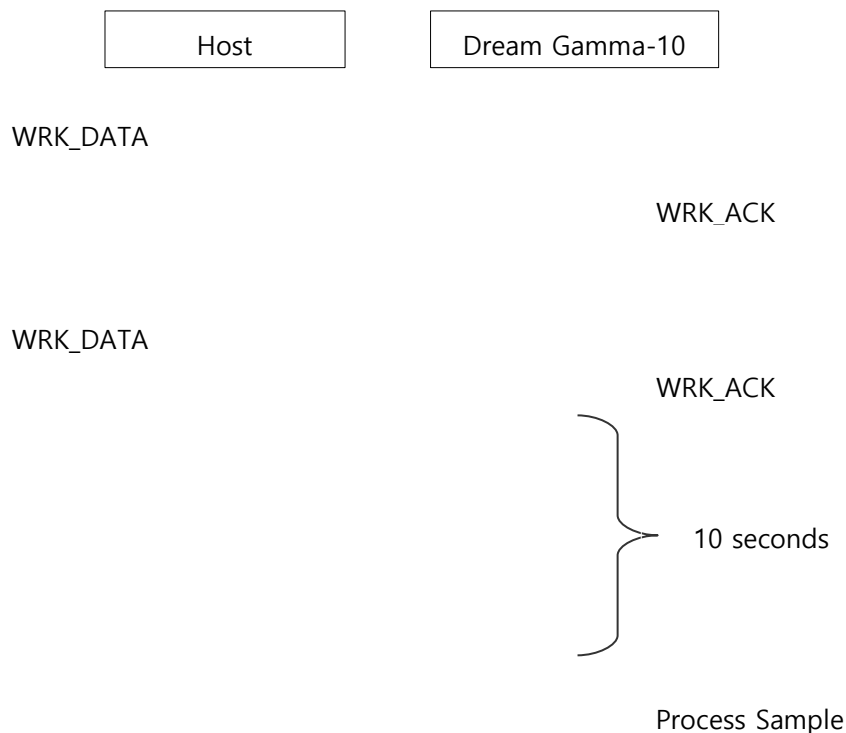
6.8.1 Worklist

1) Flow

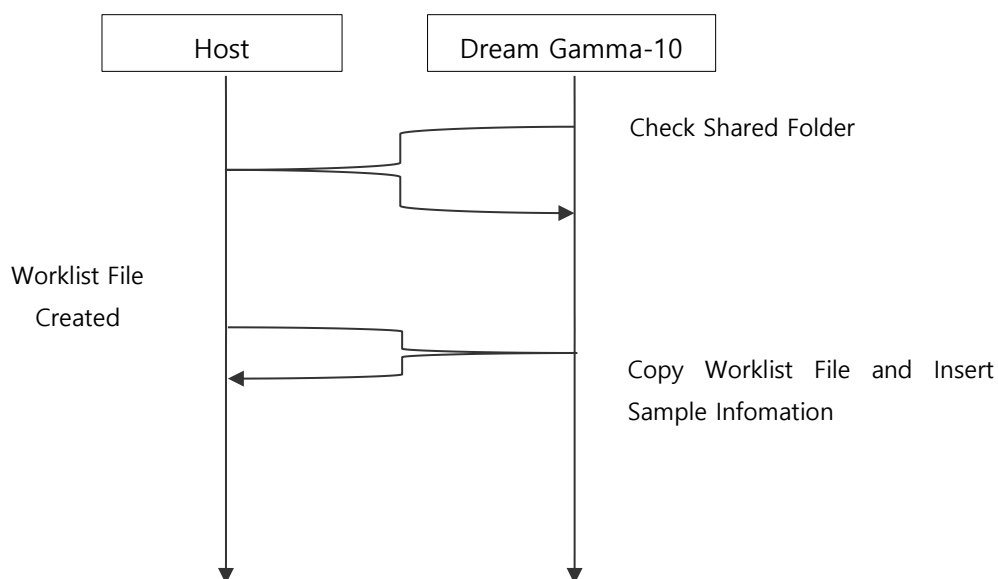
In case that data transmission is established on RS-232C, WRK_ACK is sent after WRK_DATA is received. When WRK_DATA is not received for more than 10 seconds, Host assumes that all data has been sent and arranges the data.

In case that data transmission is established on Network File, WRK_ACK is not sent and the received File will be deleted after processing. The received Worklist is saved to %NetFileHistory%\Worklist for backup.

RS232C



NETWORK FILE



2) Data Field

A. WRK_DATA

One sample can be transmitted with several test IDs.

