

Teori Pengoperasian Iradiator Gamma Merah Putih

Pelatihan Petugas Iradiator
12-23 Juli 2021

Fery Hadi Setiawan

Pusat Aplikasi Isotop dan Radiasi

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Unit Kerja : Balai IEI - Pusat Aplikasi Isotop dan Radiasi (PAIR)
Jabatan : Pranata Nuklir Ahli Pertama

Pelatihan 5 thn terakhir yg pernah diikuti :

- IAEA Summer School on Advanced Application of Electron Beam Accelerator thn 2017
- Pelatihan Pengoperasian Irradiator Gamma Merah Putih thn 2017
- Regional Training Course on Advanced Knowledge and On-site Training on Electron Beam Applications for Advanced Materials thn 2019
- Diklat Petugas Irradiator thn 2020

Lisensi : SIB petugas Irradiator

Pengalaman Kerja :

- Perawatan dan perbaikan peralatan laboratorium dan fasilitas nuklir di PAIR
- Petugas operasi, perawatan , dosimetri irradiator gamma dan mesin berkas elektron
- Tim teknis pembangunan irradiator gamma merah putih

- Tujuan: mengetahui dan memahami pengoperasian Irradiator Gamma Merah Putih



Referensi:

Preliminary OPERATION AND MAINTENANCE MANUAL For TBI-8250-140 TYPE TOTE BOX GAMMA IRRADIATOR 2017, installed at Jakarta, Volume 2

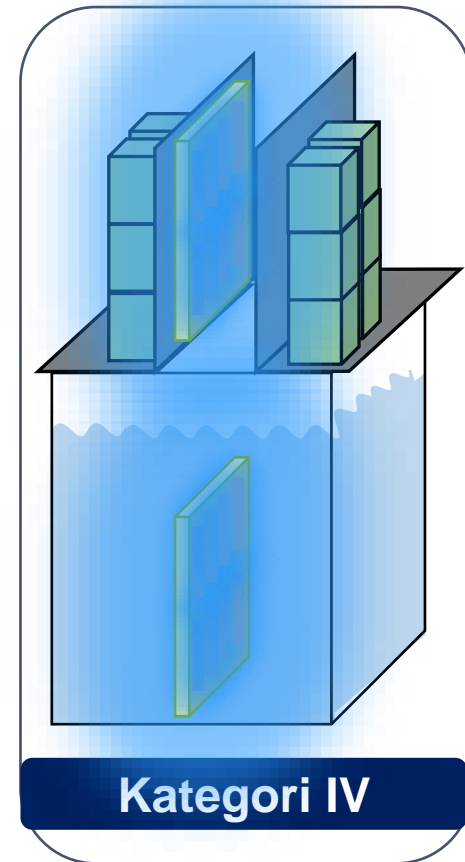
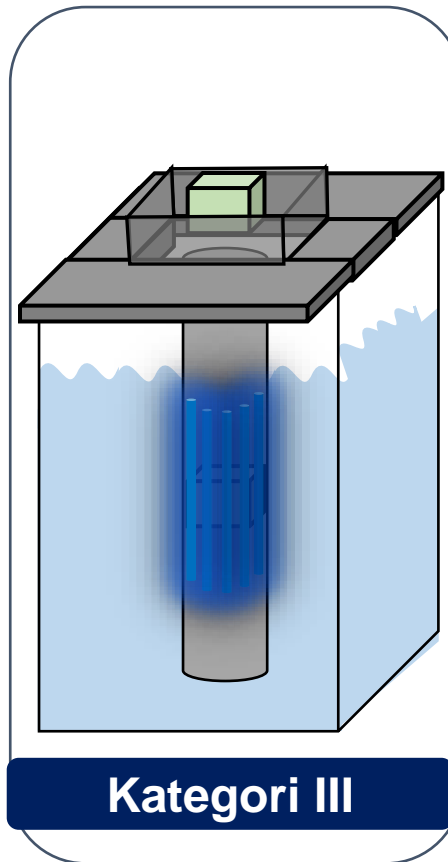
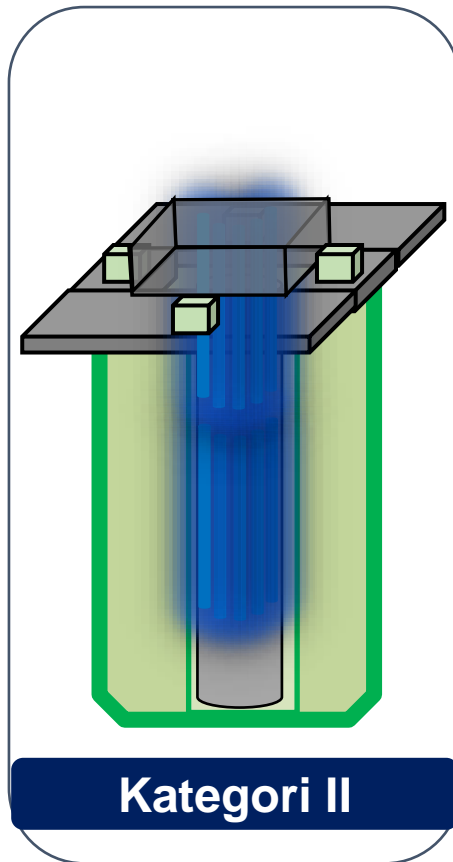
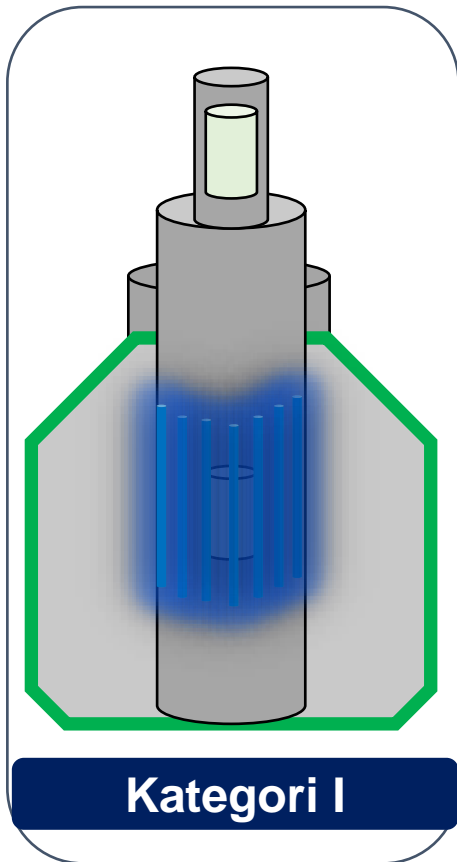
Teori Iradiator Gamma



Kategori	Penyimpanan sumber	Pergerakan Sumber	Sampel
I	Kering	Diam	Bergerak
II	Kering	Bergerak	Diam
III	Basah	Diam	Bergerak
IV	Basah	Bergerak	Diam

