Proposal of Downtime reduction solutions
Ver.2.0

MITSUBISHI ELECTRIC CORPORATION

1 How **soon** the trouble is identified ?

Remote monitor / Remote maintenance of PLC

Realization on PLC | Realization on HMI | Realization on PC

By utilizing **PLC CPU internal webserver function**, the primary diagnosis can be performed even during problem occurrence without programming tool. Also, user created web page can be added.

On-site

MELSEC iQ-R series **CPU unit [R□CPU]**

MELSEC iQ-F series **CPU unit [FX5U(C)-□]**

WEB server

WEB server

Wireless LAN Access point

WEB browser

Tablet

・Possible to monitor even without GX Works3

Office

WEB browser

・Primary diagnosis possible remotely

Verifiable screen

・Module Information
・Device batch Monitor
・Watch
・CPU Diagnosis
・Event History
・Access Log
・User Web page

MELSEC iQ-R series

最新の情報に更新   最終更新日時 2018-12-25 22:58:08

◀前へ

READY
ERROR
P RUN
USER

ユニット詳細情報
デバイス一括モニタ
ウォッチ
CPU診断
イベント履歴
アクセスログ
ユーザWebページ
システムWebページ更新

表示更新周期
5 秒(5～120)

No.	発生日時	イベント種別	状態	イベントコード	概要
00001	2018-12-25 22:52:37	システム	ⓘ 情報	00100	リンクアップ
00002	2018-12-25 22:52:32	オペレーション	ⓘ 情報	24101	動作状態の変更（STOP）
00003	2018-12-25 22:52:31	システム	ⓘ 情報	00400	電源ON/RESET解除
00004	2018-12-25 22:52:09	オペレーション	ⓘ 情報	24200	フォルダの新規作成、フォルダ/ファイルの書込み
00005	2018-12-25 22:52:08	オペレーション	ⓘ 情報	24101	動作状態の変更（STOP）

Products

① MELSEC iQ-R series CPU unit [R□CPU]
② MELSEC iQ-F series CPU unit [FX5U(C)-□]

Adoption points

① Even those without dedicated tools (GX Works3), PLC CPU can be monitored, and can perform simple diagnosis during trouble.
② Remote maintenance is possible from the external environment through VPN router

MITSUBISHI ELECTRIC — Changes for the Better

Remote monitor / Remote maintenance at the dedicated terminal screen
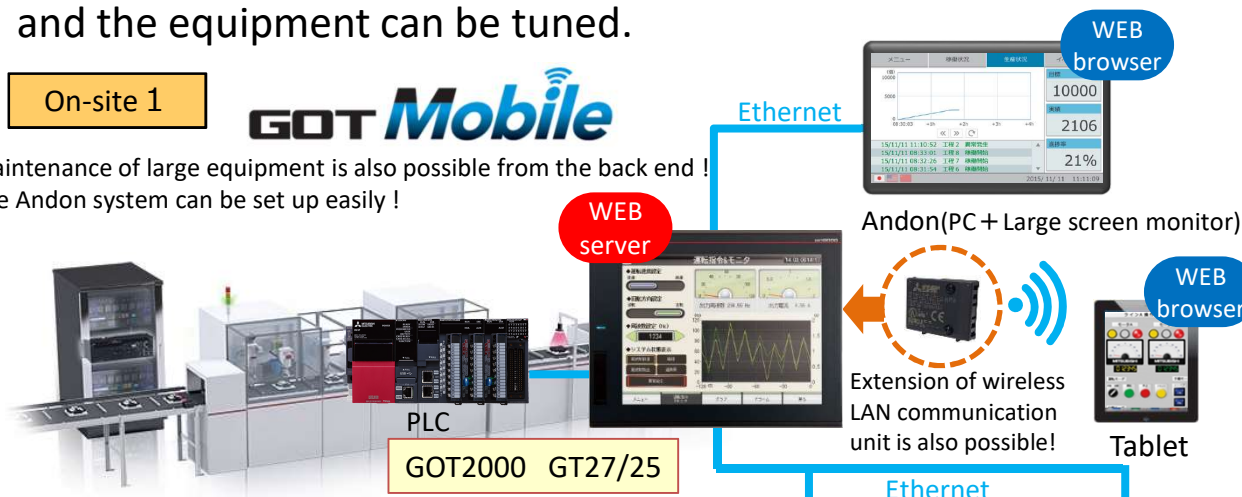
| Realization on PLC | Realization on HMI | Realization on PC |

By utilizing the **GOT Mobile function of GOT2000**, the equipment status can be remotely monitored, and the equipment can be tuned.
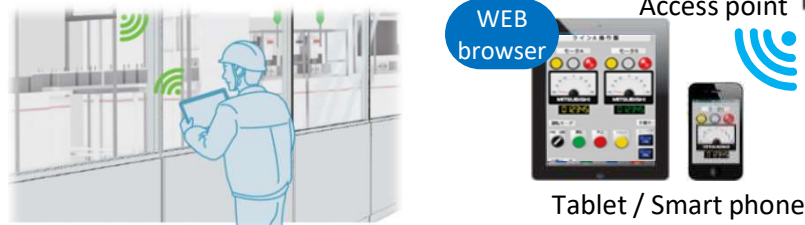
On-site 1

GOT Mobile

・Maintenance of large equipment is also possible from the back end !
・The Andon system can be set up easily !

WEB server

PLC

GOT2000　GT27/25

Ethernet

WEB browser

10000
2106
21%

Andon(PC＋Large screen monitor)

Extension of wireless LAN communication unit is also possible!

WEB browser

Tablet

Screen creation method

Terminal side screen of PC, Tablet etc. can be created in the same outline as GOT2000 using GT Works3.
・Screen size can be freely designed depending on purpose!
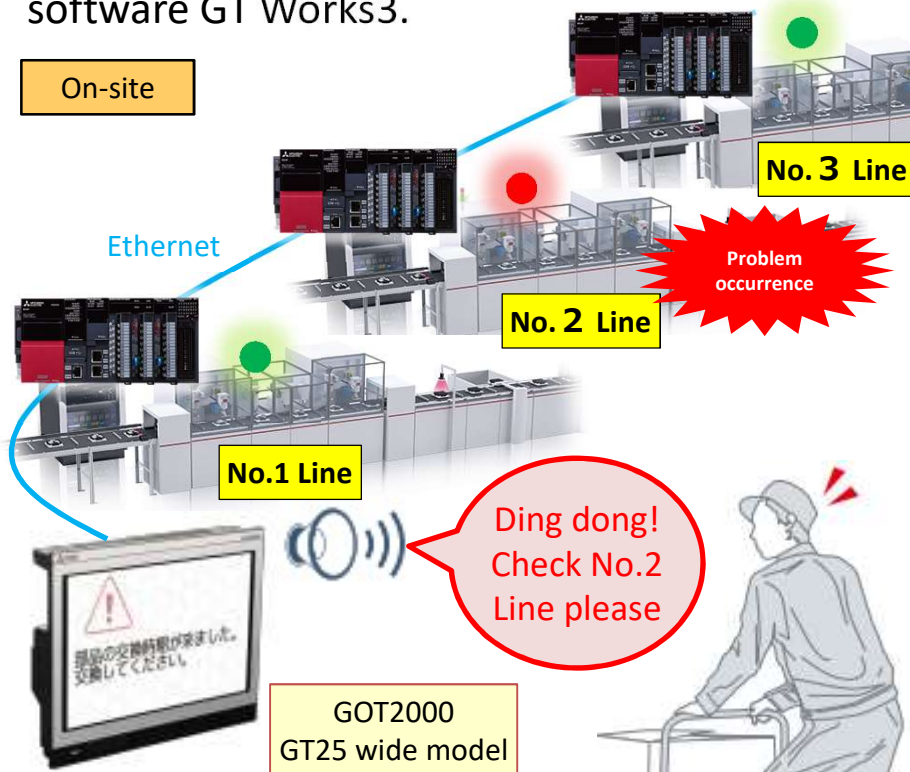
Smart phone　Tablet　　　　PC

On-site 2

・The site can be seen from outside the clean room too!

WEB browser

Tablet / Smart phone

Wireless LAN Access point

Ethernet

Office

WEB browser

PC

どこが異常かな？

・The site can be seen from the office too!
・The site can be seen from a distant place too!

Received favorably well as it can be done immediately

Products
①GOT2000　GT27 model
②GOT2000　GT25 model
③GOT Mobile feature license
④Wireless LAN communication unit

Adoption points
① Terminal side screen of PC, Tablet etc. can be created easily. Change is also easy.
② By utilizing the wireless unit, monitoring is easy from remote locations like the office etc.

Voice notification of problem occurrence

Realization on PLC	Realization on HMI	Realization on PC

Voice notification of problem occurrence is possible by utilizing **the voice output function and voice synthesis function of GOT2000**. Voice data can be easily created in the image creation software GT Works3.

On-site

No. 3 Line

Ethernet

No. 2 Line

Problem occurrence

No.1 Line

Ding dong! Check No.2 Line please

GOT2000 GT25 wide model

Voice creation method

Select speaker language and gender

ファイルNo.(F): 1
種類(T): メッセージ
話者(S): 日本語(女性)

Input arbitrary message

メッセージ(M):
2号ライン確認してください

Check the regenerated voice

再生時間: ---

対応言語

男性　日本語　英語　中国語(簡体字)　韓国語　スペイン語

女性　日本語　英語　中国語(簡体字)　中国語(繁体字)　韓国語　スペイン語

Products

①GOT2000　GT25 wide model
②GOT2000　GT25 standard model* + Voice output unit GT15-SOUT
　　　　　*GT2505 is not supported.
③GT Works voice synthesis license　SW1DND-GTVO-M

Adoption points

①Event occurrence can be communicated to remote operator from GOT.
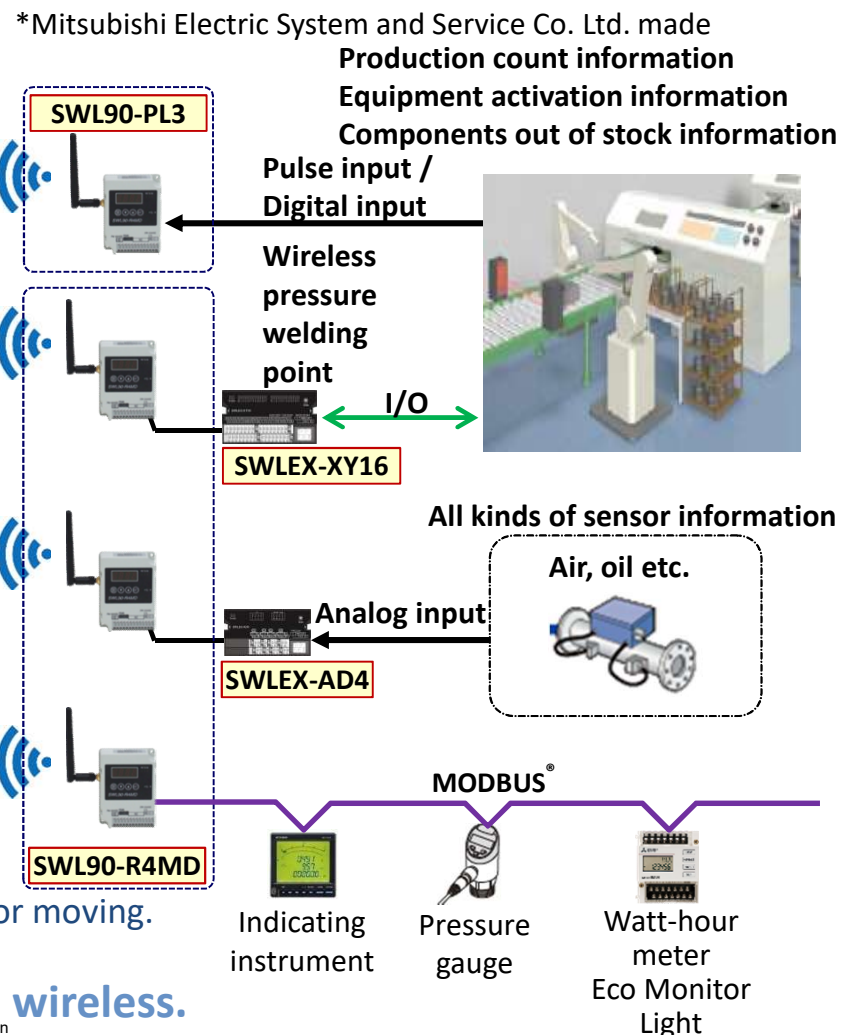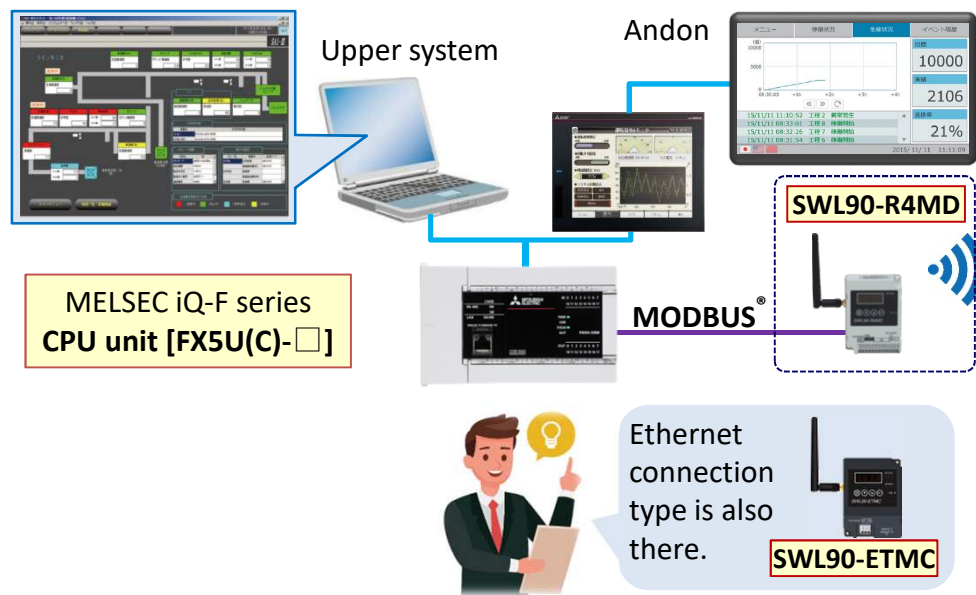②Multilingual support is possible.

Set up of wireless monitoring system and Andon system

Realization on PLC	Realization on HMI	Realization on PC

By utilizing **920MHz wireless unit SWL90 series***, Andon system of equipment and installation status monitoring system, production status, alarm etc. can be set up.

*Mitsubishi Electric System and Service Co. Ltd. made

Upper system

Andon

10000
2106
21%

MELSEC iQ-F series
CPU unit [FX5U(C)-□]

MODBUS®

SWL90-R4MD

Ethernet connection type is also there.

SWL90-ETMC

Production count information
Equipment activation information
Components out of stock information

SWL90-PL3

Pulse input / Digital input

Wireless pressure welding point

SWLEX-XY16

I/O

All kinds of sensor information

Air, oil etc.

SWLEX-AD4

Analog input

SWL90-R4MD

MODBUS®

Indicating instrument

Pressure gauge

Watt-hour meter
Eco Monitor Light

- **920MHz wireless unit surpasses** the 2.4GHz band **in diffraction**.
- **Substation can be used as relay station** through multi-hop communication.
- Reduction of cable wiring workload is possible.
- Line layout can be easily changed as there are few wires.
- Wireless control of moving units like AGV etc. is possible.
- There will be no worry of cable disconnection during earthquakes or moving.
- Communication between floors, buildings etc. will be easy.