FIELD	TYPE	LENGTH	Description
STX	CHAR	1	0x02
SAMPLE_ID	CHAR	30	Registration number of SAMPLE Up to 40 char in ENG
SAMPLE_NAME	CHAR	30	Name Up to 40 char in ENG
INTERFACE_ID1	CHAR	15	Test ID1 It should correspond to NETWORK INTERFACE ID on ASSAY PROTOCOL of GAMMA 10.
INTERFACE_ID2	CHAR	15	Test ID2
...	...		Up to 50 Test IDs are available.
CHECKSUM	CHAR	2	This is a hexadecimal notation of a remaining value that sum of ASCII VALUE of SAMPLE ID, SAMPLE_NAME and

			INTERFACE_ID are divided by 256. (Example) SAMPLE_ID : 12345 (0x31,0x32,0x33,0x34,0x35) SAMPLE_NAME : LEE (0x4C,0x45,0x45) , INTERFACE_ID: HBS (0x48,0x42,0x53) $0x31+0x32+0x33+0x34+0x35+0x4C+0x45+0x45+0x48+0x42+0x53$ $=0X02B2$ CHECK SUM = $0x02B2 \text{ \# } 0x0100 = 0XB2(\text{remainder})$ $= 'B2'$
LF(Line Feed)	CHAR	1	0x0A

Fill in the blanks with NULL(0x00).

Usage

[STX] SAMPLE_ID SAMPLE_NAME TEST1 TEST 2 TEST3 [LF]

30Bytes
30Bytes
15Bytes
15Bytes
15Bytes

(Example)

[STX]201111234 SEONG YUN LEE AFP_001 AFP_002 UE3_022 [0x0C][LF]

NULL
NULL
NULL
NULL
NULL

B. WRK_ACK

STX	CHAR	1	0x02
RESULT	CHAR	3	'SUC' : SUCCEED 'E01' INVALID CHECKSUM 'E02' STX POSITION INVALID CHECK PACKET SIZE OR STX 'E03' : UNKNOWN ERROR.
ETX	CHAR	1	0x03