IAEA Safety Series No. 107

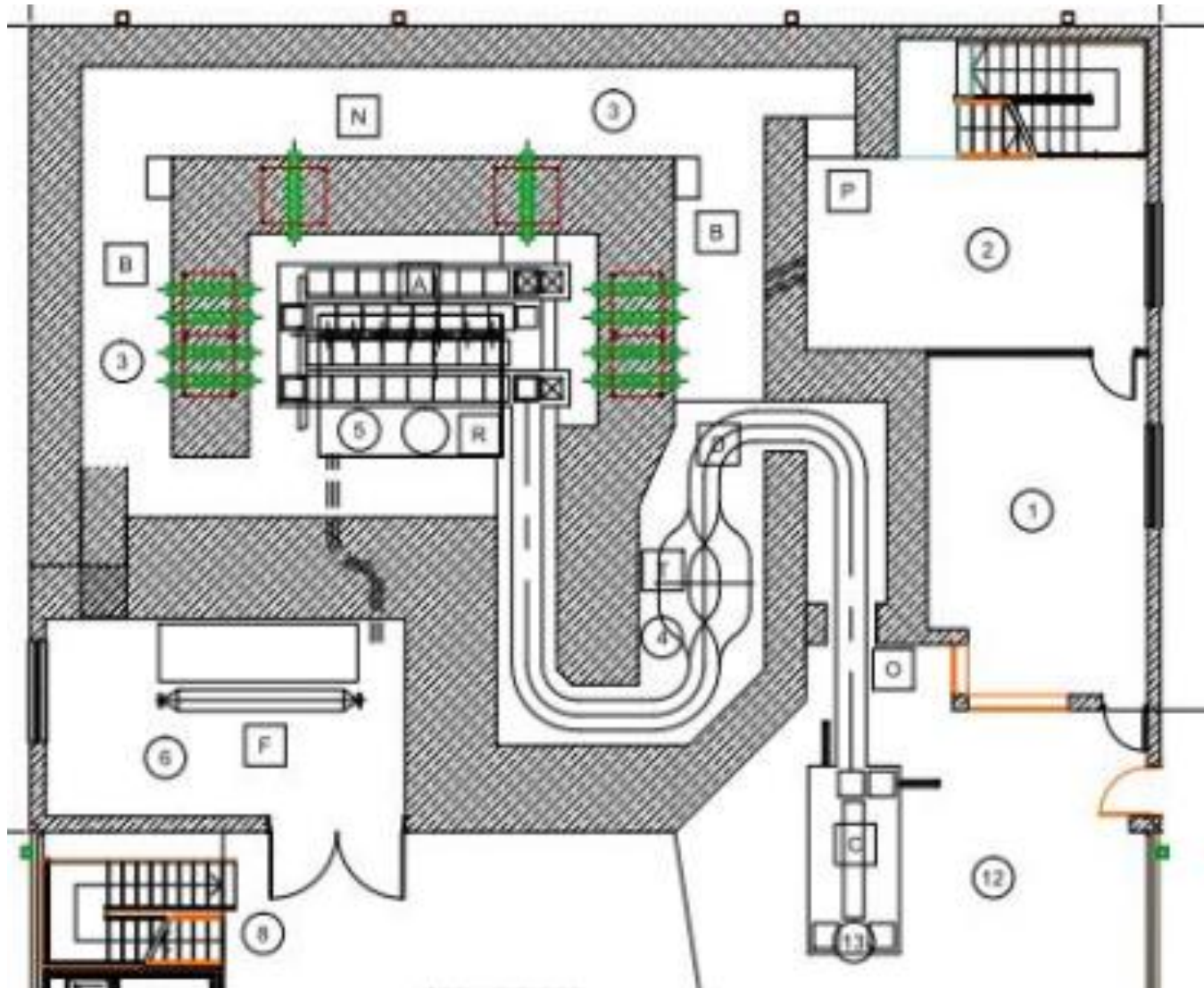
Teori Iradiator Gamma



Kategori	Iradiator	Tahun
I	<ul style="list-style-type: none">• Gamma Cell Upgrade• Gamma Chamber	<ul style="list-style-type: none">• 2016• 1992
II	Iradiator Panorama Serbaguna (IRPASENA)	1975
IV	<ul style="list-style-type: none">• Iradiator Karet Alam (IRKA)• Iradiator Gamma “Merah Putih”	1983 2017

IRADIATOR GAMMA MERAH PUTIH (IGMP)

Prinsip Kerja Radiator



- Continuous irradiation
- Batch irradiation
- Fill up – emptying irradiation
- Tote box changing in the irradiation room

Mode 1. Continuous irradiation



- Cocok untuk produk bervolume besar dengan densitas sama
- Kotak tote dikirim ke dan diambil dari ruang iradiasi menggunakan tote box car secara otomatis
- Kotak tote mengalami proses iradiasi di dalam bunker
- Lama iradiasi tergantung dosis yang diinginkan

- Cocok untuk volume kecil (kurang dari 4x72 tote)
- Prosedur:
 - Bunker diisi dengan 72 tote
 - Tahapan-tahapan otomatis
 - Rak sumber dinaikkan
 - Setiap tote bergeser atau berpindah posisi satu step
 - Tunggu dwell time untuk proses radiasi
 - Ulangi step di atas hingga 72 posisi
 - Rak sumber diturunkan
 - Kotak tote dikeluarkan dan diisi produk baru
- Jika paket kurang dari 72 tote, kekurangan tersebut diisi dengan tote dummy (densitas sama)

Mode 3. Fill up – emptying irradiation



- Digunakan untuk mengisi atau mengosongkan produk masuk/keluar bunker
- Untuk mengawali atau mengakhiri moda operasi continous dengan 72 tote pertama/terakhir
- Perpindahan dari continous ke fill up-emptying dapat dilakukan dengan tombol “Stop”

Mode 4. Tote box changing in the irradiation room



- Digunakan untuk menukar tote tanpa proses iradiasi
- Sebagai tahap persiapan untuk continuous atau batch

- Dummy disesuaikan dengan densitas target
 - Dibutuhkan bermacam-macam dummy
- Digunakan pada beberapa moda operasi:
 - Continous: 72 tote pertama dan 72 terakhir (fill up – emptying)
 - Batch: jika tote yang diiradiasi kurang dari 72 tote
- Gambar dummy



○ Kasus “Emergency”

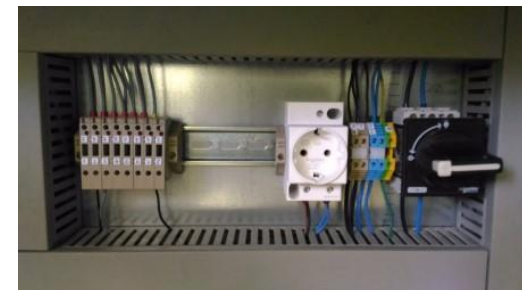
- Kasus sangat urgen terkait keselamatan radiasi
- Rak sumber langsung diturunkan ke dasar kolam secara otomatis
- Terjadi jika ada pengaktifan:
 - Tombol Darurat
 - Seling darurat
 - Motion detector, dan lain-lain