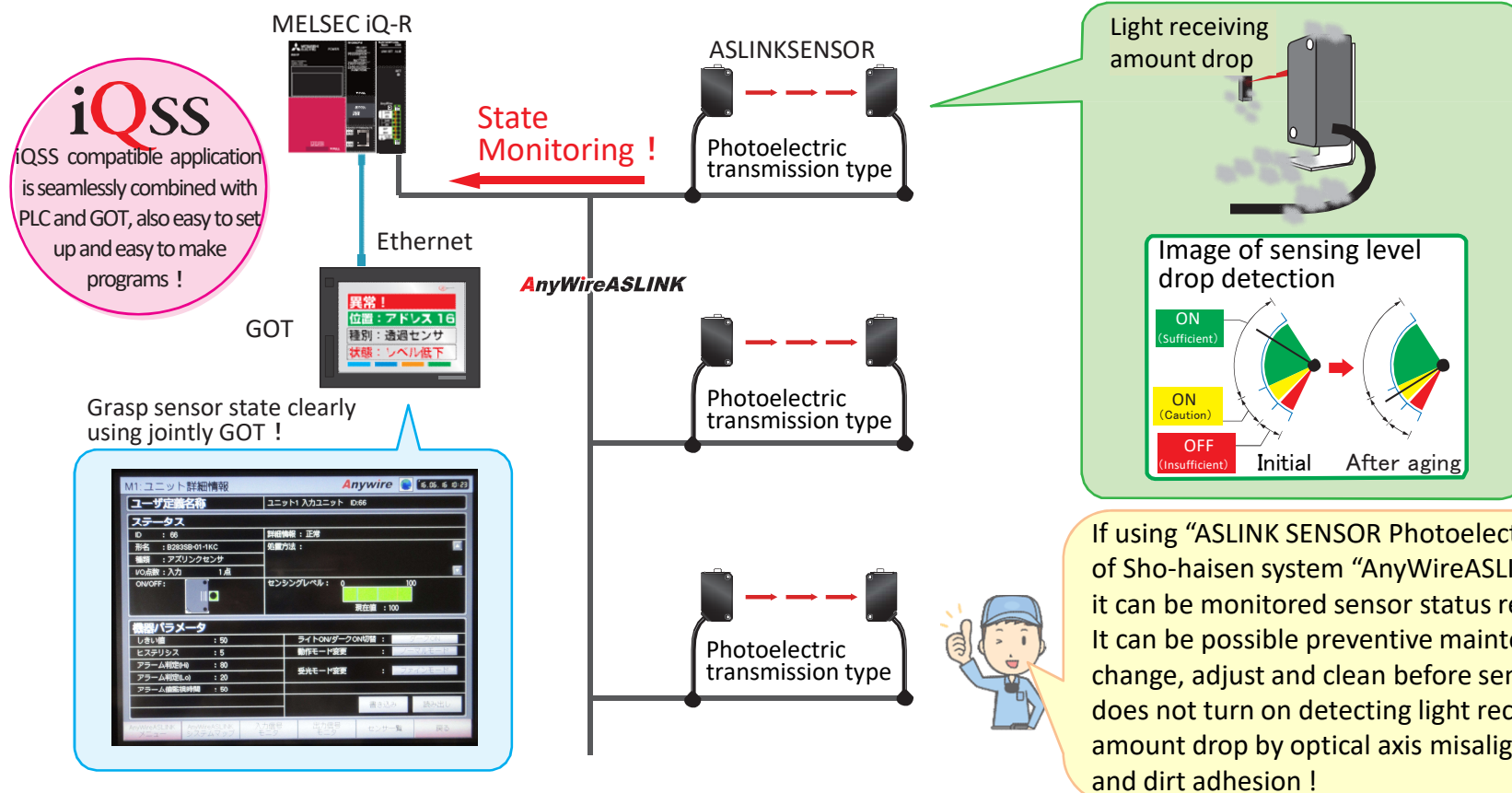**System can be set up in a short period utilizing the wireless.**

Immediate verification of sensing level

Realization on PLC | **Realization on HMI** | Realization on PC

By utilizing **iQSS supported sensor**, it is possible to check the sensing level (Sensor status) in real time in the PLC and GOT2000.

MELSEC iQ-R

iQSS

iQSS compatible application is seamlessly combined with PLC and GOT, also easy to set up and easy to make programs！

State Monitoring！

Ethernet

GOT

異常！
位置：アドレス１６
種別：透過センサ
状態：レベル低下

Grasp sensor state clearly using jointly GOT！

M1: ユニット群細情報 Anywire '6.05.6 0:23
ユーザ定着名称   ユニット1 入力ユニット ID:66
ステータス
ID   : 66   詳細情報：正常
形名   : B283SB-01-1KC   処置方法：
種類   : アズリンクセンサ
I/O点数：入力   1点
ON/OFF: センシングレベル： 0   100
                               現在値：100
機器/パラメータ
しきい値   : 50   ライトON/ダークON切替：
ヒステリシス   : 5   動作モード変更：
アラーム判定(Hi) : 80   受光モード変更：
アラーム判定(Lo) : 20
アラーム積算時間 : 50   書き込み 読み出し

AnyWireASLINK

ASLINKSENSOR

Photoelectric transmission type

Photoelectric transmission type

Photoelectric transmission type

Light receiving amount drop

Image of sensing level drop detection

ON (Sufficient)
ON (Caution)
OFF (Insufficient)

Initial   After aging

If using "ASLINK SENSOR Photoelectric type" of Sho-haisen system "AnyWireASLINK, it can be monitored sensor status remotely. It can be possible preventive maintenance to change, adjust and clean before sensors does not turn on detecting light receiving amount drop by optical axis misalignment and dirt adhesion！

It is possible to reduce the time take to quickly identify sensor related abnormality location and restoration.

Prompt detection of electric short circuit / sensor disconnection
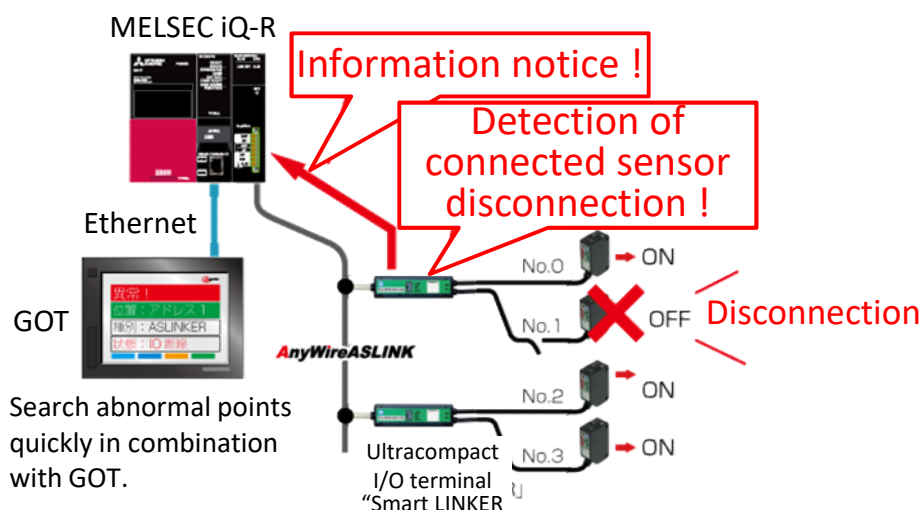
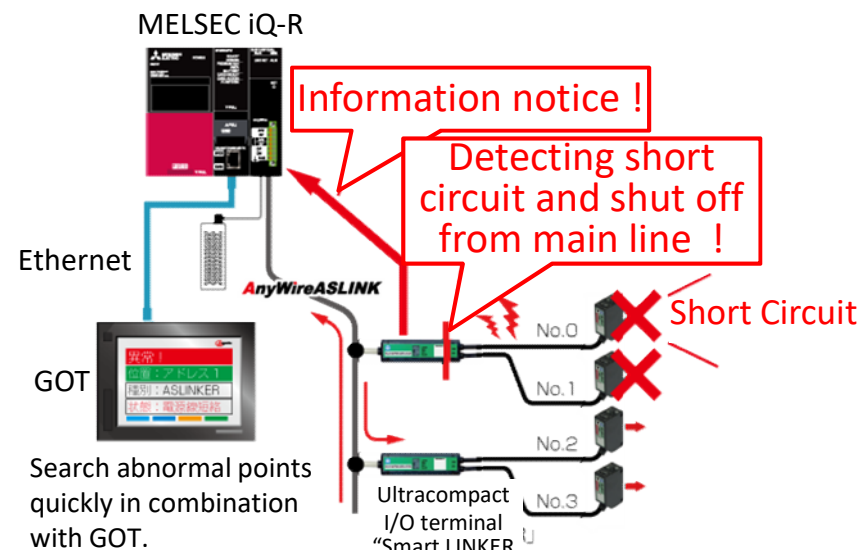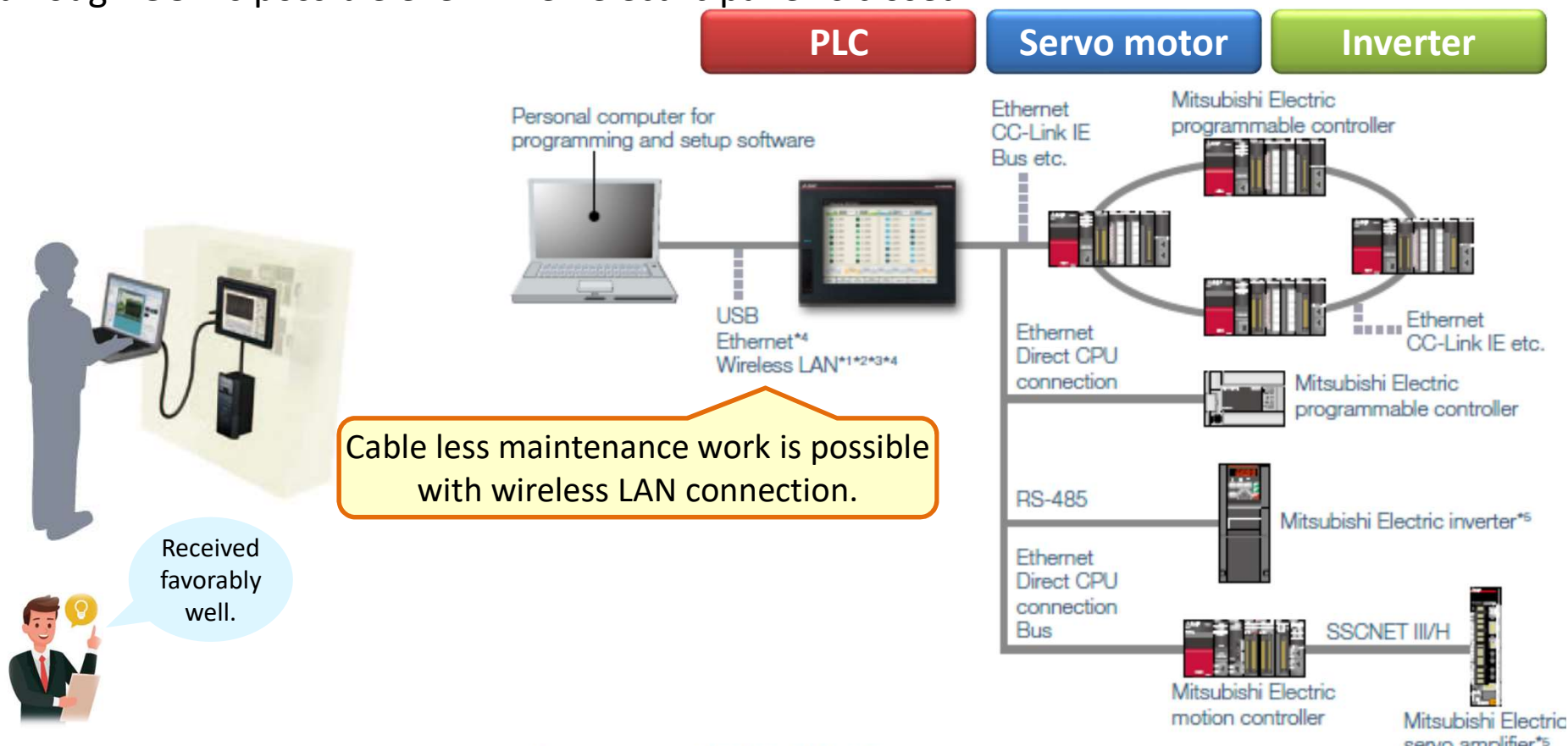| Realization on PLC	Realization on HMI	Realization on PC

By utilizing **small wiring network AnyWireASLINK**, sensor cable disconnection or sensor electric short circuit can be detected in real time.

❶ Detection of sensor cable disconnection   ❷ Detection of sensor power short circuit

MELSEC iQ-R

Information notice !

Detection of connected sensor disconnection !

Ethernet

GOT

No.0 → ON
No.1 ✕ OFF   Disconnection
No.2 → ON
No.3 → ON

AnyWireASLINK

Search abnormal points quickly in combination with GOT.

Ultracompact I/O terminal "Smart LINKER

If using "Smart LINKER" of Sho-haisen system "AnyWireASLINK, even if 3-wire type sensor cable will be disconnection, it can identify quickly which sensor is disconnected.
It is possible to detect the cause why the system is stopped.

MELSEC iQ-R

Information notice !

Detecting short circuit and shut off from main line !

Ethernet

GOT

AnyWireASLINK

No.0 ✕   Short Circuit
No.1 ✕
No.2 →
No.3 →

Search abnormal points quickly in combination with GOT.

Ultracompact I/O terminal "Smart LINKER

Are you threating long-time stop due to power goes down ? If using "Smart LINKER" of Sho-haisen system "AnyWireASLINK, it can monitor short circuit of power line cable and shut off from main line when short circuit happens !
The system except for short circuit points will be operated continuously.

It is possible to reduce the time take to quickly identify sensor related abnormality location and restoration.

2 How trouble handling is made **easy** ?

Set up and tuning of equipment without opening and closing the electric panel

| Realization on PLC | **Realization on HMI** | Realization on PC |

Utilizing **FA transparent function of GOT2000**. Set up and tuning or programming of FA products through GOT is possible even when electric panel is closed.

| PLC | Servo motor | Inverter |

Personal computer for programming and setup software

USB
Ethernet*4
Wireless LAN*1*2*3*4

Ethernet
CC-Link IE
Bus etc.

Mitsubishi Electric programmable controller

Ethernet
CC-Link IE etc.

Ethernet
Direct CPU connection

Mitsubishi Electric programmable controller

RS-485

Mitsubishi Electric inverter*5

Ethernet
Direct CPU connection
Bus

SSCNET III/H

Mitsubishi Electric motion controller

Mitsubishi Electric servo amplifier*5

> Cable less maintenance work is possible with wireless LAN connection.

> Received favorably well.

Trouble shooting utilizing PC also can be done smooth.

2 How trouble handling is made **easy** ?

Immediate restoration of programs or parameters

| Realization on PLC | Realization on HMI | Realization on PC |

Back up and restore of PLC, Inverter and Servo amplifier programs are possible with
back up / restore function of GOT2000.

Sequencer **Servo motor** **Inverter**

Replace CPU
Worksite

Restore

Back up multiple controllers

Ethernet

<NEW>
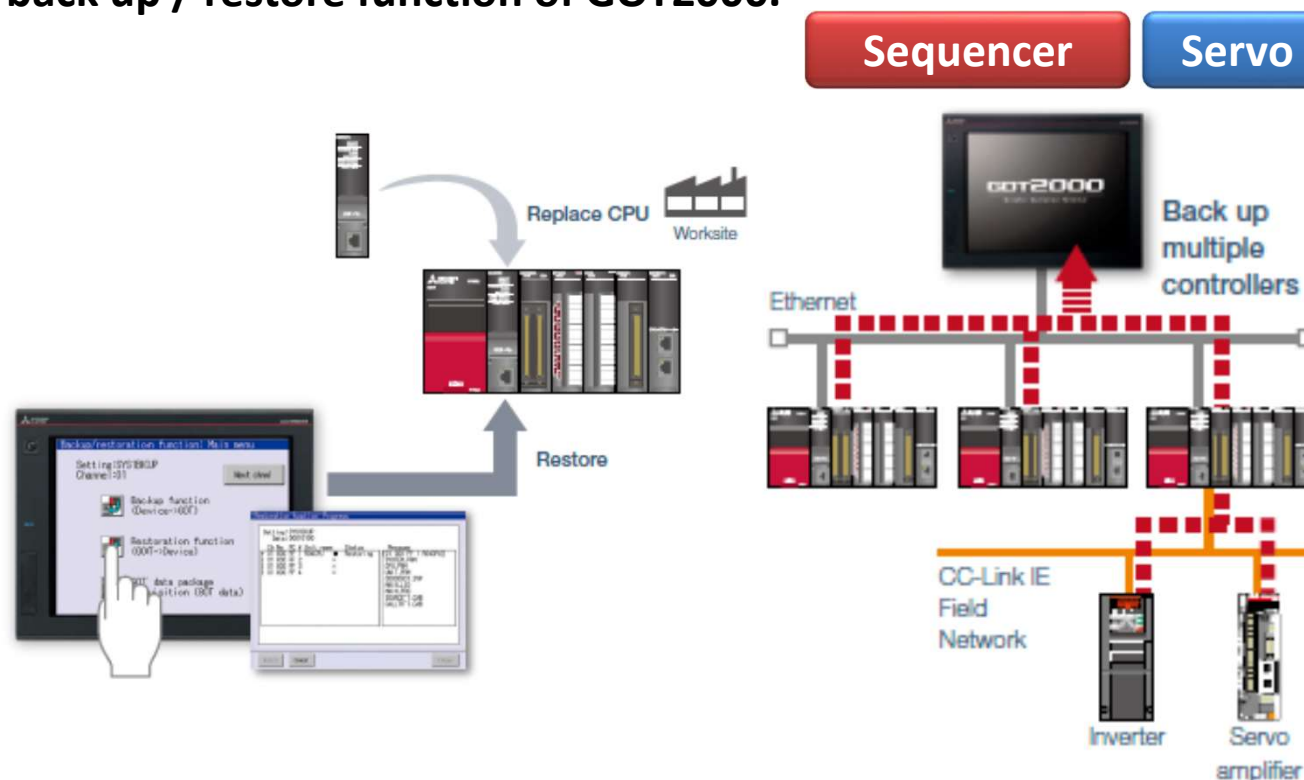
Back up and restore of inverter and servo amplifier on the CC-Link IE Field network
is possible through the MELSEC-Q/L series.

CC-Link IE Field Network

Inverter   Servo amplifier

There are no worries during FA products switching or during trouble due to program change.