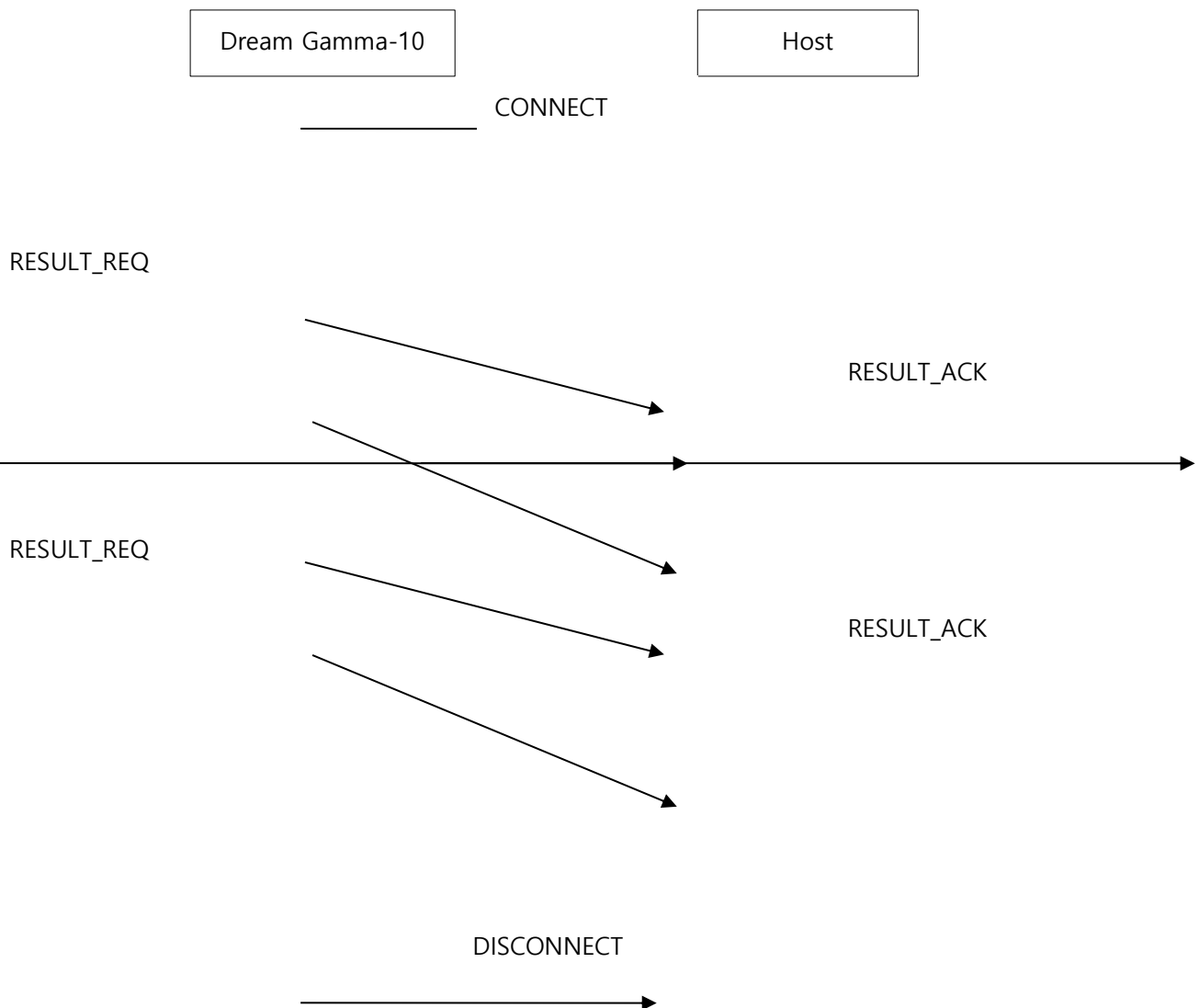
6.8.2 Result Data

1) Flow

In case that data transmission is established on RS-232C, RESULT_ACK is received after RESUKT_REQ is sent.

When the print option is selected during Autoprocess in Config, the result does not be sent automatically by RS-232 method.

RS-232



2) Field Formation

A. RESULT_REQ

FIELD	TYPE	Description								
STX	BYTE	0x02								
SAMPLE_ID	CHAR(30)	Registration number of SAMPLE								
SAMPLE NAME	CHAR(30)	Name of SAMPLE								
SEQUENCE	CHAR(5)	Sequence of each SAMPLE								
PROTOCOL_SEQ	CHAR(5)	Number of Assay Protocol (1~70)								
INTERFACE_ID	CHAR(15)	Interface ID of Assay Protocol								
TEST_TIME	CHAR(19)	Test Time 2005-10-10 02:10:10 YYYY-MM-DD HH-MM-SS								
INDEX	CHAR(10)	Qualitative Test: INDEX =CPM/CUT-OFF								
RLT	CHAR(10)	Test Result 1) Quantitative Test: Generally it is numeric value but character like '<20' or '>500' can be transmitted if 'Great than' and 'Less than' are used in Config. <table><tr><td>General concentration</td><td>10.89</td></tr><tr><td>Exception</td><td><10 >13000</td></tr></table> 2) Qualitative Test: <table><tr><td>Negative</td><td>Neg</td></tr><tr><td>Positive</td><td>Pos</td></tr></table>	General concentration	10.89	Exception	<10 >13000	Negative	Neg	Positive	Pos
General concentration	10.89									
Exception	<10 >13000									
Negative	Neg									
Positive	Pos									
CPM	CHAR(10)	CPM valule								
RLT_TYPE	CHAR(3)	'NSB'; BLANK 'NEG': NEGATIVE 'POS': POSITIVE 'ST1' : STANDARD1 'ST2' : STANDARD2 'ST3' : STANDARD3 'ST4' : STANDARD4 'ST5' : STANDARD5								

		'ST6' : STANDARD6 'ST7' : STANDARD7 'ST8' : STANDARD8 'CT1' : CONTROL1 'CT2' : CONTROL2 'CT3' : CONTROL3 'TOT' : TOTAL 'SMP' : SAMPLE
RSVD	CHAR(6)	Dummy Field
CHECKSUM	CHAR(2)	This is a hexadecimal notation of a remaining value that sum of ASCII VALUE of the field data from SAMPLE ID to RSVD is divided by 256. (Example) SAMPLE_ID : 12345 (0x31,0x32,0x33,0x34,0x35) SAMPLE_NAME : LEE (0x4C,0x45,0x45) , SEQUENCE: 1 (0x31) PROTOCOL_SEQ : 3 (0x33) INTERFACE_ID: HBS (0x48,0x42,0x53) TEST_TIME : 2010-01-01 10:10:10 (0x32,0x30,0x31,0x30,0x5F,,0x INDEX : 1.23 (0x32,0x2D,0x32,0x33) RLT : Neg (0x4E,0x65,0x67) CPM : 1033 (0x31,0x30,0x33,0dx33) RLT_TYPE : SMP (0x53,0x4D,0x50) RSVD : CHECK SUM =0x0A41 $\div$ 0x0100 = 0x41 (remainder) ='41'
ETX	CHAR	0x03

B. RESULT_ACK

STX	CHAR	1	0x02
RESULT	CHAR	3	'SUC' : SUCCEED 'ERR' ERROR If 'ERR' is received to the result, G10 Manager will stop transmission.
ETX	CHAR	1	0x03