○ Kasus “Stop”

- Kasus tidak normal yang mengganggu proses pengoperasian iradiasi
- Rak sumber diturunkan setelah menyelesaikan satu siklus
- Terjadi jika ada pengaktifan:
 - Tombol Stop
 - Ketidaksiapan posisi area muat bongkar tote, dll

Saklar Utama Pengoperasian Irradiator

- Switching di-on-kan jika dalam keadaan mati
- Switch ini sebaiknya tidak dimatikan (karena dapat mencatat kejadian-kejadian abnormal)



Levels of responsibility



- Level 1: Chief operator (tingkatan paling tinggi)
- Level 2: Supervisor
 - Mengatur troubleshooting and fixing the failures.
 - Diperbolehkan menangani, mengecek dan menguji systems, subsystems dan komponen fasilitas iradiator
- Level 3: Operator
 - Dapat memulai, melaksanakan dan mengakhiri proses iradiasi dengan prosedur normal
 - Dapat log in ke sistem kontrol hanya jika fasilitas bekerja tanpa kasus abnormal (properly working : no failure or emergency)
- Hanya satu orang yang dapat bekerja dengan sistem kontrol setiap saat.

- 1. Master key
 - memungkinkan operasi apa pun di terminal
- 2. Password
 - menentukan tingkat otorisasi orang tersebut (operator, supervisor, kepala operator)
- 3. Access key
 - memungkinkan pengoperasian iradiator
- 4. Acknowledge key
 - Untuk me-reset errors

Warning signs and signals

- Untuk menginformasikan personel tentang status keselamatan dan kondisi pengoperasian fasilitas.
- Lokasi
 - Di dalam ruang iradiasi
 - Di ruang kontrol
 - Area muat bongkar tote



Beberapa Informasi di Area Muat Bongkar Tote (loading unloading area)



No
operation
time 00:00

Start
process

Source
moving
up

Cycle
completion

Source
moving
down

Pengoperasian dengan akses sebagai Operator

Layar tampilan desktop: basic state



Irradiation time
hour : min 000 : 00

Rest of dwell time
h : m : s 00 : 00 : 00

Tote box number
□□□□□□

Storage Transport System
⊘ ⊘ ⊘

Actual irradiation time
STS system last box □□□□

Rack selection
Rack 1 Rack 2 Rack 3

Operation mode
Continuous irradiation

NO RADIATION HAZARD
RADIATION HAZARD

DRM#1	DRM#2	DRM#3	DRM#4	DRM#5
STAND	STAND	STAND	STAND	STAND
ALARM	ALARM	ALARM	ALARM	ALARM

Rest time to enter
Ventilation is working 000 sec

System test	Source lifting in progress	STS WAITING	SYSTEMS WORKING	IRRAD. WAITING	Source descent in progress	Waiting before enter
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Go to starting screen **Operator exit**

Op. name: XXXXXXXXXXXXXXXXXXXX

Desktop Main units Logbooks List of errors Settings Info 08/05/2017 18:02

Layar tampilan desktop: operasi



Irradiation time
hour : min 2 : 10

Rest of dwell time
h : m : s 0 : 00 : 00

Tote box number
20 / 2

Actual irradiation time
Tote Box Car [] min Unload station [] min

Rack selection
Rack 1 (grey) Rack 2 (yellow) Rack 3 (grey)

Operation mode
"Fill up - empty" irradiation

Storage transport system
Waiting for corner #4

TBC Unlock Cylinder
S3_P

Rest time to enter
Ventilation is working 0 sec

RAD. HAZARD

DRM#1: STAND ALARM
DRM#2: STAND ALARM
DRM#3: STAND ALARM
DRM#4: STAND ALARM
DRM#5: STAND ALARM
DRM#6 Radiation monitor: 0.000000 mGy/h

System test | Source lifting in progress | WORKING | WAITING | Source descent in progress | Waiting before enter

STOP operation

Operator change
Op. name: []

Desktop | Main units | Logbooks | List of errors | Settings | Info | 25/09/2013 18:52

Starting the process



Tote box number

Start conditions

- Safety system
- Storage transport system
- Goods maze transport system
- Source pass mechanism

Irradiation time

hour : min 3 : 00

Source rack selection

rack #2 only

rack #1 and #3 together

all 3 racks together

START of operation

Start process

- Control point #1
- Personnel door chain
- Personnel door close
- Control point #2

08/01/2006 15:32

Operator's name:

Exit

Select operation mode:

- Tote BOX changing
- Batch irradiation
- "Fill up - emptying" irradiation**
- Continuous irradiation

Contoh window bantuan



Tote box number

Start conditions

- Safety system
- Storage transport system
- Goods maze transport system
- Source pass mechanism

Irradiation time

hour : min :

Source rack selection

- rack #2 only
- rack #1 and #3 together
- all 3 racks together

TEST MODE-Vietnam3-160:Safety s...

- Safety system ERROR**
- Ventilation system ERROR

- Emergency stop wire
- Emergency stop button No. 1
- Emergency stop button No. 2
- Emergency stop button No. 3
- Radiation monitor failure
- All racks down
- Compressed air pressure normal
- No earthquake
- Fire alarm
- Roof plug in place
- Source valves BOX closed
- UPS mains failure

START

Operation

08/01/2006 16:32

Operator's name:

de:

-
-
-
-

- Waktu antara dua gerakan yang diselesaikan oleh tote box pada mekanisme lintasan sumber adalah waktu siklus (cycle time atau dwell time).
- Cycle time setara dengan $1/72$ waktu iradiasi.
- Opsi konfigurasi rak sumber radioaktif
 - “_ _ 1” : hanya rak sebelah kanan
 - “_ 2 _” : hanya rak tengah
 - “3 _ 1” : hanya rak kiri dan kanan
 - “3 2 1” : semua rak

Source Pass Mechanism (Proses Iradiasi)

Source pass mechanism

Step number

System outputs

- READY
- WORK
- ERROR
- WAIT for TBC
- TBC is READY
- TBC is FREE

Place

Function

Tote BOX

Dose

Desktop | Main units | Logbooks | List of errors | Settings | Info | 10/03/2016 17:51

Goods Maze Transport System (Lori dan rel)



Goods maze transport system

System outputs

Home	GO plus
READY	GO minus
Working	LEAVE Station
WAIT ITS	ERROR
WAIT STS	☐☐☐

IN Home start

Micro-switch NO NC

← C →

↑ CO ↓

POS end OUT POS home

Motor parameters

Speed 99.99 Hz

Run Home
POC Brake

Limit switch

Position -9999.9 cm
Tension -9999.9 cm

Power 999 % 99 %

TBC Minus side

TB No.: ☐☐☐☐

Irr. T.: ☐☐☐☐

TBC Plus side

TB No.: ☐☐☐☐

Irr. T.: ☐☐☐☐

DesktopMain unitsLogbooksList of errorsSettingsInfo🇬🇧08/05/201717:50

Storage Transport System (Area Muat Bongkar Tote)