2 How trouble handling is made easy ?

Batch storage of device data during abnormality occurrence

| Realization on PLC | Realization on HMI | Realization on PC |

Utilizing **memory dump function of PLC CPU,** device data can be automatically stored in the SD card at the set trigger conditions. Status during abnormality occurrence can be verified later.

iQ-R CPU
iQ-F CPU

Abnormality occurrence

Automatic saving of data during abnormality occurrence in the SD memory card

SD memory card

MITSUBISHI ELECTRIC
SDHC
16GB
NZ1MEM-16GBSD

Data forwarding with mail etc.

GX Works3

Quick investigation of the root cause while verifying data during abnormality occurrence

Received favorably well.
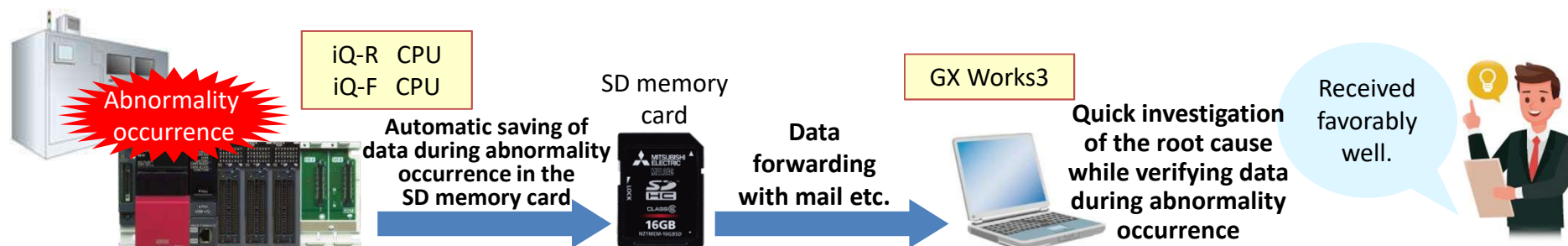
■ Overseas factory

Setting of trigger conditions to store data in advance

■ Domestic design office

Data during abnormality occurrence can be displayed

Can be verified by applying in program!

As it is possible to recreate the status during abnormality, it is very helpful in debugging during troubles.

Collection of operation history for resolution of troubles quickly

Realization on PLC	Realization on HMI	Realization on PC

By Utilizing the **Event history collection function**, event history of operation, error etc. related to each unit is stored in the CPU unit. History can be verified in GX Works 3.

MELSEC Q series

MELSEC iQ-R series

Operation, errors in CPU are understood chronologically, and investigation of cause of trouble becomes easy.

Program has been altered at some point ! Who modified it ?

?

Even if we know that the program has been changed, we don't know when the program has been changed.

Restoration is fast as the cause of error is identified and the handling method is displayed in detail !

Can be output in CSV file, and forwarded by mail to engineers in remote location.

Investigation to determine cause during problem occurrence is easy.

Logging of device data before and after problem occurrence

| Realization on PLC | Realization on HMI | Realization on PC |

By utilizing the **trigger logging function of the CPU unit or the high speed data logger unit**, data before and after the problem occurrence can be logged and stored in the SD card. Settings can be done easily with dedicated tools.

Event occurrence

Time

Data (Equipment status)

Data before and after trigger occurrence

Store only this range as logging data

Trigger occurrence

Normal

Cause ?

Data storage capacity of the SD memory card can be economized.

	No. of settings	Maximum points for 1 setting	Collection period	Maximum no. of records of trigger logging
R□ CPU	10	128	per scan/ 50μs~	1,000,000
RD81 DL96	64	1024	per scan/ 0.5ms~	65,535
Reference QD81 DL96	64	256	per scan/ 1ms~	65,535

MELSEC iQ-Rseries
CPU unit [R□CPU],
High speed data logger unit
[RD81DL96]

Before trigger occurrence

After trigger occurrence

Trigger occurrence
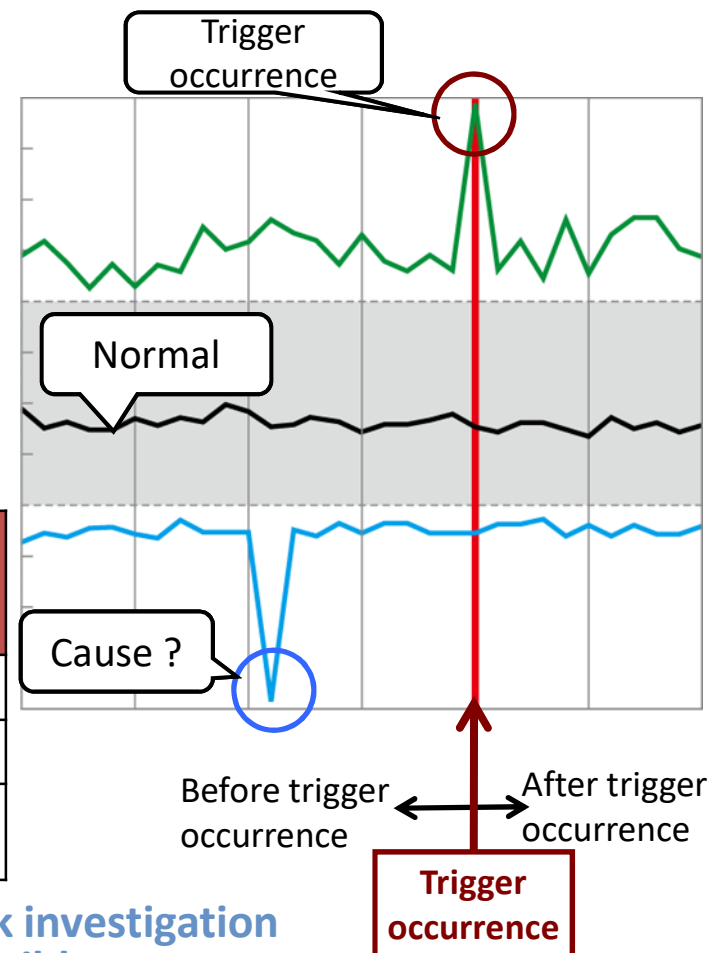
As only the necessary data for data analysis is stored, quick investigation to identify cause and early stage restoration support is possible.

Logging on grasping the trouble occurrence

| Realization on PLC | Realization on HMI | Realization on PC |

By utilizing the **Event logging function of the High speed data logger unit**, the trouble can be understood chronologically and logged. Mail sending during event occurrence is also possible. Settings can be done easily with dedicated tools.

Accumulated data in the SD memory card

Date and time	Occurrence /Restoration	Event name	...
09/04/28 14:25:23	Occurrence	Equipment A Intrusion detection	...
09/04/28 16:24:05	Occurrence	Equipment B Temperature exceeded	...
09/04/28 16:34:54	Occurrence	Equipment C Long process time	...
09/04/28:17:45:02	Occurrence	Equipment D Process XX warning	...
:	:	:	...

High speed data logger unit **[RD81DL96]**

Mail transmission during event occurrence if necessary

16GB
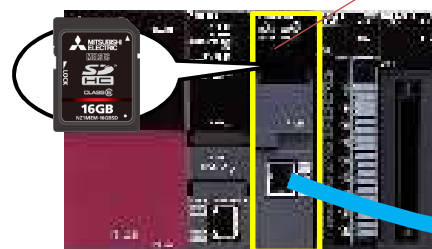
Master station

Mail server

Other station's events can also be set easily with dedicated tools.

Ethernet / CC-Link / CC-Link IE / MELSECNET/H

Equipment A
Intrusion detection switch ON (Bit On/Off condition) ［M0 is ON］

Local station

Equipment B
Temperature exceeded ! (comparison condition with the numerical value) ［D0 exceeded 100］

Local station

Equipment C
Process time is long (Completion time condition) ［M0 is ON for more than 3 secs］

Local station

Equipment D
Device sequence is scattered (Completion sequence condition) ［Did not ON in the order M0-M1-M2］

Event occurence

Local station

Event logging system for the whole line can be set up by adding 1 machine to the existing line.

2 How **easy** is trouble handling made?

Confirmation of mechanical fault or operator mistake

| Realization on PLC | **Realization on HMI** | Realization on PC |

[When/What/How] was operated can be verified with GOT using the **operation log function of GOT2000**.

Log details can be verified.

Video can be displayed and operation parts can be identified.
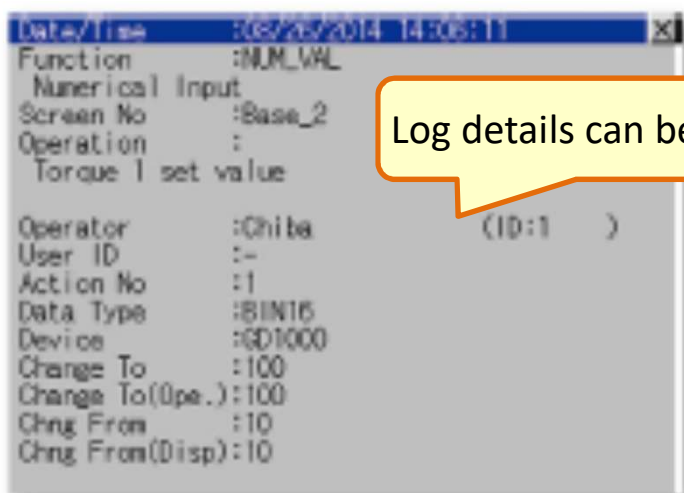
◆ [Who] operated can also be recorded in combination with the Operator authentication function.

◆ The operator authentication/management operation can also be recorded in the operation log.

Easy understanding of operation before problem occurrence.
Smooth identification of cause of trouble.

Optimization of equipment set up and debugging during trouble

| Realization on PLC | Realization on HMI | Realization on PC |

By utilizing **real time monitoring function of GX LogViewer**, by doing some simple settings it possible to grasp the timing of microscopic changes in the monitored device in real time.

iQ-R CPU
iQ-F CPU
L CPU
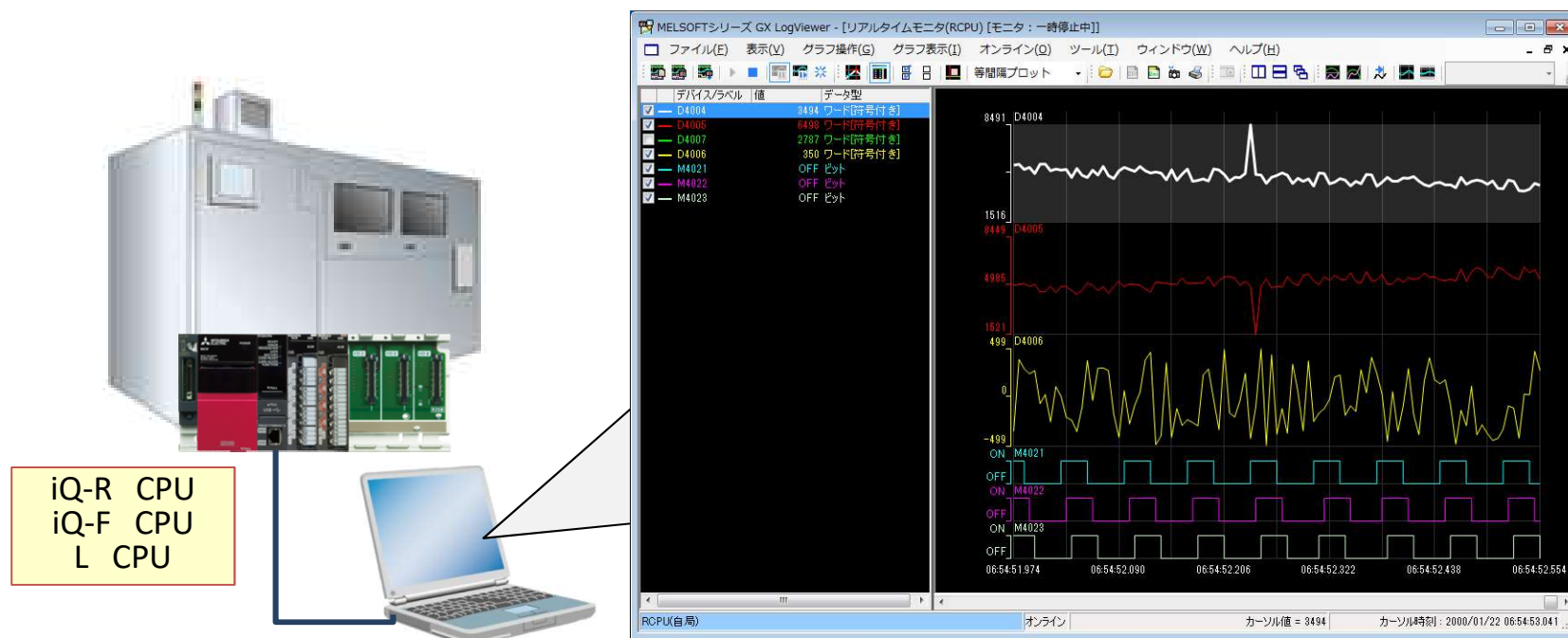
Device points where simultaneous monitoring is possible

Word:16 points *
Bit:16 points
*:Bit data registration time is maximum 15 points

Investigation to determine root cause during equipment set up or problem occurrence becomes easy.

Confirmation of logged data in graph and ladder

Realization on PLC	Realization on HMI	Realization on PC

Logged data can be linked to graphs and ladder and verified with the **offline monitor function**.
Equipment operation is reproducible by playing back chronologically with the cursor control on the graph.

Abnormality occurrence

Logging file
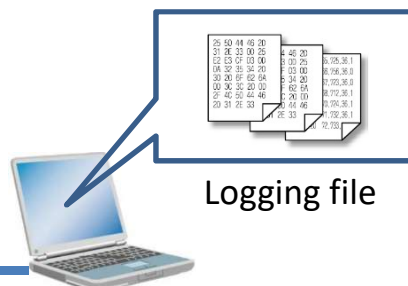
Received favorably well

	Maximum points	Collection period	Maximum no. of records
iQ-R	128	Fastest 50µs	65,500
iQ-F	128	Fastest 1ms	65,500

iQ-R CPU internal logging function
iQ-F CPU internal logging function

GX Works 3
GX LogViewer
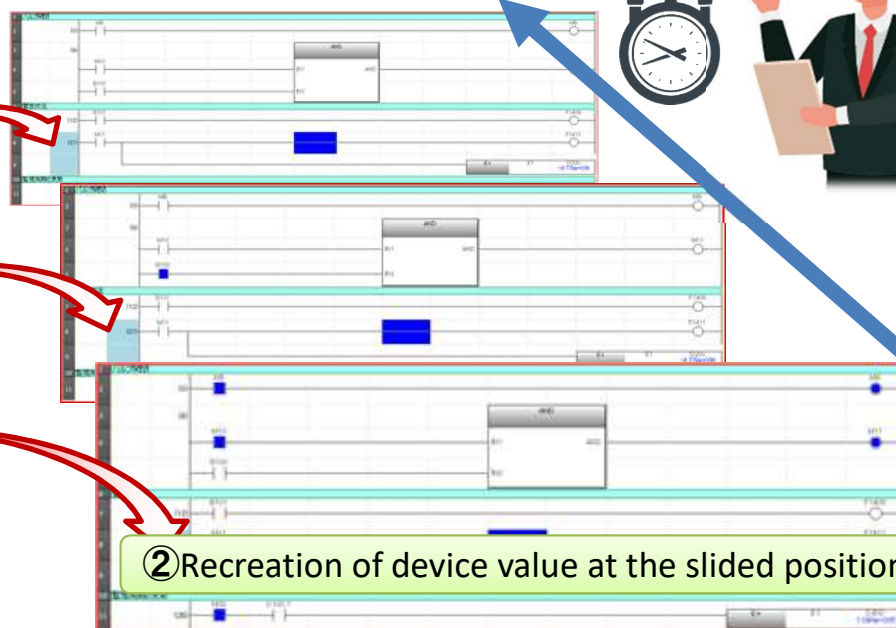
①Slide the red cursor

②Recreation of device value at the slided position

As it is possible to recreate the status during abnormality, it is very helpful in debugging during troubles.

© Mitsubishi Electric Corporation

Tracing the cause of trouble with the waveform data

Realization on PLC	Realization on HMI	**Realization on PC**

In **GX LogViewer**, data matching the conditions can be searched, or the difference between the status before and after trouble can be checked by superimposing.