Storage transport system Step number

The control panel displays a layout of the storage transport system. It features a central area with a **Loading station** and an **Unloading station**. A **Tote BOX car** is positioned at the bottom center. Four corner position sensors are labeled: **IS_3** (Corner#3), **IS_2** (Corner#2), **IS_4.1** (Corner#4.1), and **IS_1** (Corner#1). Two additional sensors, **IS_4.2** (Corner#4.2) and **IS_2** (Corner#2), are shown with green arrows and numbers (s3, s2, s4, s1) indicating their status. A **Waiting for unload** indicator is present on the right side. The **System outputs** section includes buttons for **READY**, **ERROR**, **WORK**, **Waiting for Tote Box Car**, **Corner#2**, **Corner#4**, **Unloading**, **TBC is ready**, and **TBC is FREE**. The **STS last box** section shows **TB No.:** 0000 and **Irr. T.:** 0000. The bottom navigation bar contains buttons for **Desktop**, **Main units**, **Logbooks**, **List of errors**, **Settings**, **Info**, a flag icon, and a date/time display: **08/05/2017 17:48**.

Water Treatment System/Plant (WTP)



Water treatment

Water temperature in pool	Water temperature in WTS	Conductivity of the water coming from the pool	Conductivity of the water going to the pool
-99.9 °C	-99.9 °C	99.9 μS/cm	99.9 μS/cm
Diagram		Water conductivity diagram	

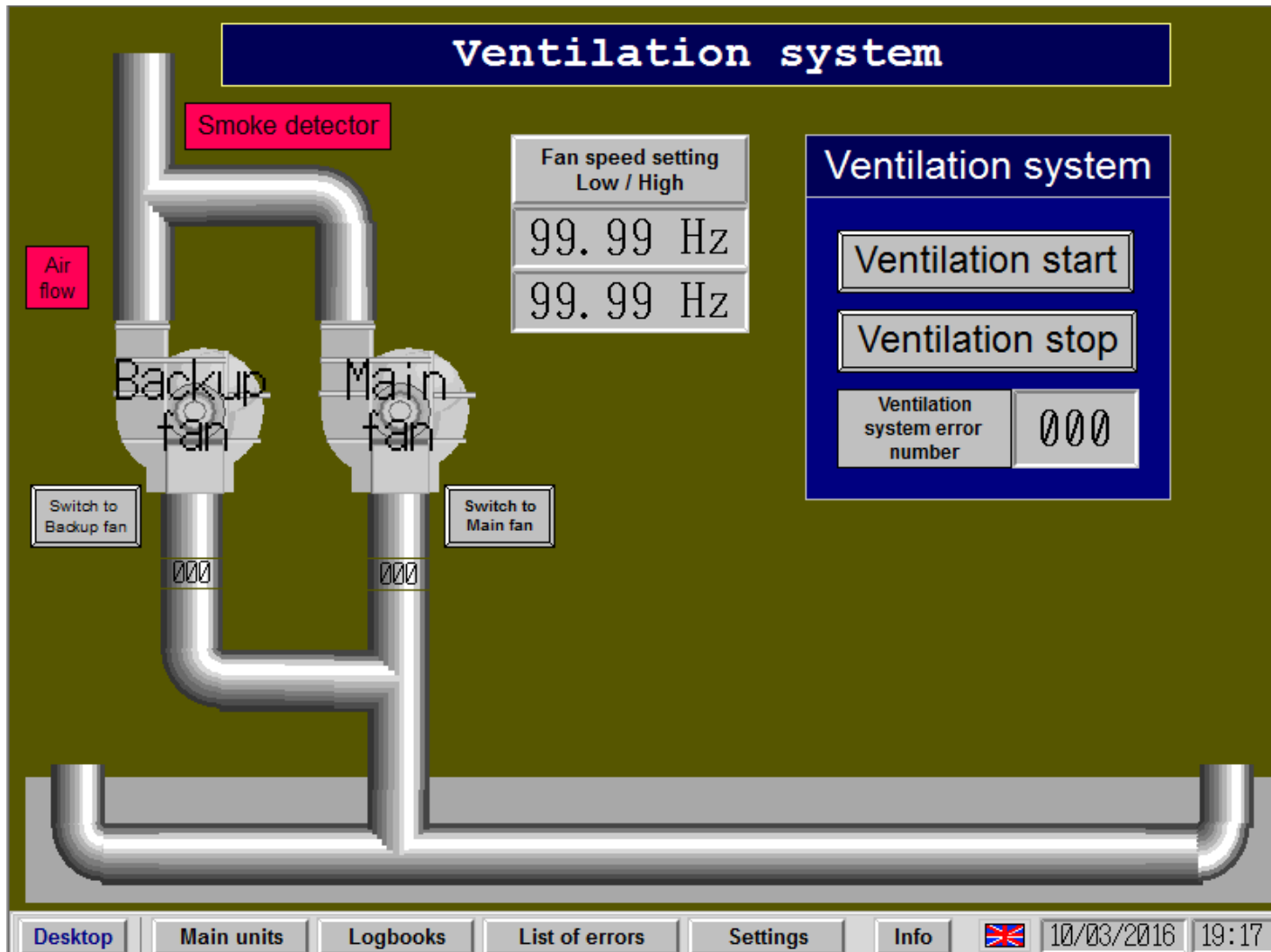
Water treatment ERROR	Water Conductivity limit
000	-9.99 μS/cm
	Water level in the pool
	-99.9 cm

Emergency level meter	High level	Low level
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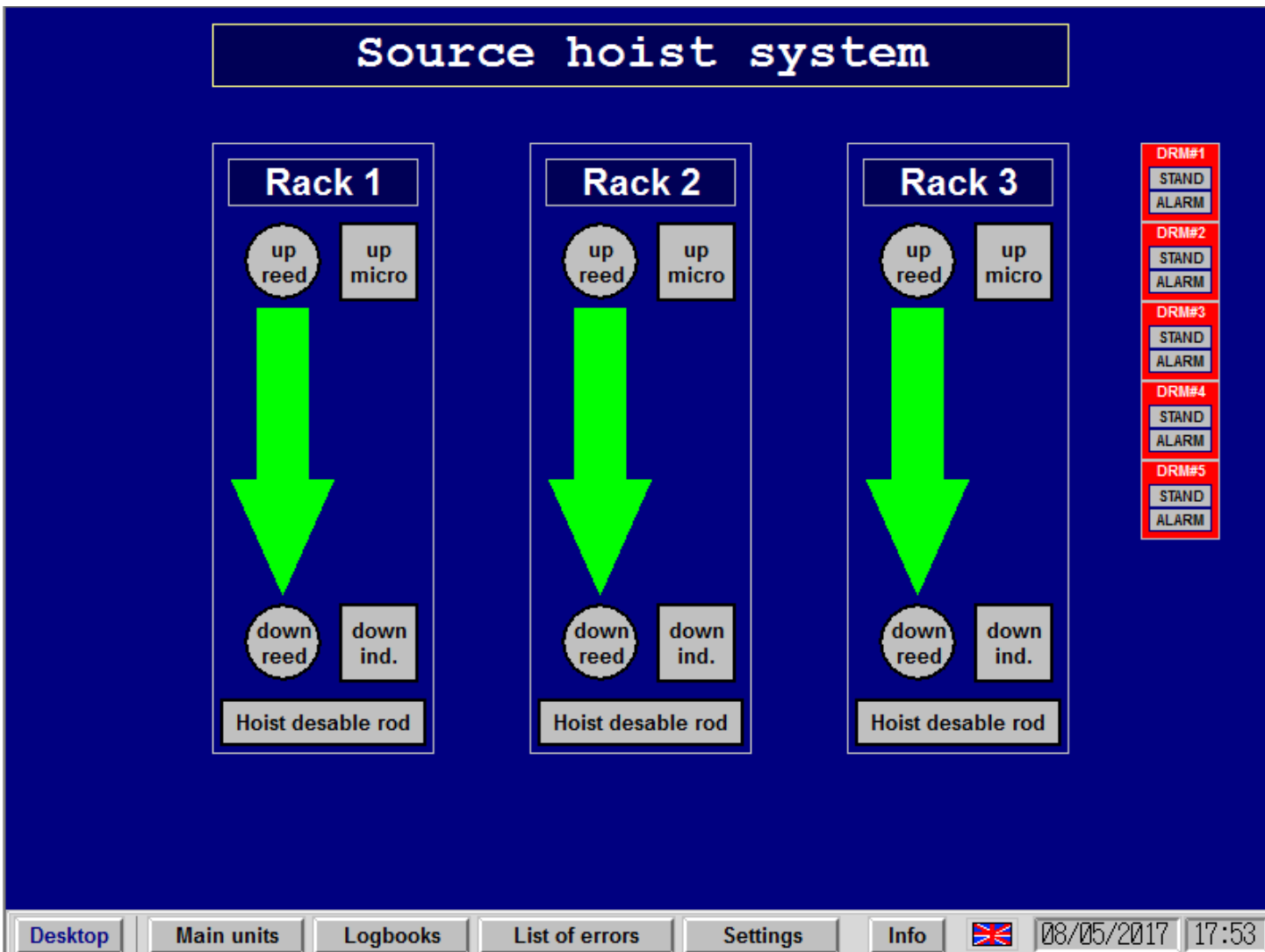
Water treatment error signal	Emergency water supply valve
Error	Valve closed Valve open Open
	Filling time
	00.0 sec

Desktop Main units Logbooks List of errors Settings Info 10/03/2016 19:14

Ventilation system (Blower)



Source Hoist System (Pengangkat Rak Sumber)



Safety system

Emergency stop button No. 1 <input type="radio"/>	Earthquake ALM1, ALM2, RDY <input type="radio"/> <input type="radio"/> <input type="radio"/>						
Emergency stop button No. 2 <input type="radio"/>	Motion detector PD#1, GMD#2 <input type="radio"/> #1 <input type="radio"/> #2						
Emergency stop button No. 3 <input type="radio"/>	Motion detector labirint PL#3, PL#4 <input type="radio"/> #3 <input type="radio"/> #4						
Emergency stop button No. 4 <input type="radio"/>	No fire alarm <input type="radio"/>						
Emergency stop wire <input type="radio"/>	Roof plug in place <input type="radio"/>						
Personnel door closed <input type="radio"/>	Compressed air pressure normal <input type="radio"/> OK <input type="radio"/> NOK						
Personnel door locked <input type="radio"/>	Source safety valve pressure <input type="radio"/> OK <input type="radio"/> NOK						
Safety Gate closed <input type="radio"/>	Goods maze door switch <input type="radio"/> OK <input type="radio"/> NOK						
Control point #1 <input type="radio"/> OK <input type="radio"/> NOK	<table border="1" style="width: 100%; border-collapse: collapse;"><tr><td style="padding: 5px;">Radiation hazard <input type="radio"/> <input type="radio"/></td><td style="padding: 5px;">Emergency <input type="radio"/></td></tr><tr><td style="padding: 5px;">Radiation monitor failure <input type="radio"/> <input type="radio"/></td><td style="padding: 5px;">No radiation <input type="radio"/></td></tr><tr><td style="padding: 5px;">Tote BOX moving <input type="radio"/> <input type="radio"/></td><td style="padding: 5px;">Source rack moving <input type="radio"/></td></tr></table>	Radiation hazard <input type="radio"/> <input type="radio"/>	Emergency <input type="radio"/>	Radiation monitor failure <input type="radio"/> <input type="radio"/>	No radiation <input type="radio"/>	Tote BOX moving <input type="radio"/> <input type="radio"/>	Source rack moving <input type="radio"/>
Radiation hazard <input type="radio"/> <input type="radio"/>	Emergency <input type="radio"/>						
Radiation monitor failure <input type="radio"/> <input type="radio"/>	No radiation <input type="radio"/>						
Tote BOX moving <input type="radio"/> <input type="radio"/>	Source rack moving <input type="radio"/>						
Control point #2 <input type="radio"/>							
Acknowledge key <input type="radio"/>							
Master key <input type="radio"/>							
UPS mains OK <input type="radio"/>							

DesktopMain unitsLogbooksList of errorsSettingsInfo 08/05/2017 17:56

The log files

Operator log

No.	Operator	Mode	Enter	Exit
000	XXXXXXXXXXXXXXXXXXXX	X	00.00.0000 00:00	00.00.00:00
000	XXXXXXXXXXXXXXXXXXXX	X	00.00.0000 00:00	00.00.00:00
000	XXXXXXXXXXXXXXXXXXXX	X	00.00.0000 00:00	00.00.00:00
000	XXXXXXXXXXXXXXXXXXXX	X	00.00.0000 00:00	00.00.00:00
000	XXXXXXXXXXXXXXXXXXXX	X	00.00.0000 00:00	00.00.00:00
000	XXXXXXXXXXXXXXXXXXXX	X	00.00.0000 00:00	00.00.00:00
000	XXXXXXXXXXXXXXXXXXXX	X	00.00.0000 00:00	00.00.00:00
000	XXXXXXXXXXXXXXXXXXXX	X	00.00.0000 00:00	00.00.00:00
000	XXXXXXXXXXXXXXXXXXXX	X	00.00.0000 00:00	00.00.00:00
000	XXXXXXXXXXXXXXXXXXXX	X	00.00.0000 00:00	00.00.00:00

Print from number:

Desktop | Main units | Logbooks | List of errors | Settings | Info | 18/01/2006 | 09:49