◎ **Cursor jump function after searching for value**

Search of data matching the condition and jumping to it is possible.
The corresponding ladder program can be verified by linking with the GX Works 3 offline monitoring function.
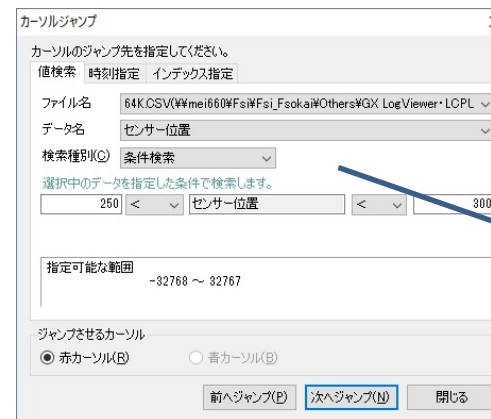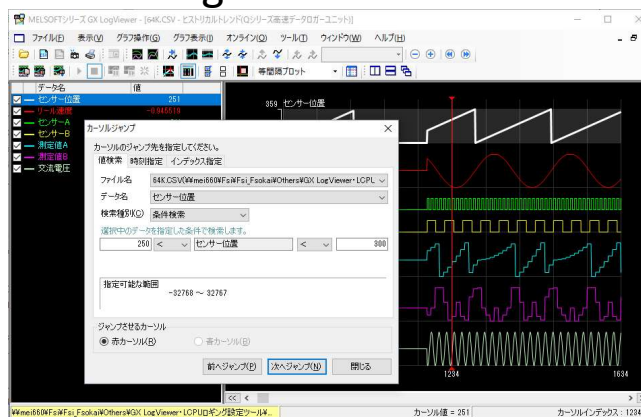
It Is possible to search in terms of value, time, index number

◎ **Waveform superimposition function**

The waveforms of the logging data during normal times and during problem occurrence can be superimposed and the difference can be checked.
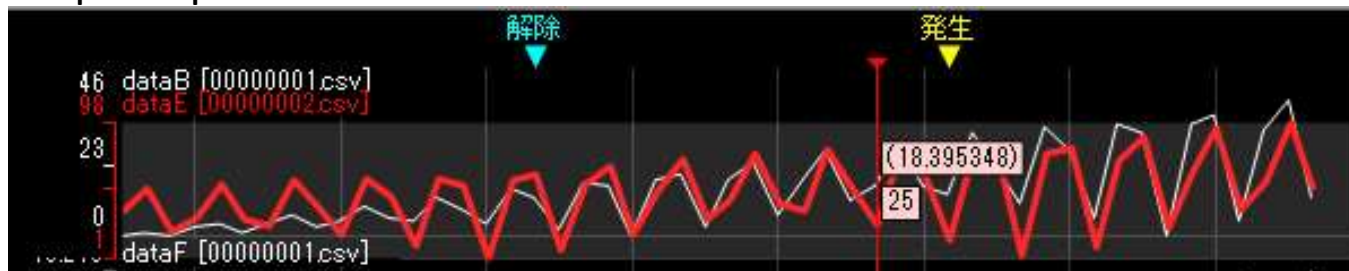
Record program change information

Realization on PLC	Realization on HMI	Realization on PC

By utilizing the **collation function**, it is possible to register the history of change regarding the project file at any time. It is possible to display the difference between comparison source and comparison destination in the Ladder format too.
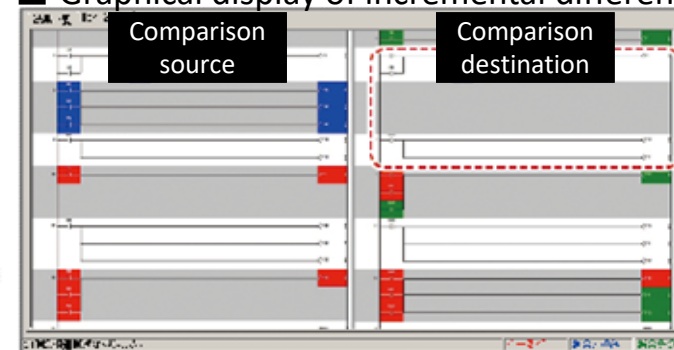
MELSEC Q series In case of storing the project, only on implementing history registration.

MELSEC iQ-R series
GX Works3

Ladder, SFC, FBD, ST languages are supported!

■ Online data operation
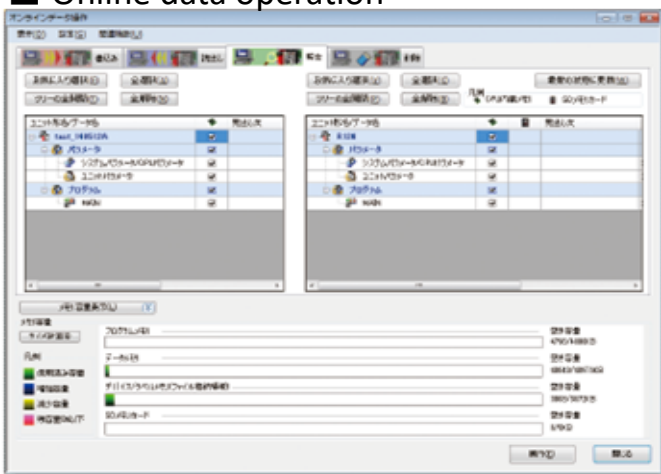
■ Graphical display of incremental differences

Comparison source

Comparison destination

Received favorable reception.

Blue :Deletion	Red :Change	Green :Addition

Checking where and how it was changed is also possible

■ Comparison results
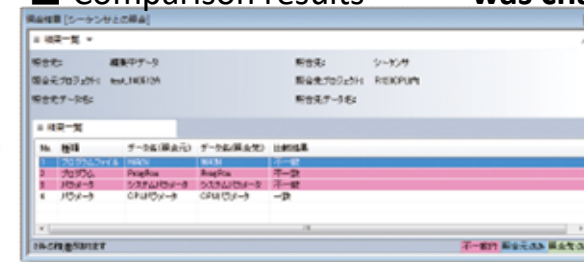
Possible to checking who changed and when

Checking modified parts becomes easy, and reduction of re-use plan and design maintenance management is possible.

2 How **easy** is trouble handling made ?

Visual confirmation of network connection trouble

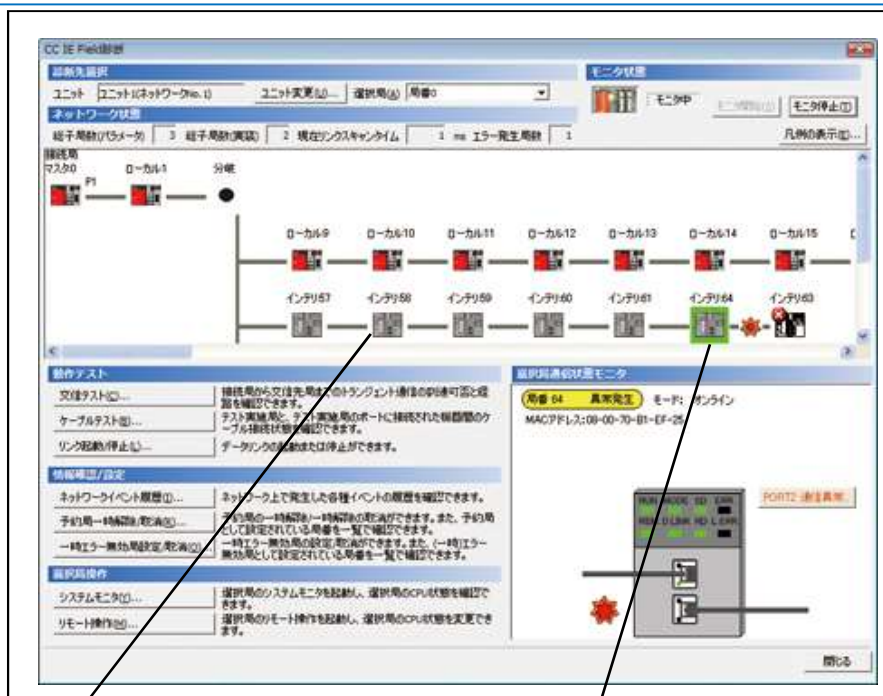| Realization on PLC	Realization on HMI	Realization on PC

By utilizing the **Network diagnosis function**, abnormal parts can be identified at a glance as errors can be displayed in the system block diagram.

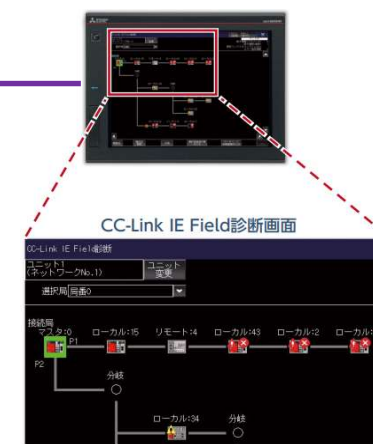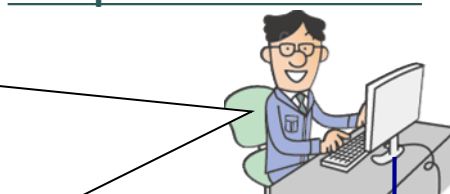**(Example: CC-Link IE field network diagnosis)**

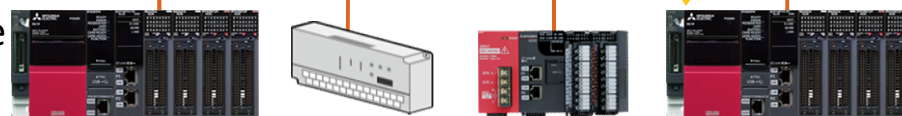Identification of abnormal parts on the network.
Also possible with GOT.

Connection problem occurred !

CC-Link IE Field

Display of departments in the same order as the actual system configuration

Abnormal parts can be identified at a glance!

Reduction of downtime during network connection trouble.

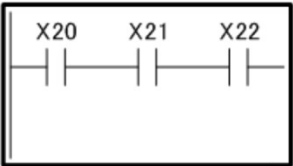| Person in charge of maintenance in each country is easy	Realization on PLC	Realization on HMI	Realization on PC

Language wise management of comments in the same project is possible with **Multiple comment switching function**. Also, display languages can be switched easily.

MELSEC Q series

Project (Japanese)

Japanese comment   Program

デバイス名	コメント
X20	非常停止
X21	ヒューズ正常
X22	安全確認
X23	：

X20 X21 X22

MELSEC iQ-R series

Project (Japanese＋Chinese)

Comment (Japanese＋Chinese) Program

デバイス名	日本語	中文
X20	非常停止	緊急停止
X21	ヒューズ正常	保険丝正常
X22	安全確認	安全确认
X23		

X20 X21 X22
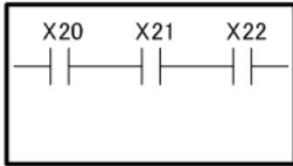
2-fold management of the same program.
Difficult to maintain consistency.

Integration of program.
Language wise management of multiple kinds of comments.
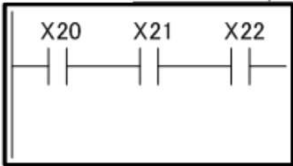
Project (Chinese)

Chinese comment   Program

デバイス名	コメント
X20	緊急停止
X21	保険丝正常
X22	安全确认
X23	：

X20 X21 X22

複数コメント表示設定
☑ 複数コメント表示を有効にする(M)

No.	表示対象	利用可能	
6	●	☑	Japanese/日本語
7	○	☐	English
8	○	☑	Chinese/中文

X20 X21 X22
非常 ヒューズ 安全
停止 正常 確認

Designer
(Japanese person)

複数コメント表示設定
☑ 複数コメント表示を有効にする(M)

No.	表示対象	利用可能	
6	○	☑	Japanese/日本語
7	○	☐	English
8	●	☑	Chinese/中文

X20 X21 X22
緊急 保険丝 安全
停止 正常 确认

Display language can be changed easily from the menu.

Maintenance person
(Chinese person)

Maintenance by the person in charge in each country becomes easy.

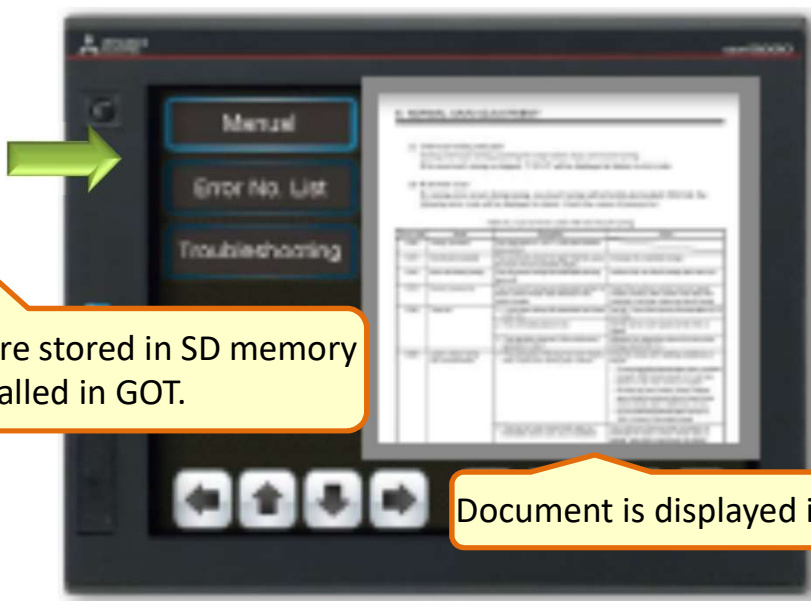**Confirm error handling methods immediately**

| Realization on PLC | Realization on HMI | Realization on PC |

Documents like operation manual etc. can be displayed in GOT, and restoration methods can be confirmed with the **Document display function of GOT2000.**

Utilizing keyword search and bookmark function, it can quickly access desired page from the PDF file.

Manual etc. are stored in SD memory card, and installed in GOT.

検索

C003

前へ　次へ　キャンセル

1589/2932ページ

Document is displayed in GOT.

(Example)
Input the servo amplifier error code

Function details and cause of error can be smoothly investigated and troubleshooting can be quick.
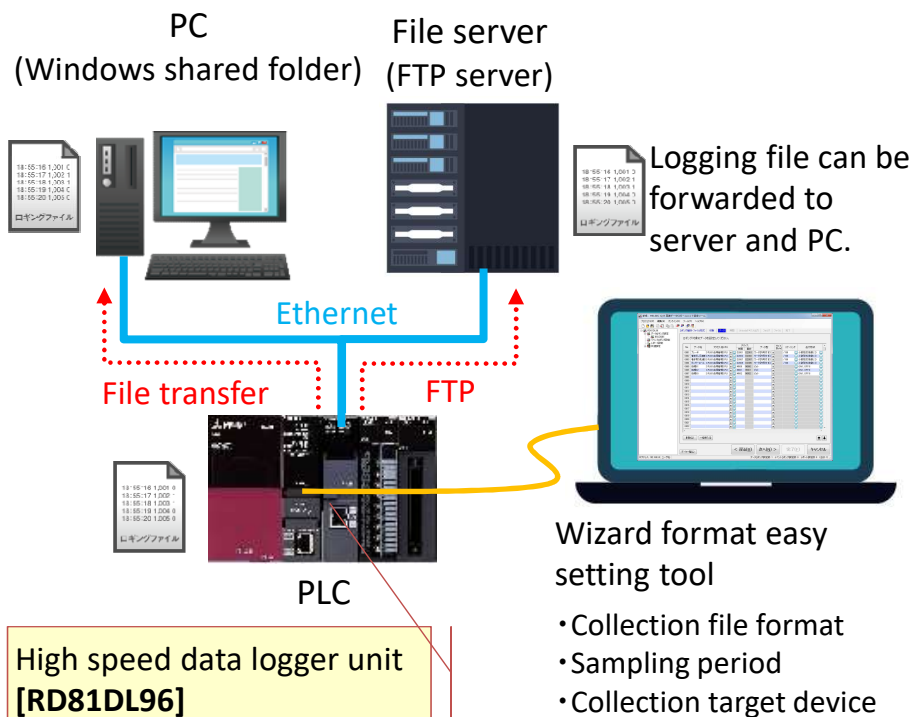
Auto creation and storage of reports

Realization on PLC	Realization on HMI	Realization on PC

By utilizing the **High speed data logger unit**, logged data can be forwarded to PC or file server.
Also, by utilizing the **Report creation function**, reports can be auto-created and stored.

PC
(Windows shared folder)

File server
(FTP server)

Logging file can be forwarded to server and PC.

Ethernet

File transfer   FTP

PLC

High speed data logger unit [RD81DL96]

Wizard format easy setting tool
・Collection file format
・Sampling period
・Collection target device
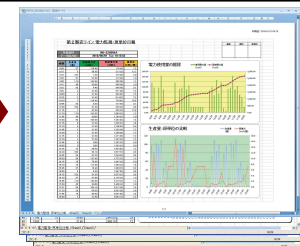
Example of convenient use

・Can be saved in Excel file format also.
 Forms and reports can be Auto generated from the logging data.

Transfer the layout file with the High speed data logger unit setting tool.

Based on the layout file, specified device value is inserted at the specified timing, and stores as the daily report file.
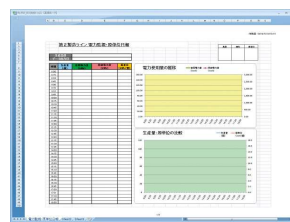
Blank daily report layout file (Excel)

Daily report file (Excel)

Products
①PLC High speed data logger unit   iQ-R series [RD81DL96]   or   Q series [QD81DL96]

Adoption points
①Data logging is possible by mounting of the PLC base and simple setting. ②Data logging is possible in memory card without troublesome system architecture. ③Easy to handle with Wizard format easy setting tool. ④Data can be used in Excel.

MITSUBISHI ELECTRIC
Changes for the Better

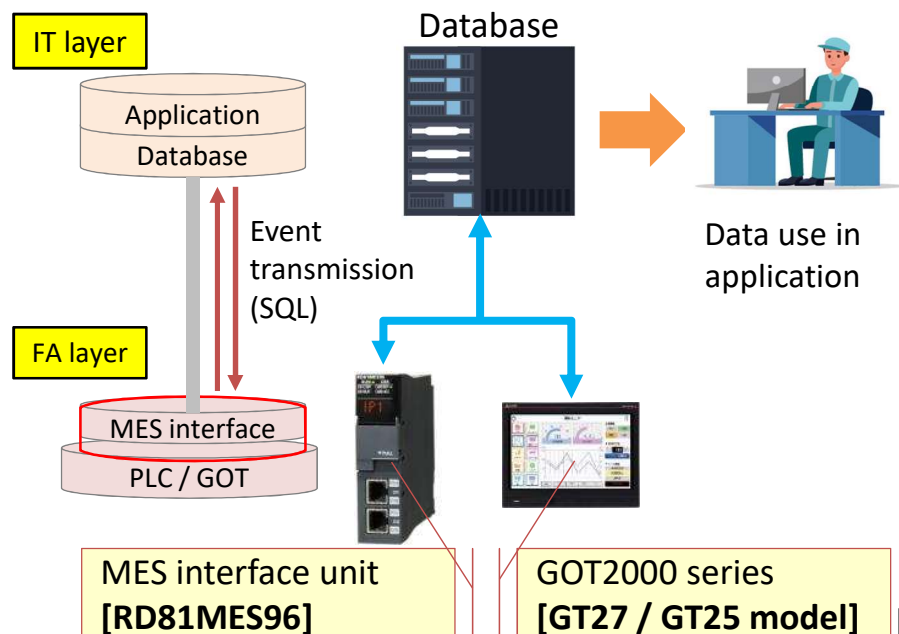## Store on-site data in database and utilize

| Realization on PLC | Realization on HMI | Realization on PC |

By utilizing **MES interface unit or GOT2000 MES function**, Connect with various databases and SQL types. FA engineer can also set with the Wizard format easy setting tool.

Accessible database classification : Oracle®Database, Microsoft®SQL Server®, Microsoft®Access®, MySQL®, PostgreSQL etc.,

IT layer

Application Database

Database

Data use in application

Event transmission (SQL)

FA layer

MES interface

PLC / GOT

MES interface unit **[RD81MES96]**

GOT2000 series **[GT27 / GT25 model]**

Products
①PLC MES interface unit   iQ-R series [RD81MES96]
               or   Q series   [QJ71MES96N]
②Display device   GOT2000 series [GT27 model]
                       or   [GT25 model]

Usage example in partner application

e-F@ctory Alliance

· **Monitoring/control system for industry/manufacturing   SA1-Ⅲ**
(Mitsubishi Electric System and Service Co., Ltd. made)

Manufacturing and confirmation of necessary information for each department is possible
・Equipment management division
・Manufacturing division
・Energy management division
・Company management division   etc.

· **Traceability system software   Traceabia**
(Mitsubishi Electric Control Software Corporation made)

Necessary functions for traceability in standard equipment
・Data search
・Trend display
・Alarm collection

Adoption points
①System architecture without need for PLC program for data communication is possible.
②Workload reduction as the program or SQL script file near the PC that fills the CSV file becomes unnecessary compared to the database link of the general PLC.
③There is no need for the update of the virus pattern file etc. without PC.
④In the MES interface function(GT27, GT25 model standard function) of GOT2000, linking of other company databases of PLC is also easily implemented.
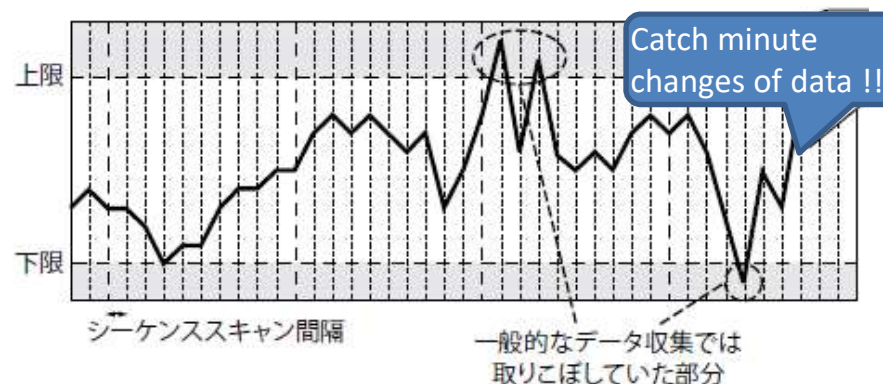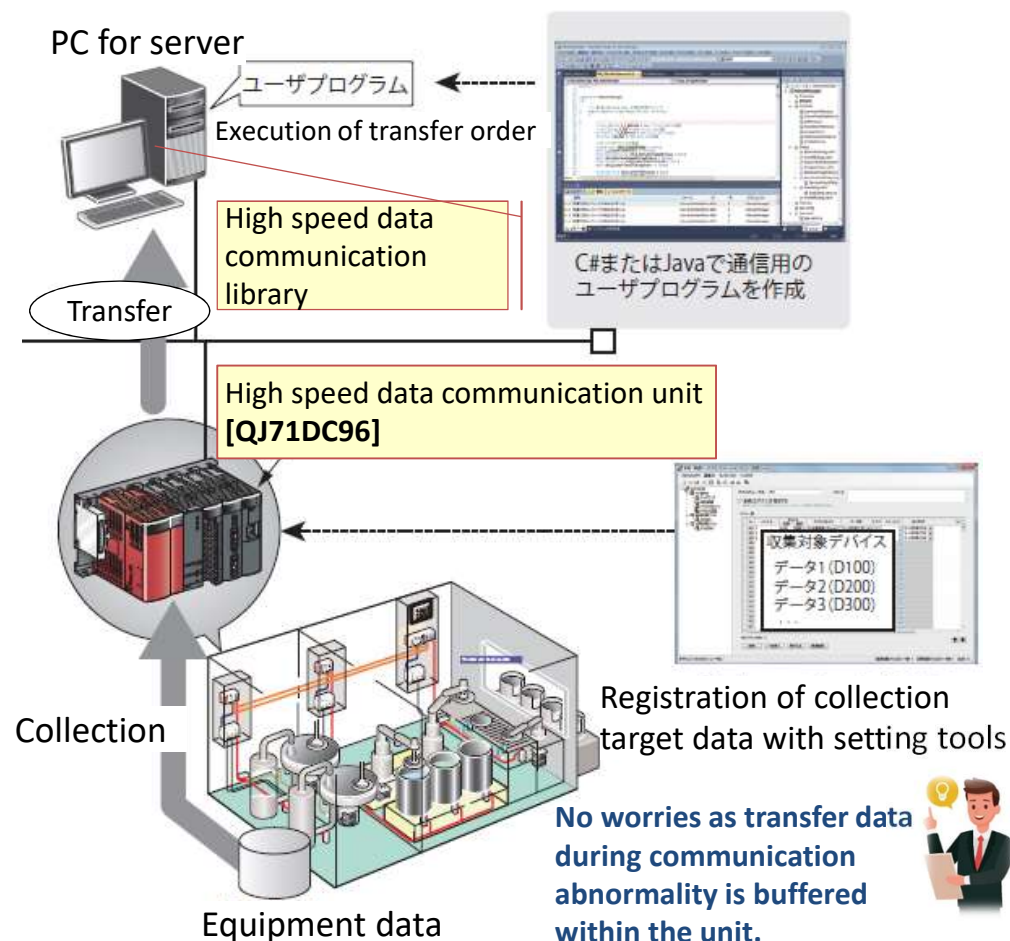
Real time transfer of control data to the PC

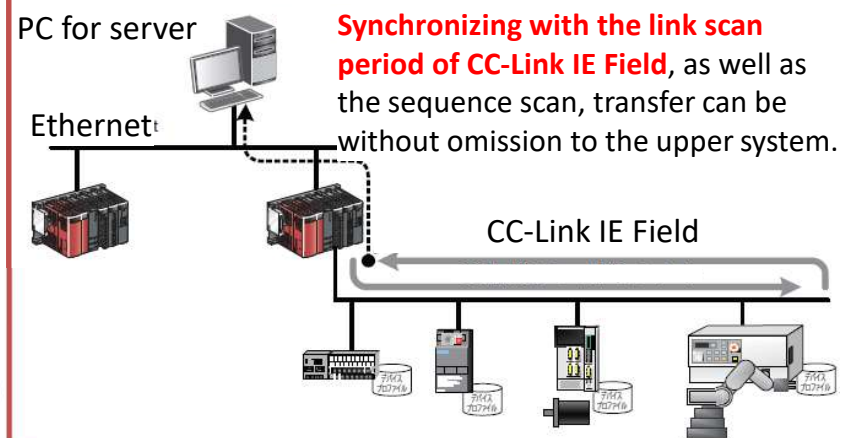| Realization on PLC	Realization on HMI	Realization on PC

By utilizing the **High speed communication unit**, data synchronized with the sequence scan with high precision can be transferred in real time through the Ethernet to user program on the PC.

PC for server

ユーザプログラム

Execution of transfer order

High speed data communication library

C#またはJavaで通信用の
ユーザプログラムを作成

Transfer

High speed data communication unit **[QJ71DC96]**

収集対象デバイス
データ1（D100）
データ2（D200）
データ3（D300）

Collection

Registration of collection target data with setting tools

Equipment data

No worries as transfer data during communication abnormality is buffered within the unit.

上限

下限

シーケンススキャン間隔

一般的なデータ収集では
取りこぼしていた部分

Catch minute changes of data !!

Example of convenient use

PC for server

Ethernet

Synchronizing with the link scan period of CC-Link IE Field, as well as the sequence scan, transfer can be without omission to the upper system.

CC-Link IE Field

Reliable and rapid high capacity data transfer in real time is possible.
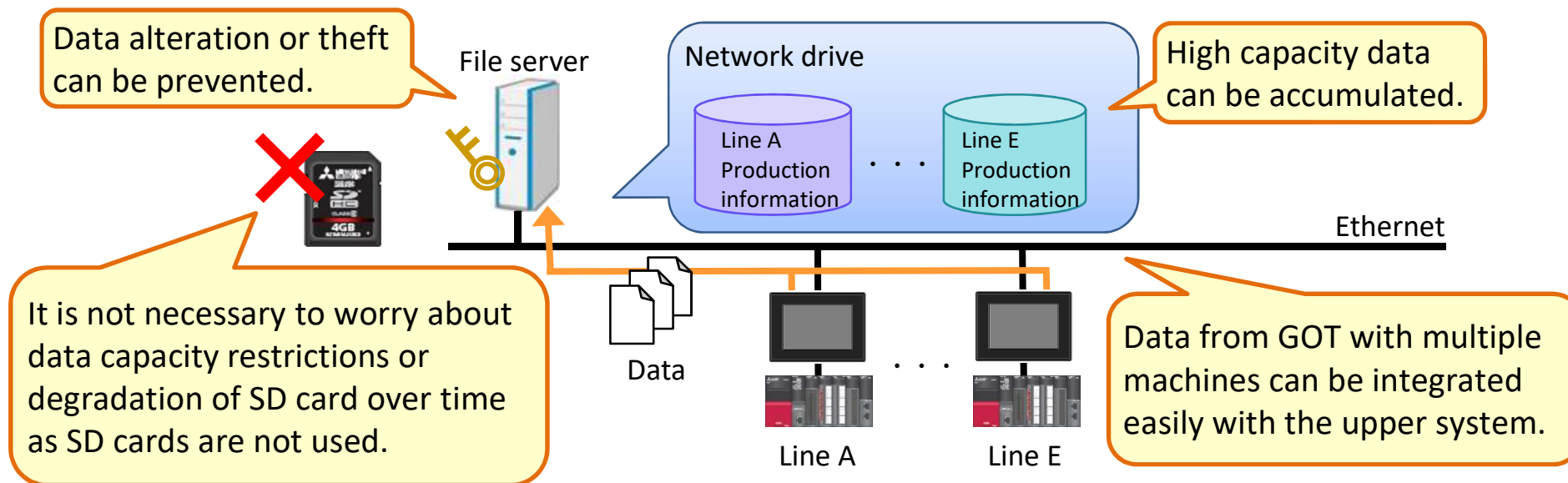
*Main product is the best effort function.

Batch management of the equipment status in the upper system

Realization on PLC	Realization on HMI	Realization on PC

Data generated by GOT can be stored in the network drive with the **Network drive function of GOT2000**.

Data alteration or theft can be prevented.

File server

Network drive

High capacity data can be accumulated.

Line A Production information

Line E Production information

Ethernet

It is not necessary to worry about data capacity restrictions or degradation of SD card over time as SD cards are not used.

Data

Data from GOT with multiple machines can be integrated easily with the upper system.

Line A   Line E

Data can be accumulated without worrying about capacity restrictions by using external storage. Data from GOT with multiple machines can be integrated easily with the upper system and batch management is possible.

Do you have these kind of problems ?

Realization on PLC	Realization on HMI	Realization on PC

● Trouble occurred however cannot be reproduced easily.

● Would like to record the status before and after the problem occurrence and check.

● Have a rough idea of the root cause however would like to obtain evidence.

● Abnormality is only detected in the current equipment system. Would like to know

the operation of the equipment or the actions of the operator when the problem occurred.

Introducing 3 application methods

GOT2000

Graphic Operation Terminal
Multimedia function

ONVIF Gateway Unit

Miranda-VR

Investigation to determine the cause becomes quick by utilizing video.

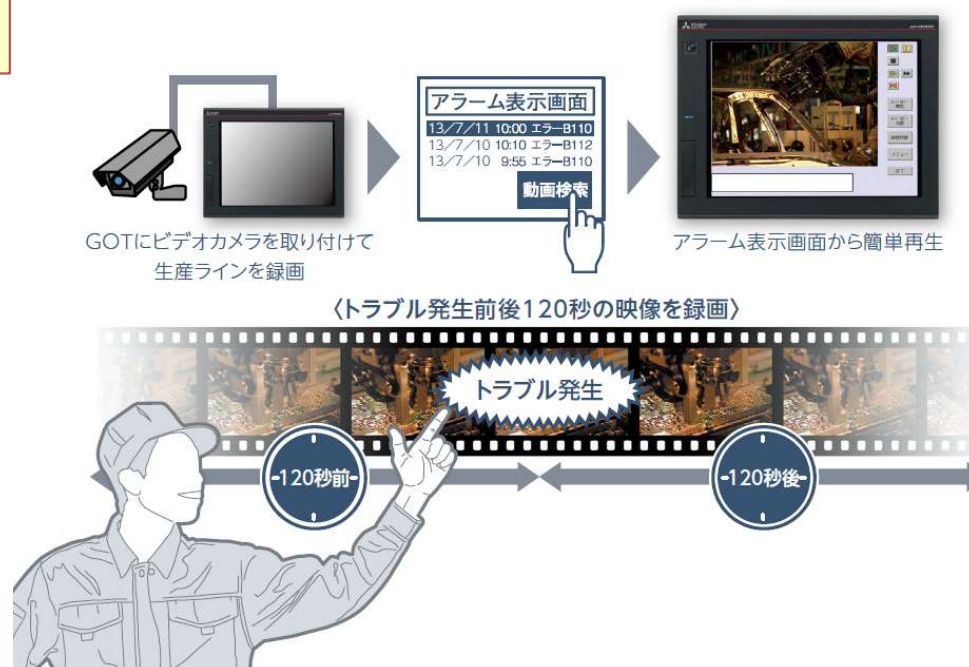## Recording and regeneration of status during problem occurrence in GOT

Realization on PLC | **Realization on HMI** | Realization on PC

GOT2000 Multimedia function records and regenerates the video in the video cameras connected to the GOT multimedia unit. Any device like PLC etc. of the connection equipment can be made the trigger for recording timing.

Received favorably well

GOT2000 series   GT27 model*
Multimedia unit   GT27- MMR- Z
CF card

*Except GT2705.

Video camera (NTSC format or PAL format

Production facilities

Problem occurrence
⇒Device ON

GOTにビデオカメラを取り付けて
生産ラインを録画

アラーム表示画面
13/7/11 10:00 エラーB110
13/7/10 10:10 エラーB112
13/7/10 9:55 エラーB110
動画検索

アラーム表示画面から簡単再生

〈トラブル発生前後120秒の映像を録画〉

トラブル発生

-120秒前-   -120秒後-

Even machine problems occurring in the production line can be analized for root cause with the clear picture later.