Operation log

No.	Starting/finishing	Mode	Source	Tr. time	Stop	Operator
000	00.00.0000 00:00	XXXXX	XXXXX	000:00	XXXXX	XXXXXXXXXXXXXXXXXXXX
000	00.00.0000 00:00	XXXXX	XXXXX	000:00	XXXXX	XXXXXXXXXXXXXXXXXXXX
000	00.00.0000 00:00	XXXXX	XXXXX	000:00	XXXXX	XXXXXXXXXXXXXXXXXXXX
000	00.00.0000 00:00	XXXXX	XXXXX	000:00	XXXXX	XXXXXXXXXXXXXXXXXXXX
000	00.00.0000 00:00	XXXXX	XXXXX	000:00	XXXXX	XXXXXXXXXXXXXXXXXXXX
000	00.00.0000 00:00	XXXXX	XXXXX	000:00	XXXXX	XXXXXXXXXXXXXXXXXXXX
000	00.00.0000 00:00	XXXXX	XXXXX	000:00	XXXXX	XXXXXXXXXXXXXXXXXXXX
000	00.00.0000 00:00	XXXXX	XXXXX	000:00	XXXXX	XXXXXXXXXXXXXXXXXXXX
000	00.00.0000 00:00	XXXXX	XXXXX	000:00	XXXXX	XXXXXXXXXXXXXXXXXXXX
000	00.00.0000 00:00	XXXXX	XXXXX	000:00	XXXXX	XXXXXXXXXXXXXXXXXXXX

Print from number:

Desktop | Main units | Logbooks | List of errors | Settings | Info | 08/01/2006 | 15:04

Error log

No.	Error description	Date, time	Operator
000	XXXXXXXXXXXXXXXXXXXX	00.00.0000 00:00	XXXXXXXXXXXXXXXXXXXX
000	XXXXXXXXXXXXXXXXXXXX	00.00.0000 00:00	XXXXXXXXXXXXXXXXXXXX
000	XXXXXXXXXXXXXXXXXXXX	00.00.0000 00:00	XXXXXXXXXXXXXXXXXXXX
000	XXXXXXXXXXXXXXXXXXXX	00.00.0000 00:00	XXXXXXXXXXXXXXXXXXXX
000	XXXXXXXXXXXXXXXXXXXX	00.00.0000 00:00	XXXXXXXXXXXXXXXXXXXX
000	XXXXXXXXXXXXXXXXXXXX	00.00.0000 00:00	XXXXXXXXXXXXXXXXXXXX
000	XXXXXXXXXXXXXXXXXXXX	00.00.0000 00:00	XXXXXXXXXXXXXXXXXXXX
000	XXXXXXXXXXXXXXXXXXXX	00.00.0000 00:00	XXXXXXXXXXXXXXXXXXXX
000	XXXXXXXXXXXXXXXXXXXX	00.00.0000 00:00	XXXXXXXXXXXXXXXXXXXX
000	XXXXXXXXXXXXXXXXXXXX	00.00.0000 00:00	XXXXXXXXXXXXXXXXXXXX

Print from number:

Desktop | Main units | Logbooks | List of errors | Settings | Info | 08/01/2006 | 15:04

Activity calculation

Radiation source parameters

half life = decay constant =

Initial data

Rack#2 activity : date : (day month year)

Rack#1+#3 activity : date : (day month year)

Calculated data

elapsed days #2: #1+#3:

Rack#2 activity : Rack#1+#3 activity : All racks activity :

For information only!

Desktop | Main units | Logbooks | List of errors | Settings | Info | 30/07/2013 | 10:12

Pengoperasian dengan akses sebagai Supervisor

- Tanggung jawab:
 - untuk memeriksa dan menguji bagian dan subsistem peralatan atau mengatur keadaan dasar dan parameter operasi.
 - supervisor tidak dapat melaksanakan pengoperasian normal (continuous / batch irradiation)
- Rak sumber dapat diangkat hanya dalam wadah yang sangat khusus (untuk perawatan rak atau untuk mengganti kabel pengangkat sumber).

Supervisor desktop



Source pass mechanism parameters	
Time limit of lift cylinders	00.0 sec
Time limit of row pusher cylinders	00.0 sec
Time limit of lock, puller cylinders	00.0 sec

Goods maze transport sys. parameter	
Time limit of door cylinder	00.0 sec

Storage transport system parameters	
Time limit of row pusher cylinders	00.0 sec
Limit of other cylinders	00.0 sec
Limit of waiting time	000 sec

Whole system parameters	
Switch time of valves	0.0 sec
Minimum switch time of cylinders	0.0 sec
Starting process time	000 sec
Door opening time after irradiation	000 sec

Door power Door opening

Operation cycle counter reset

Supervisor exit

Desktop Main units Systems List of errors Settings Info 30/07/2013 07:45

Source pass mechanism (SPM) in supervisor mode



Basic state:

- 1+ ○ 8-
- 2+ ○ 9-
- 3+ ○ 10-
- 4- ○ 11-
- 5+ ○ 12-
- 6- ○ 13-
- 7- ○ 14-

The screenshot displays the 'Source pass mechanism' control interface. The main area is a grid of 14 steps, each with a 'Place' and 'Function' label. The steps are numbered 1 through 14. A 'System inputs' panel contains 'START', 'STOP', and 'STEP' buttons. A 'System outputs' panel shows 'READY', 'WORK', 'ERROR', 'WAIT for TBC', 'TBC is READY', and 'TBC is FREE'. Two red vertical arrows indicate step numbers 1 and 2. The interface also includes a 'Desktop' menu, a date/time display (10/03/2016 18:03), and a language selector (UK flag).

Siklus pergerakan tote



Step No.	Cylinder movements					
1	7+	9+				
2	7-	9-				
3	1-	3-	4+			
4	8+	10+	11+	13+		
5	8-	10-	11-	13-		
6	1+	2-	3+	4-	5-	6+
7	12+	14+				
8	12-	14-				
9	2+	5+	6-			