© Mitsubishi Electric Corporation

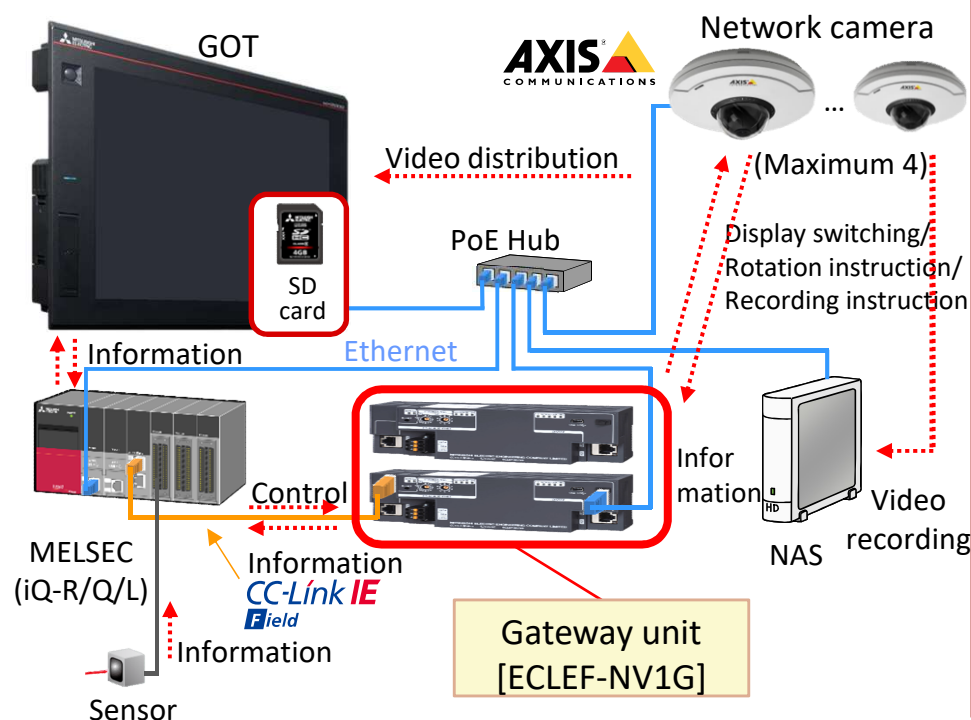# 2 How **easy** is trouble handling made ? ONVIF Gateway Unit

Video link between GOT and the network cameras
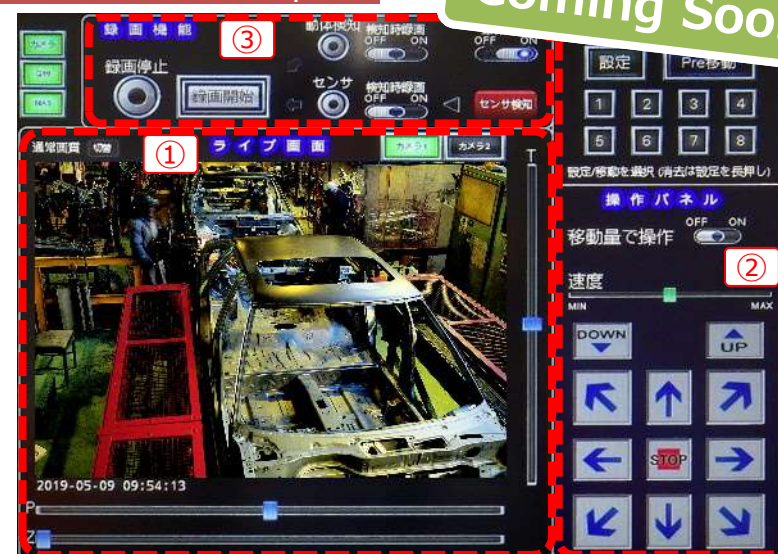
| Realization on PLC | Realization on HMI | Realization on PC |

By utilizing the **ONVIF gateway unit**, camera image confirmation, operation of the bearing of the exposure axis and drive recorder function can be implemented with GOT .

GOT

AXIS COMMUNICATIONS

Network camera

Video distribution

(Maximum 4)

PoE Hub

SD card

Display switching/
Rotation instruction/
Recording instruction

Information

Ethernet

Information

Control

Infor mation

MELSEC
(iQ-R/Q/L)

Information
CC-Link IE
Field

Information

Video recording

NAS

Sensor

Gateway unit
[ECLEF-NV1G]

GOT screen example

Coming Soon!

①Camera video display (Switching of multiple cameras possible)
*Display is 1 screen only
②Change of the bearing of the exposure axis of the camera (Registration of the bearing of the exposure axis/control of the registration direction (PTZ))
③Recording control of connected camera (Trigger is possible as any past recording with PLC)

Products
①CC-Link IE Field network / ONVIF Network support Gateway unit
 [ECLEF-NV1G] (Manufactured by Mitsubishi Electric Engineering Co. Ltd.)
②Display device GOT2000 series (Supports GT27 / GT25)
③Axis made Network camera (Refer : AXIS M5054 etc.)
④NAS (for recording) (Refer : I-O Data Device Inc., Buffalo Inc.etc.)

Adoption points
①Image confirmation of the monitoring camera and operation of the bearing of the exposure axis is possible without using the PC on-site.
②By recording the image information before and after sensor detection, investigation to determine the cause of trouble can be clarified.
 (Drive recorder function)
 Recorded images of the necessary parts can be checked in the PC, tablet etc. (Recorded video file format : mkv)

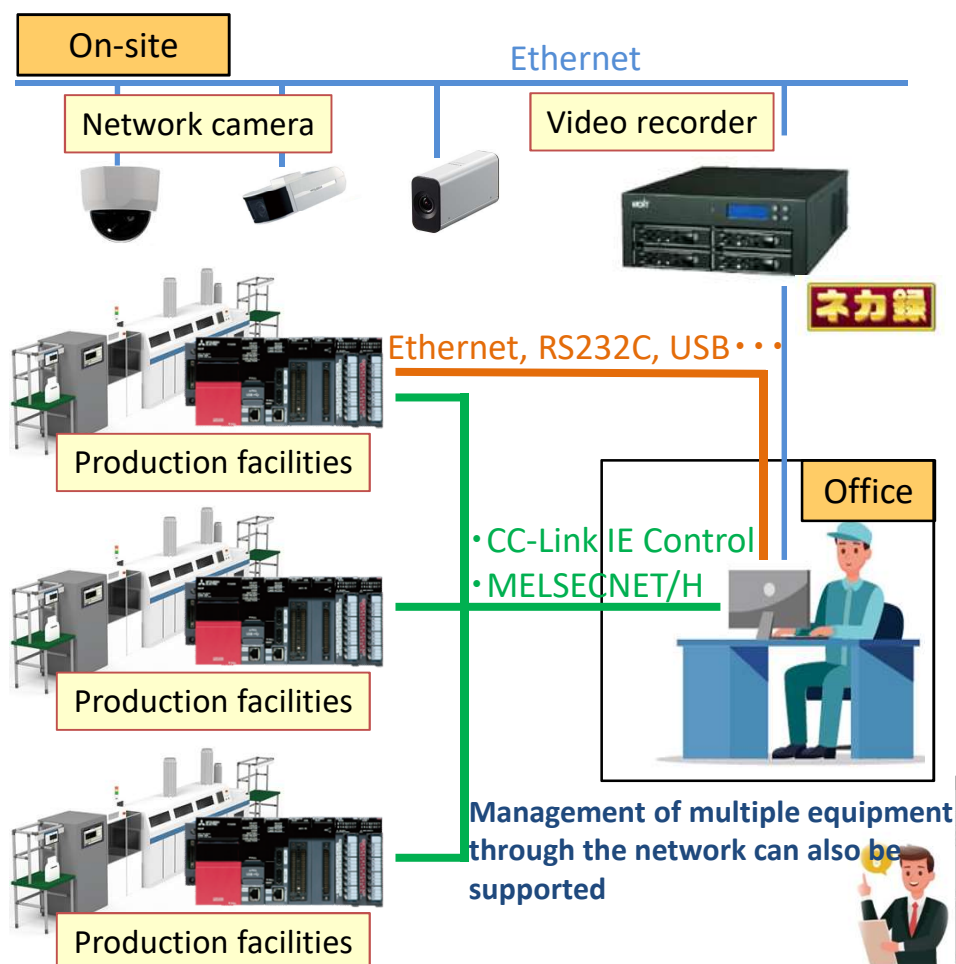# **2** How **easy** is trouble handling made ？

Miranda-VR

Linked record of the video and control data

| Realization on PLC | Realization on HMI | **Realization on PC** |

By utilizing the **Data collection software [Miranda-VR]***, linking video and control data of camera, investigation to determine the cause of trouble, and status recreation can be quick.

On-site

Ethernet

Network camera

Video recorder

ネカ録

Production facilities

Ethernet, RS232C, USB・・・

Office

・CC-Link IE Control
・MELSECNET/H

Production facilities

Management of multiple equipment through the network can also be supported

Production facilities

*Mitsubishi Electric Control Software Corporation made

Synchronized regeneration of the camera and control data of the PLC

By linking the actions of equipment and persons, productivity increase or quick problem handling and resolution can be planned.

Adoption points
① Quick trouble resolution is possible with the 2 axes of image data and equipment operation.
② Faithful reproduction of the site status even in remote location, and reduction of support effort in the remote location.
③ Simple analysis of click operation core is possible due to packaged software.

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Miranda-VR

Linked record of the video and control data

Realization on PLC

Realization on HMI

Realization on PC

Miranda-HR

Miranda-LV

Miranda-VR recommendation points!

Central management of logging data

Control data only

Ethernet

1 Custom installation is possible in existing line

CC-Link IE / MELSECNET

高速データロガーユニット

GOT

SPUユニット

データベース

MES I/F unit

2 Configurable with simple engineering tools

3 Video and control data can be stored in high capacity HD (Duplication is also possible)

OMRON シーケンサ

4 ONVIF network camera can be used

5 Camera can be extended up to 100m (Further extension is possible with HUB)

MELSEC シーケンサ

Ethernet

RS-232C、USB、Ethernet...

Network camera   Video recorder

6 PC or GOT screen can be recorded as image

Miranda-LT

Miranda-VR

Control data only

Video and control data
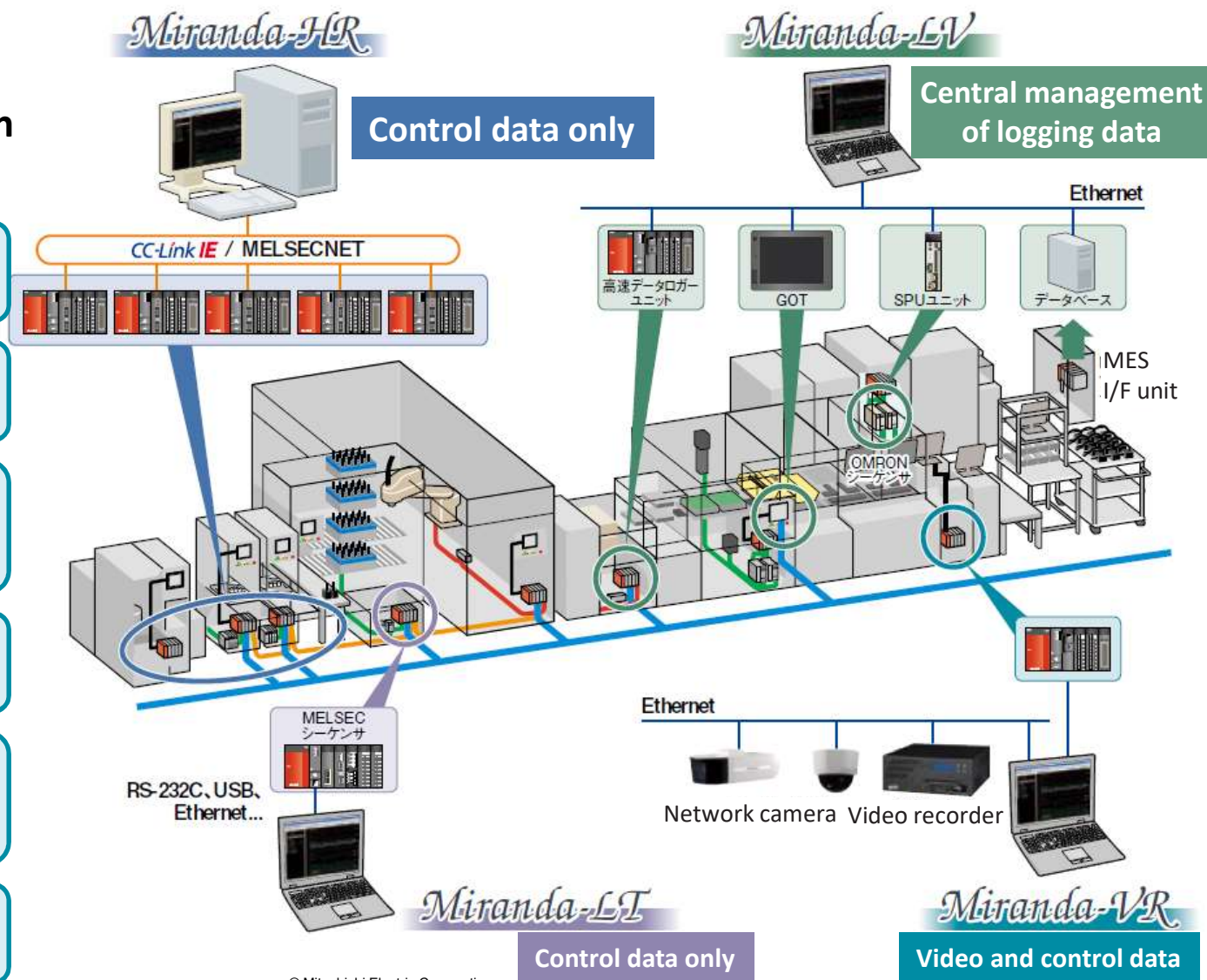
Intuitive easy-to-understand graphical interface

Trend graph

Toolbar for intuitive operation

- Collection period
- Lot number
- Type of product

Display signal list
*List of signals with graph display

Status bar
Display of name/datatype/unit/ lower and upper limits/cursor value/ cursor of the selected signal

Graph area

Monitoring

■ Trend graph

The signal value can be collected periodically and the graph displayed in real time.
Any combination of multiple signal values can be displayed.

■ Bar graph
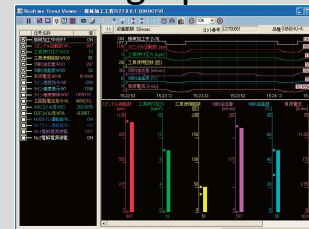
The signal value at the time indicated by the cursor in the trend graph is displayed in the bar graph.
The maximum value/minimum value of the collected signal values is displayed with the ▲ mark in the bar graph.

■ Alarm display
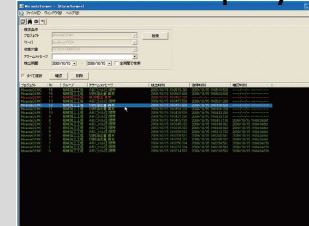
The collected signal can be monitored and displayed as alarm if there is a change in value. Comparison of the analog signal with the set value and ON/OFF change of the digital signal can be set as the alarm detection conditions. The buzzer sound during alarm detection can be recreated.

Intuitive operation and settings as per the collected data are possible.

Data accumulation function
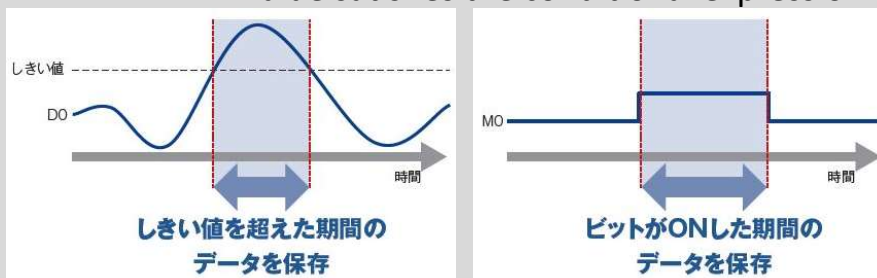
Realization on PLC

Realization on HMI

Realization on PC

The following 2 conditions can be selected for the timing of data storage
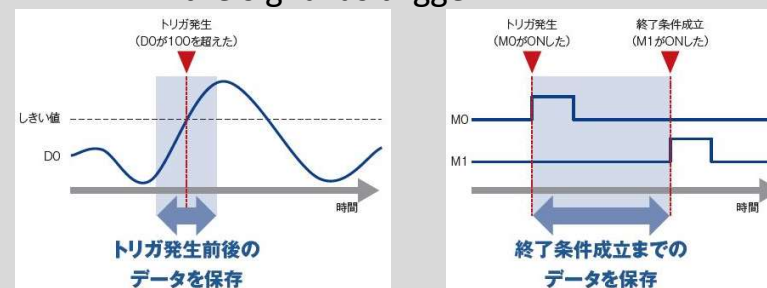
Level trigger Data is stored for the period the signal value satisfies the conditional expression
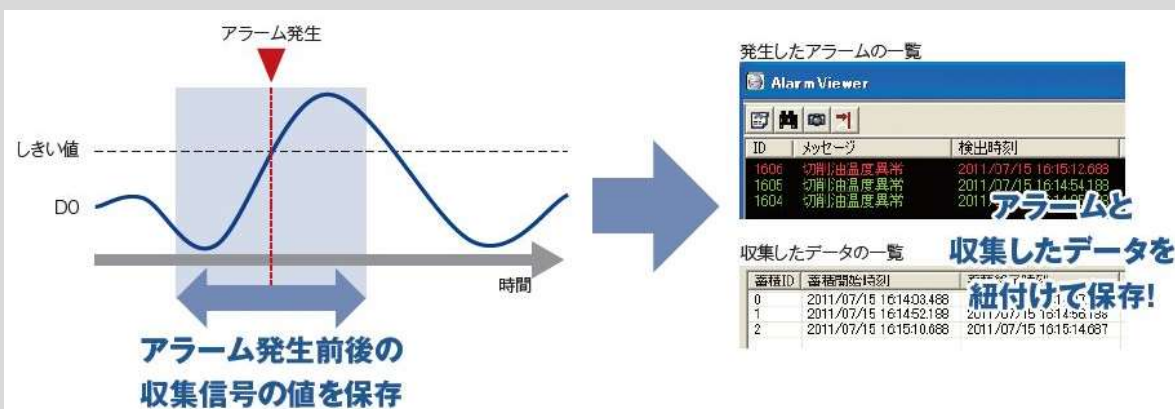

Edge trigger Data is stored with the rise and fall of the signal as trigger

Alarm can also be set in the conditional expression, and data before and after alarm occurrence can be backed up and stored

Alarm settings for trigger conditions

By linking and storing the alarm occurrence and collected data, data during abnormality occurrence can be searched easily

Data collection and storage can be implemented with the aforementioned timing.