Goods Maze Transport System in supervisor mode



Goods maze transport system

System outputs

Home	GO plus
READY	GO minus
Working	LEAVE Station
WAIT ITS	ERROR
WAIT STS	000

System inputs

Auto change

Hand plus

Hand minus

Stop

Brake unlock

IN

Home start

Micro-switch
NO | NC

← C1 →

↑ CO ↓

Motion sensor

Opto sensor

TBC Plus side
Irr. T.: 0000

TBC Minus side
Irr. T.: 0000

Position Settings

POS end

OUT

POS home

Motor parameters

Speed 99.99 Hz

Run Home

POC **Brake**

Limit switch

Position -9999.9 cm

Tension -9999.9 cm

Power 999 % 99 %

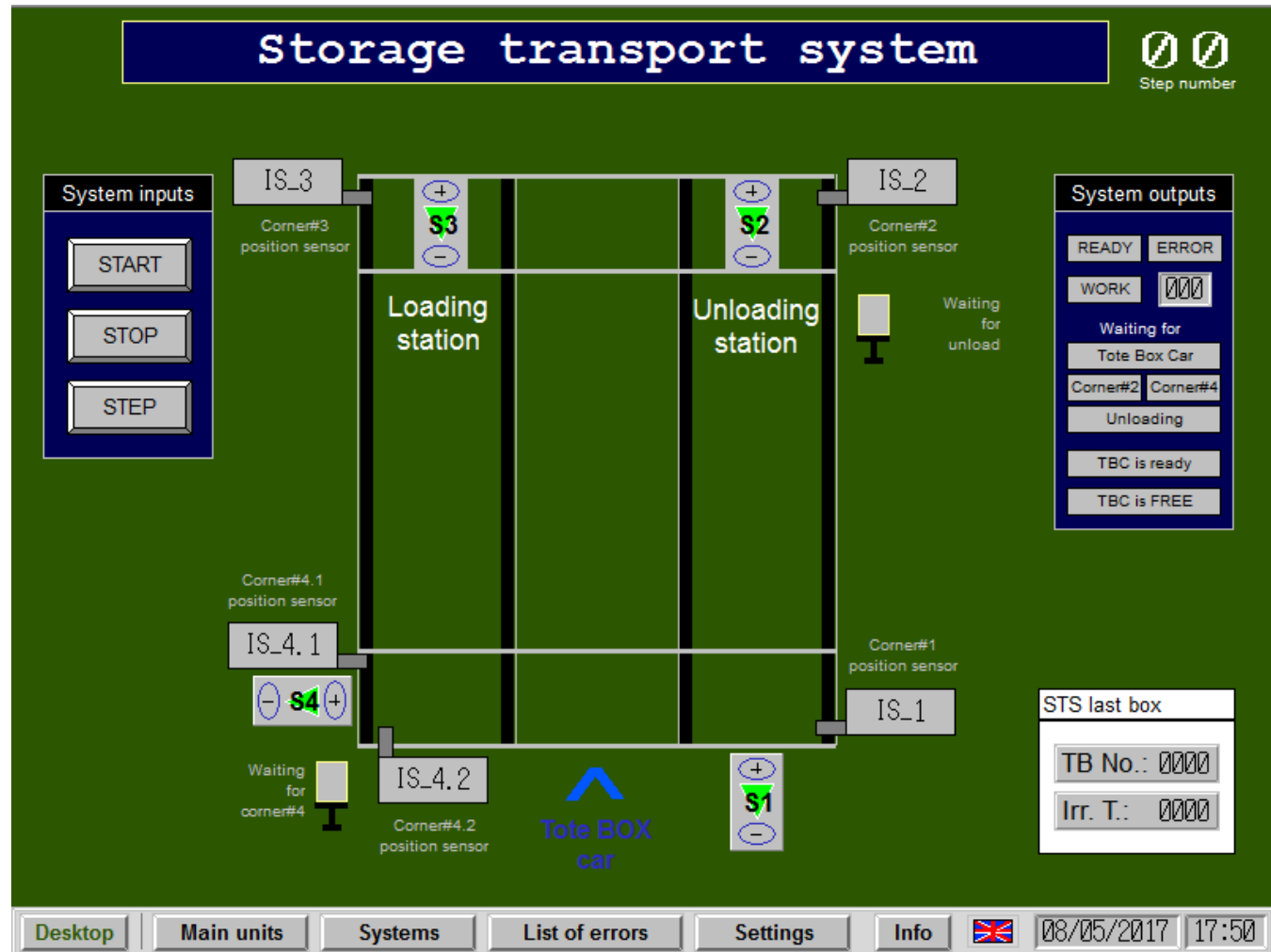
DesktopMain unitsSystemsList of errorsSettingsInfo🇬🇧08/05/201717:52

Storage Transport System in supervisor mode



Basic state

- S1-
- S2-
- S3-
- S4-



Water treatment system in supervisor mode



Water treatment

Water temperature in pool	Water temperature in WTS	Conductivity of the water coming from the pool	Conductivity of the water going to the pool
-99.9 °C	-99.9 °C	99.9 μS/cm	99.9 μS/cm
Diagram		Water conductivity diagram	

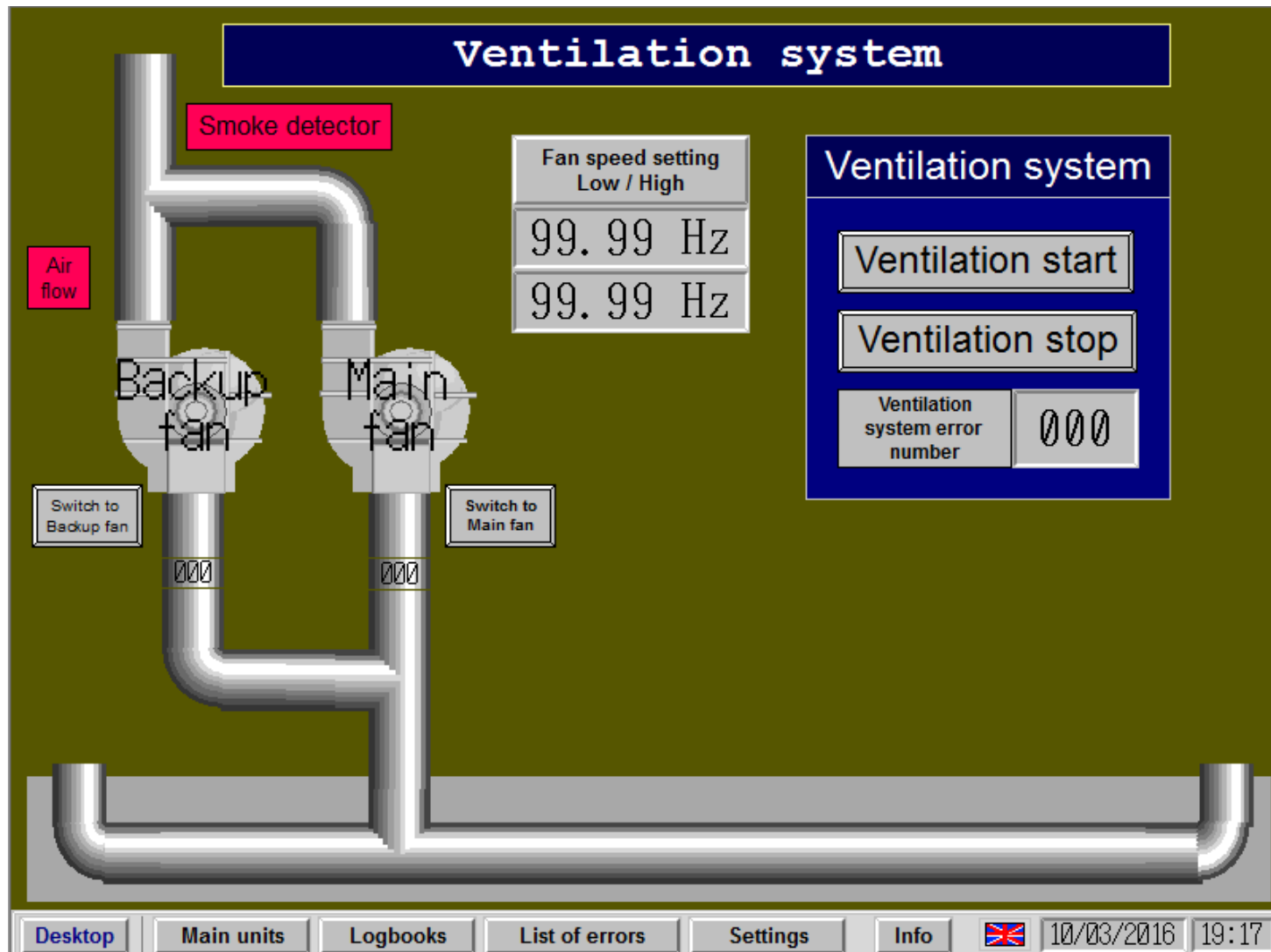
Water treatment ERROR	Water Conductivity limit	-9.99 μS/cm
000	Water level in the pool	-99.9 cm

Emergency level meter	High level	Low level
-----------------------	------------	-----------

Water treatment error signal	Emergency water supply valve	Valve closed	Valve open	Open
Error	Filling time	00.0 sec		

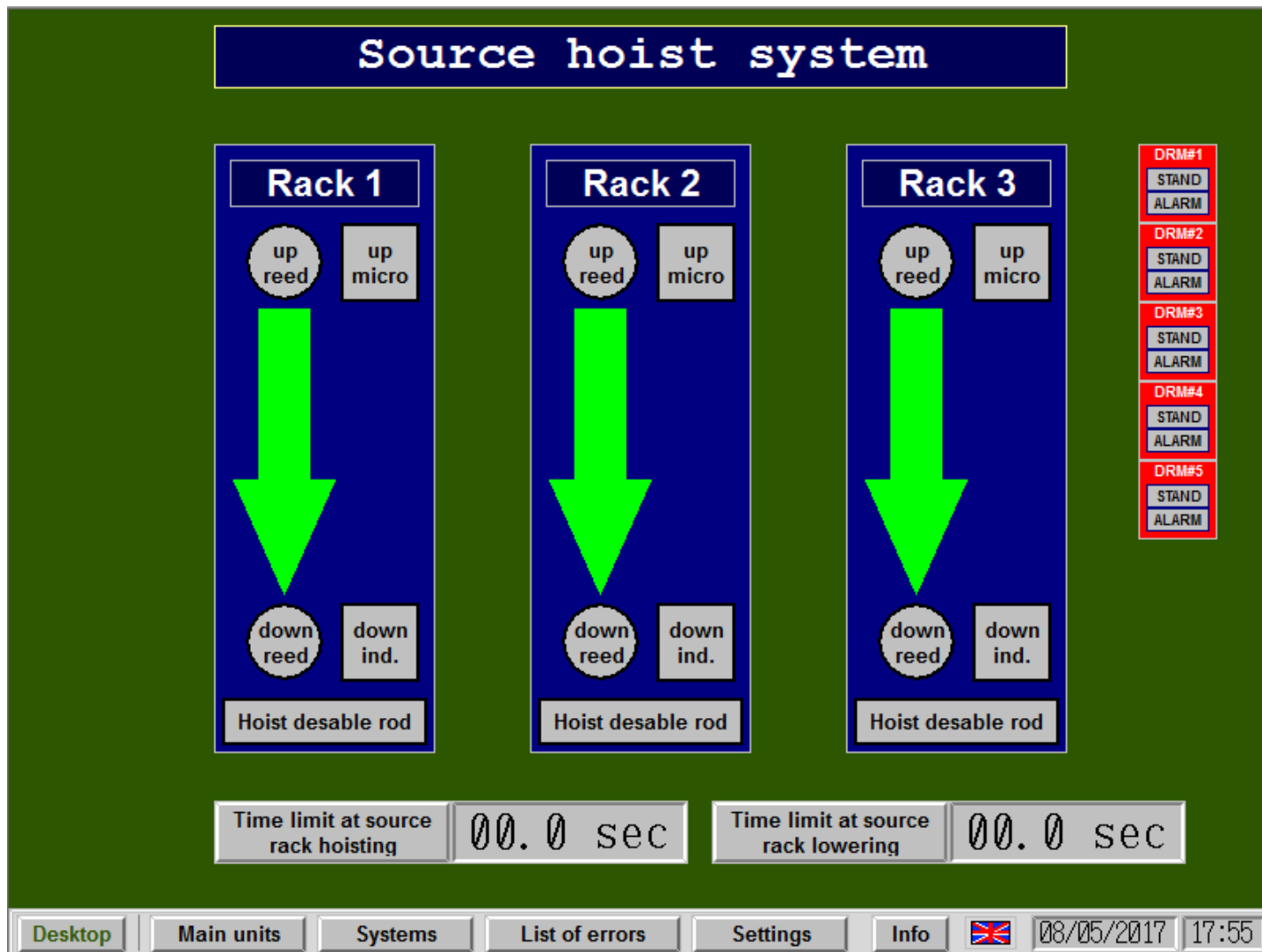
Desktop | Main units | Systems | List of errors | Settings | Info | 10/03/2016 19:15

Ventilation system and turn tables in supervisor mode



The screenshot displays a control interface for a ventilation system. At the top, a blue header reads "Ventilation system". The main area features a 3D-style diagram of a duct system with two fans labeled "Backup fan" and "Main fan". A pink box labeled "Smoke detector" is positioned above the fans. A pink box labeled "Air flow" is on the left. Below the fans are two buttons: "Switch to Backup fan" and "Switch to Main fan". To the right of the fans, a panel shows "Fan speed setting Low / High" with two digital displays, both showing "99.99 Hz". Further right, a blue panel titled "Ventilation system" contains three buttons: "Ventilation start", "Ventilation stop", and "Ventilation system error number" which displays "000". At the bottom, a navigation bar includes buttons for "Desktop", "Main units", "Logbooks", "List of errors", "Settings", "Info", a UK flag, and a date/time display "10/03/2016 19:17".

Source hoist system in supervisor mode



Pengoperasian dengan akses sebagai Chief Operator

Chief operator menu



Chief operator desktop

Operations number	000000000
Source hoisting number	000000000
Source Pass Mechanism cycle number	000000000
Goods Maze Transport System cycle number	000000000
Storage Transport System cycle number	000000000

Chief operator exit

Login data change



Login data change

Operators shown with red colour are authorized to log-in in supervisor mode

1		6	
2		7	
3		8	
4		9	
5		10	

Login data change

Operator name or password change

Operator name:

Keyboard

Desktop | Operators | Logbooks | Settings | Info | 08/01/2006 | 15:05



ERROR HANDLING

- Jika terjadi malfungsi atau penghentian darurat terjadi, sistem kontrol selalu memberi operator informasi tentang masalah saat ini di pop up window.



○ Kode-kode tersebut tidak disusun secara berurutan tetapi disusun dalam kelompok ratusan sebagai berikut :

- #1xx = Safety system errors
- #2xx = Errors terjadi pada Source pass mechanism
- #3xx = Errors terjadi pada Storage transport system
- #4xx = Errors terjadi pada Goods maze transport system
- #5xx = Errors terjadi pada Water treatment system
- #6xx = Errors terjadi pada Ventilation system

○ (Lihat daftar tabel Errors)

Sharing is like Experiencing



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