Alarm monitoring function

| Realization on PLC	Realization on HMI	**Realization on PC**

The following 2 methods can be selected for alarm occurrence periods
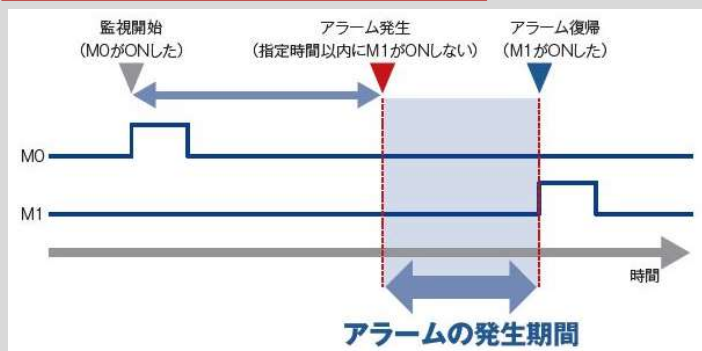
Constant comparison
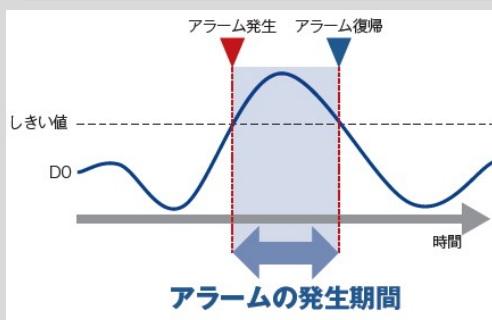
The signal value is periodically monitored, and the alarm is detected if the detection condition of the set alarm is satisfied.

The period the waveform exceeds the threshold value can be detected as the alarm occurrence period
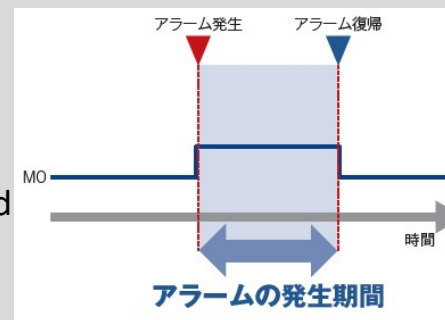
The period the contact is ON can be detected as the alarm occurrence period

Timeout monitoring

Alarm occurs in case the signal value does not change within the specified time

After the signal value satisfies the monitoring start conditions, alarm occurs if the next condition is not satisfied within the specified time

Setting of alarm detection and occurrence period can also be flexibly changed.

Setting / Tuning / Diagnosis of Servo without PC

Realization on PLC	Realization on HMI	Realization on PC

By utilizing the **GOT Drive**, part of the functions (Setting / Tuning / Diagnosis) of MR Configurator2 (MR-J4 support) can be implemented in GOT.

Servo motor

Received favorably well

MITSUBISHI GRAPHIC OPERATION TERMINAL
MITSUBISHI SERVO AMPLIFIERS & MOTORS
GOT2000 + MELSERVO-J4

Before (PC) — **After (GOT Drive)**

PC is necessary to do anything. It is terrible···

Increase of sites where PC cannot be taken inside

Easy as tuning of set up and maintenance work can be done with GOT without PC!

© Mitsubishi Electric Corporation

Setting / Tuning / Diagnosis of Servo without PC

| Realization on PLC | Realization on HMI | Realization on PC |

GOT Drive application scenario

Servo motor

配線の確認

周辺環境の確認

各パラメータの設定

テスト運転モードによる
サーボモータ単体でのテスト運転

指令による
サーボモータ単体でのテスト運転

機械を連結してのテスト運転

ゲイン調整

Before (PC)	After (GOT Drive)
Parameter setting / change in MR Configrator2	➡ Parameter setting/change from GOT
Cam data creation in MT Works2	
Implementation of JOG operation etc. in MR Configrator2	➡ JOG operation using GOT
Graph function of Servo status	➡ Graph verification using GOT
Digital oscilloscope function	
Machine analyser function	
Implementation of one touch tuning, tuning function in MR Configrator2	➡ Implementation of one touch tuning, tuning function using GOT

Set up / tuning of servo is also possible without PC.

Setting / Tuning / Diagnosis of Servo without PC

Realization on PLC

Realization on HMI

Realization on PC

GOT Drive application scenario

Servo motor

Before (PC)	**After (GOT Drive)**
	Confirming the servo network configuration using GOT
Drive recorder function	Analysis with the GOT Drive recorder function
Machine diagnostic function	Display of machine diagnosis results in GOT
Amp lifespan diagnostic function	Display of amp lifespan diagnosis information in GOT
Electric power monitoring function	Display of electric power information in GOT
Alarm details display	Display of alarm details, countermeasure information in GOT

本稼動

停止
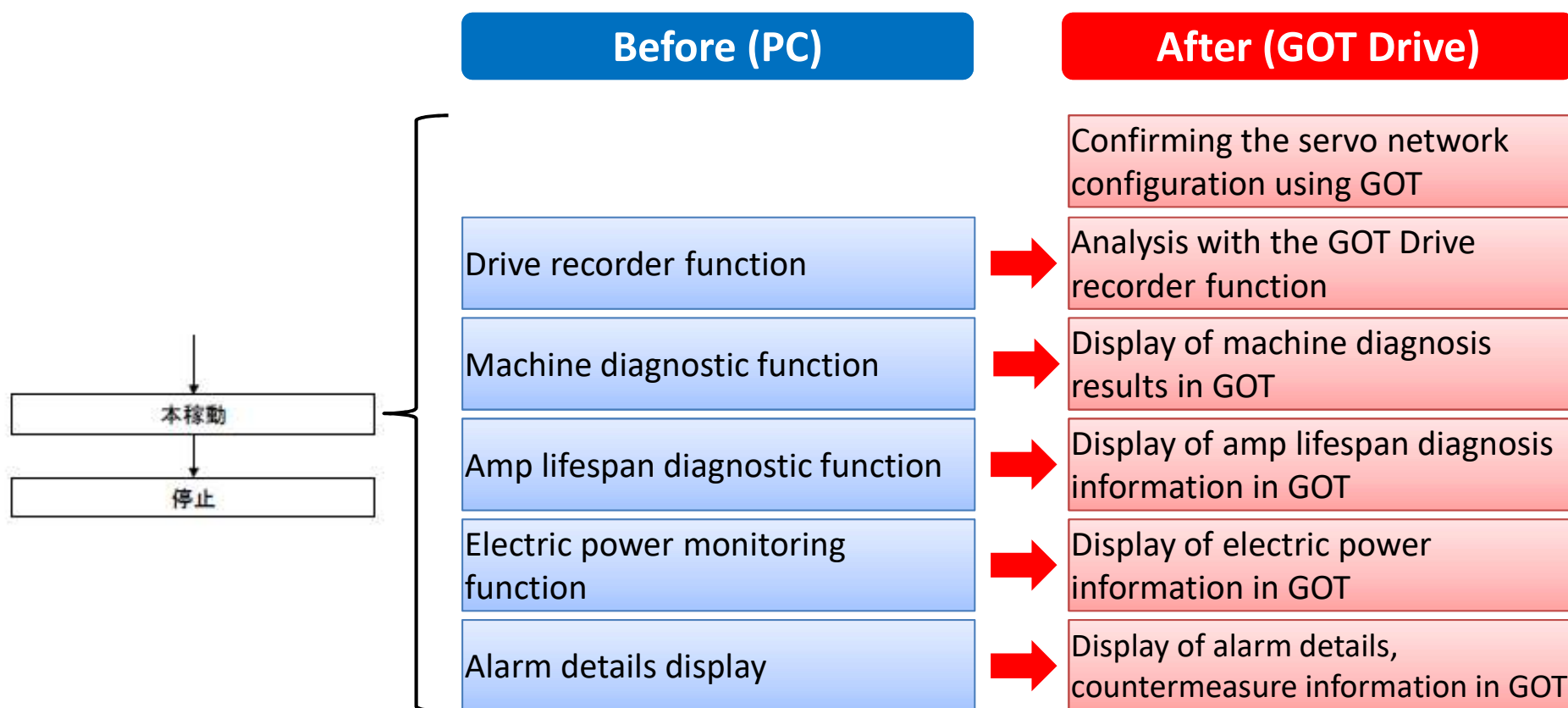
Servo maintenance / preservation while working is also possible without PC.

© Mitsubishi Electric Corporation

One touch tuning of servo without PC

Realization on PLC | **Realization on HMI** | Realization on PC

One touch tuning is possible with a single button on the GOT screen with the **One touch tuning / Tuning function of GOT2000** without connecting the PC.

Servo motor

Finding the optimum gain at equipment set up is difficult.
It is troublesome to connect the PC for gain tuning every time.

One-touch tuning is possible with a single button on the GOT screen!
Same tuning operation as MR Configurator 2 is possible without PC.
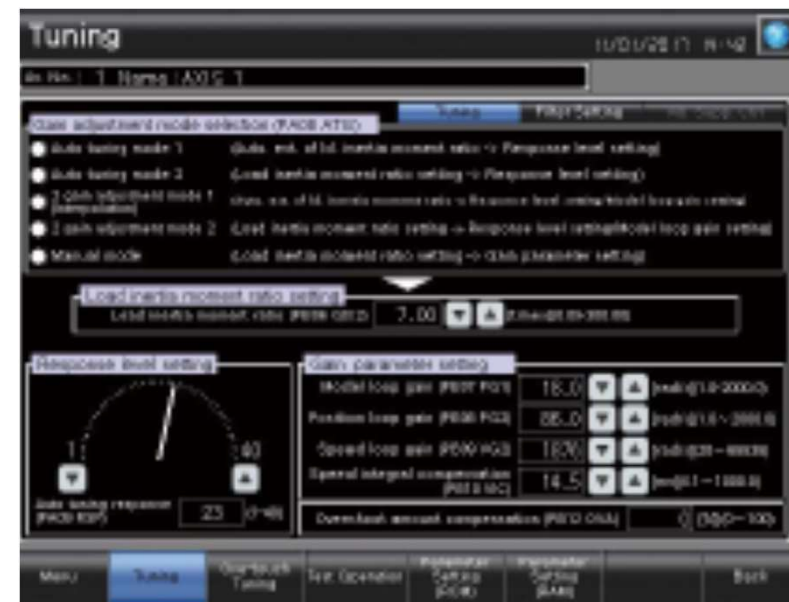
Set up / tuning can be optimized with tuning in GOT without PC.

Confirmation of servo waveform data without PC

Realization on PLC	Realization on HMI	Realization on PC

Servo data (motor electric current, position instructions etc.) before and after servo alarm occurrence can be read out and displayed as waveform or data list with the **Drive recorder function of GOT2000**.

Display the waveform data during servo alarm occurrence

Can be checked with the graph waveform from the alarm occurrence time list

Servo motor
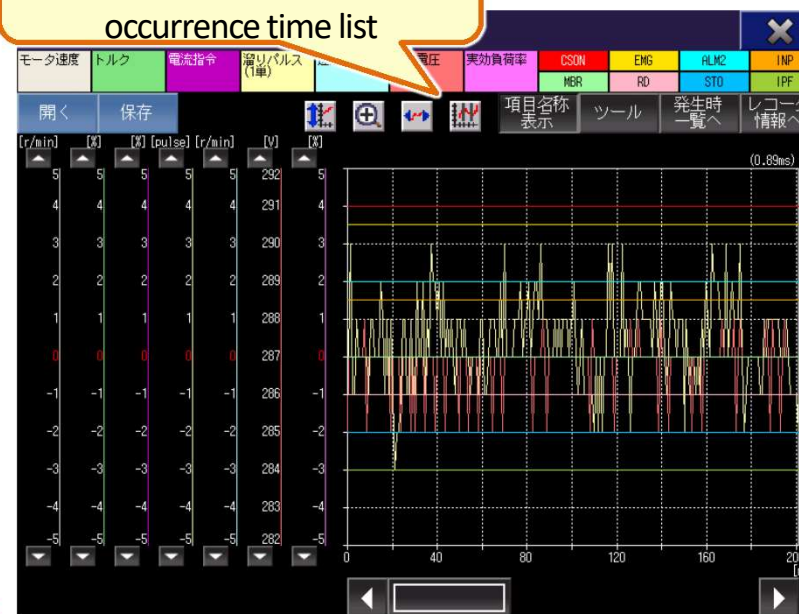
The engineer can investigate the cause without going to the site if the gpf2 files storing the measurement results etc. are sent through mail etc.

gpf2ファイル

Remote location

Servo data can be easily checked in GOT without PC.

Checking servo alarm without PC

Alarm during occurrence, history, detailed information can be checked in GOT with **Alarm display function of GOT2000**. The servo amplifier status can be checked in the system block diagram with **System launcher function**.
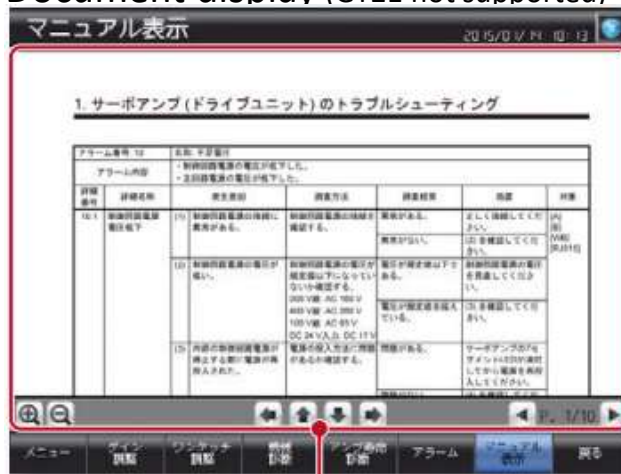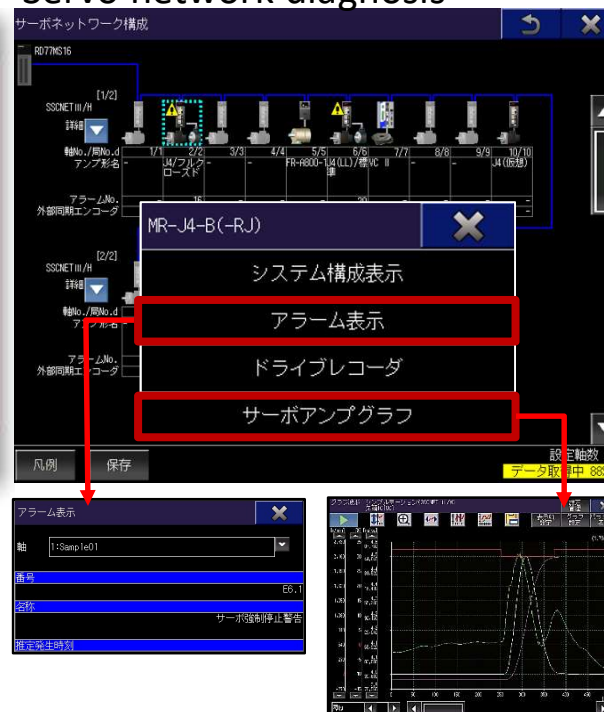
Servo motor

Alarm display

Document display (GT21 not supported)

Servo network diagnosis

Touch here for detailed display!

Details of alarm occurred can be checked !

Abnormal parts are displayed in an easily understandable manner.

GOT abnormal parts can be checked without PC and troubleshooting can be quick.

MITSUBISHI ELECTRIC
Changes for the Better

GOT Drive

## Inverter maintenance without opening the control panel

| Realization on PLC | Realization on HMI | Realization on PC |

The current values of the inverter output frequency, output voltage etc. can be monitored in GOT with the **batch monitoring function of GOT2000**. Simple mode parameters of the inverter can be tuned in GOT with the **parameter setting (Simple mode) function**.

Inverter
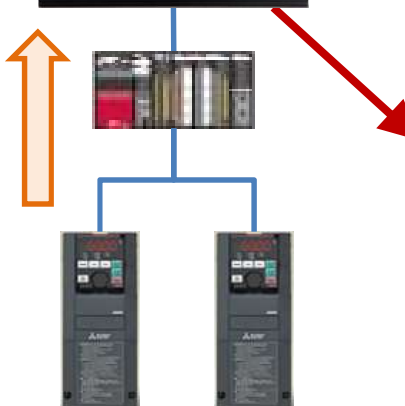
There is no work of setting up the PC or checking the inverter directly as monitoring can be done with GOT.

Parameters can be backed up (stored) as recipe files, and restored (written) when necessary.

By switching the target deparment, multiple inverters can be monitored.

The parameter to be set can be quickly found as the parameter names are displayed in a list.

**Batch monitoring of inverters and easy tuning of parameters are implemented in GOT.**

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MITSUBISHI ELECTRIC
Changes for the Better

GOT Drive

Restoration to parameter before tuning

| Realization on PLC | Realization on HMI | Realization on PC |

The inverter parameters can be backed up / restored using the GOT recipe function with the **parameter recipe (Simple backup / restore) function of GOT2000**.

Parameter recipe setting

Axis 1

Back up date

Back up
(INV → GOT)
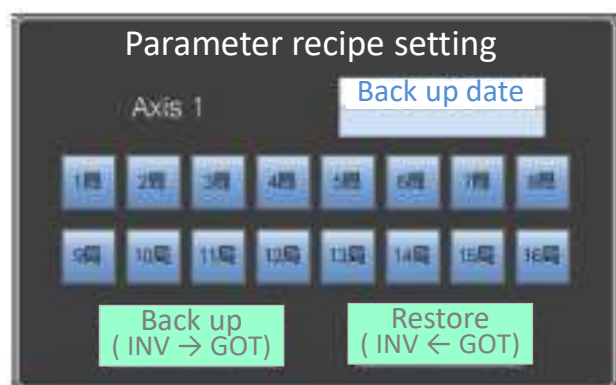
Restore
(INV ← GOT)

Parameter setting screen

▶ Return to the parameter before adjustment

① Back up current parameter as recipe file before adjustment

Recipe File

② Restore backed up parameter in advance

Inverter

OK

During set up / tuning of the inverter, parameters can be restored with the values before change.

Easy set up / tuning of the robot

Realization on PLC

Realization on HMI

Realization on PC

Robot operation can be performed from GOT without using teaching box with **Robot linking function of GOT2000**. Robot operation work, jog operation and hand operation etc. is possible from the GOT screen.

Robot

< Robot operation panel screen>

< Robot jog/hand operation screen >

*Sample screen data can be downloaded from the Mitsubishi Electric FA website !

Quick handling of Robot troubles.

3 How is problem occurrence **prevented** ?

| **Prevention of system crash by detecting relay lifetime** | **Realization on PLC** | Realization on HMI | Realization on PC |

Counting number of times the relay is ON in the Relay output unit, and sounding the alarm when the relay lifetime approaches, exchange is possible before the unit breaks down. Output unit has heating safeguards and excess current safeguards.

| 発生 時間	発生 箇所	先頭 I/O	エラー情報
12/2 13：10：30	基本 ベース	0010	Y04リレーON 回数積算設定値 オーバ
12/2 13：20：30	基本 ベース	0010	Y05リレーON 回数積算設定値 オーバ

Unforeseen system crash can be prevented.

Maintenance cost and time reduction in the spring clamp terminal block

Realization on PLC	Realization on HMI	Realization on PC

By utilizing the **iQ-R or iQ-F spring clamp terminal block products**, loosening of the electric cable due to oscillation can be prevented.

STEP1 → **STEP2** → **STEP3**

Precision driver etc.

PUSH
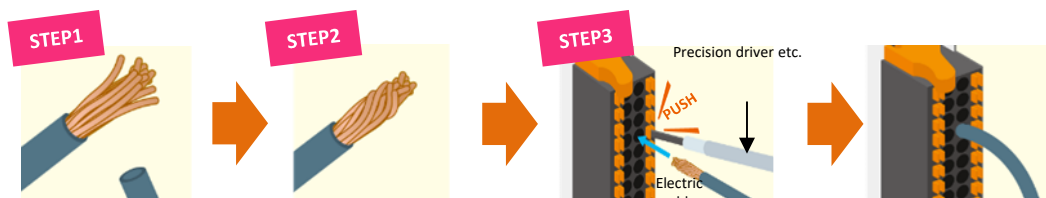
Electric cable

Wire facing **Twisted wire** **Electric cable insertion** **Wiring complete!**

*iQ-R can only use stick type crimped terminal

iQ-R series

Input unit
・RX10-TS
・RX40C7-TS
・RX41C4-TS

Output unit
・RY10R2-TS
・RY40NT5P-TS
・RY41NT2P-TS
・RY40PT5P-TS
・RY41PT1P-TS

iQ-F FX5 series

CPU unit
・FX5UC-32MT/DS-TS(DSS-TS)
・FX5UC-32MR/DS-TS
Input unit
・FX5-C32EX/DS-TS
Output unit
・FX5-C32EYT/D-TS(DSS-TS)
・FX5-C16EYR/D-TS

I/O unit
・FX5-C32ET/DS-TS
・FX5-C32EYT/DSS-TS
Intelligent unit
・FX5-4AD/4DA
・FX5-8AD
・FX5-4LC

✓ Crimping connector or crimping tools are not necessary!

✓ Wiring is possible without cost!
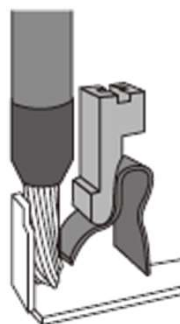
Spring clamp terminal block is the terminal block to fix electric cable conductor with the force of the spring inside the terminal block.
Electric cable loosening due to oscillation can be prevented as it is fixed with constant force.

Furthermore!

If the stick type crimped terminal is used, wiring is possible by inserting with the push-in method.

Wiring is smooth even within narrow disks!

Periodic tightening maintenance is unnecessary.

3 How is problem occurrence **prevented** ?

Prevention of unauthorized access through the network

Realization on PLC	Realization on HMI	Realization on PC

By **registering IP addresses able to access the CPU unit**, unauthorized access to the CPU unit(Customer property) from equipment other than those permitted can be prevented.

MELSEC Q series

Access control with the remote password function by setting password for each communication channel/connection.

MELSEC iQ-R series

Smooth access control with the IP filter function

New functions in addition to existing features

IP address registration

Block access to IP addresses other than the ones set

Wrong rewriting of programs can be prevented.

Restriction of operations for persons without permissions

Realization on PLC	Realization on HMI	Realization on PC

Operator login can be managed with operator name and password utilizing the **Operator authentication function of GOT2000**.

◎ Operation authorized

Operation screen is displayed

Login OK

× Operation unauthorized

Operation screen is not displayed

Login NG

◆ The administrator can register, edit and delete operator management information.

◆ Management by multiple administrators is implemented by specifying general operators as sub-administrators.

<NEW>

External authentication with USB device

Supports external authentication with USB device connected to the USB interface(Host) of GOT.

Not to worry about security with password management.

Verification of machine lifetime

Realization on PLC	Realization on HMI	Realization on PC

The machine diagnostics information of the servo amplifier can be checked without connecting to PC in GOT with the **Machine diagnostic function of GOT2000**.

Servo motor

Motion Controller

Servo Amplifier
MR-J4-☐B(-RJ)

Ball screw

Servo Motor

By switching the axis numbers, multiple axes can be maintained in the same screen.

The estimated values collected with the Machine diagnostic function of the servo amplifier are displayed in GOT.

Preventive maintenance is supported without PC by understanding the degradation over time of high frequency acceleration equipment with heavy load.

Checking the lifetime of the condenser and relay of the servo amplifier
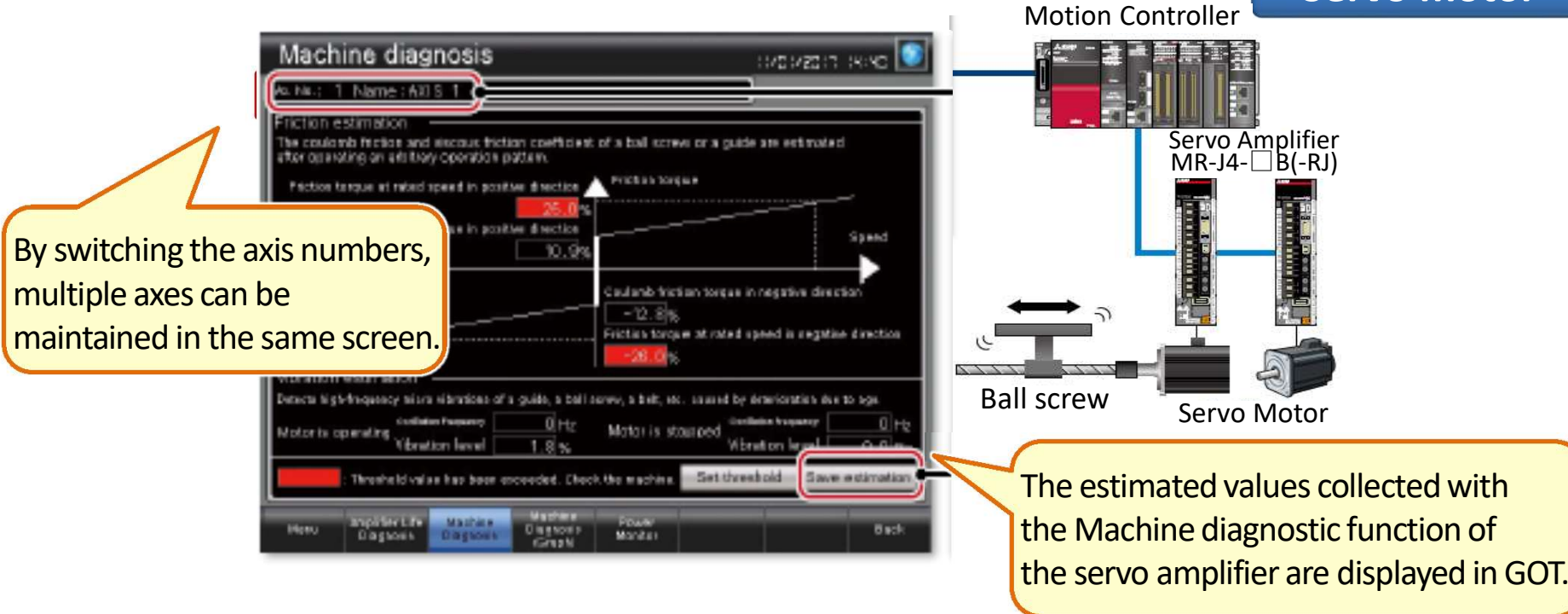
Realization on PLC	Realization on HMI	Realization on PC

The machine diagnostics information of the servo amplifier can be checked without connecting to the PC in GOT with the **Amplifier lifetime diagnostic function of GOT2000**.

Servo motor

◆ **Criteria for switching time of the condenser and relay can be checked in GOT.**

◆ **The above link with the alarm function of GOT is also possible.**

Periodically check the internal data of the servo amplifier
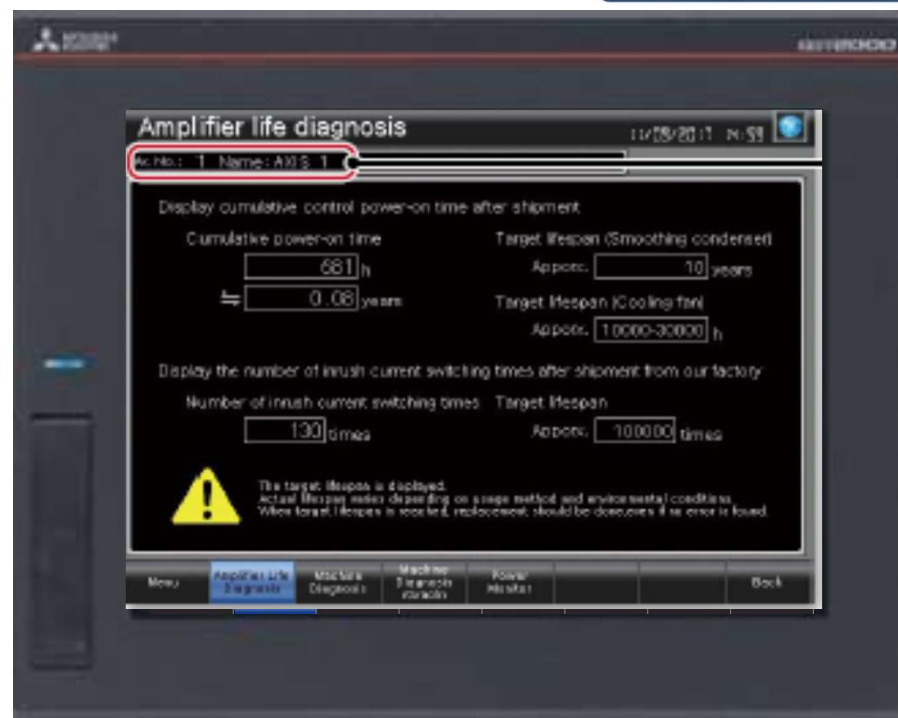
Preventive maintenance is supported without PC by understanding the amplifier lifetime.

Understanding the switching time of the inverter

| Realization on PLC | Realization on HMI | Realization on PC |

The operating status of the existing lifetime components of the inverter can be monitored in GOT with the **Inverter lifetime diagnosis of GOT2000**, and the switching time can be checked.

Inverter

インバータ寿命診断   2018/06/08 15:45

局番選択 局番： 1 Axis 1

⚠ 寿命は目安を表示しています。
ご使用方法や環境条件により実際の寿命は変動しますので
異常を発見した場合、交換の必要があります。

警報	名称	寿命	詳細
⚫	主回路コンデンサ (標準構造品、IP55対応品)	100 %	寿命は主回路コンデンサ寿命測定したものです。 85%以下が交換次期の目安です。
⚫	制御回路コンデンサ	100 %	10%以下が交換時期の目安です。
⚫	突入電流抑制回路 (標準構造品、IP55対応品)	100 %	10%以下が交換時期の目安です。
⚫	冷却ファン	----------	指定回転数未満で警報を表示します。
⚫	内気循環用ファン (IP55対応品)	----------	定格回転数の70%未満で警報を表示します。
----	積算通電時間	123456 h	インバータ出荷後の通電時間の積算値です。
----	実稼働時間	123456 h	インバータが運転している時間の積算値です。

メニュー | アラーム履歴(インバータ) | 機械診断(負荷特性測定) | インバータ寿命診断 | | | | 戻る

Criteria for switching time of the lifetime components are displayed in GOT.

Preventive maintenance is implemented by switching before the break down of inverter.

MITSUBISHI ELECTRIC — Changes for the Better

e-F@ctory **Support module**

Small start
Customizable

Realization on PLC **Realization on HMI** Realization on PC
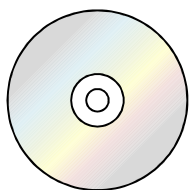
Sample Program

GX Works 3 format Sample project for MELSEC iQ-R series

GT Works 3 format Sample project for GOT2000 series

MELSEC iQ-R series

GOT2000 — Graphic Operation Terminal

Provide the sample program to support IoT at the manufacturing site.
Can be used in operation monitoring, preventive maintenance and quality control.

Equipment operation monitoring solutions

Packaged all-purpose functions that can be used by many customers.

Operation monitoring
Implement operation monitoring of the manufacturing site by collecting operating information from the equipment.

Production counting

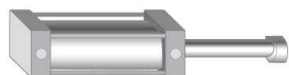Processing ability index

Operation status monitor

Preventive maintenance
Preventive maintenance is implemented by monitoring the operating time or frequency of the air cylinder, the cycle time or frequency of the equipment.

Cylinder measurement monitor

Cycle time measurement monitor

Abnormal signs inspection

Vibration analysis (FFT analysis)

Primarily used in preventive maintenance or quality control.
FFT analyze the analog waveform taken from the sensor and transform to the frequency axis.

Vibration — Time

FFT analysis

Vibration

Easy to understand abnormal signs or abnormal parts

Frequency [Hz]
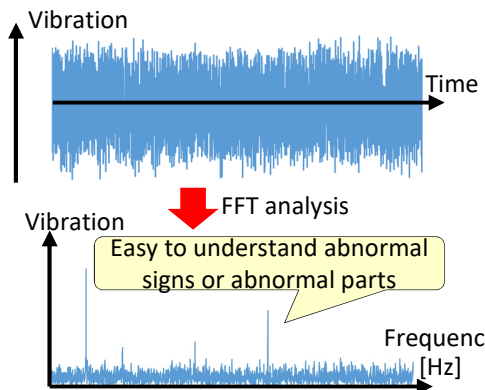
Multivariate analysis (MT method)

Primarily used in process monitoring or quality control.
Draw uni space (Standard data group) with the data during normal time, and judge if the new data is normal or abnormal.

Normal judgment method — Item A

Simple judgment of abnormality if far from the average as correlation is not considered

+5, 0, -5 — 0 +5 — Item B

MT method — Item A

Judgment of normal/abnormal based on the balance between items

+5, 0, -5 — -5 0 +5 — Item B

Operation monitoring and preventive maintenance of existing equipment

Realization on PLC	Realization on HMI	Realization on PC

Operation monitoring and preventive maintenance can be implemented in existing equipment by adding the equipment operation monitoring solutions of the e-F@ctory assistance module.

e-F@ctory Support module
Equipment operation monitoring solutions

Sample Program

New PLC / GOT

iQ-R   GOT2000

Existing equipment
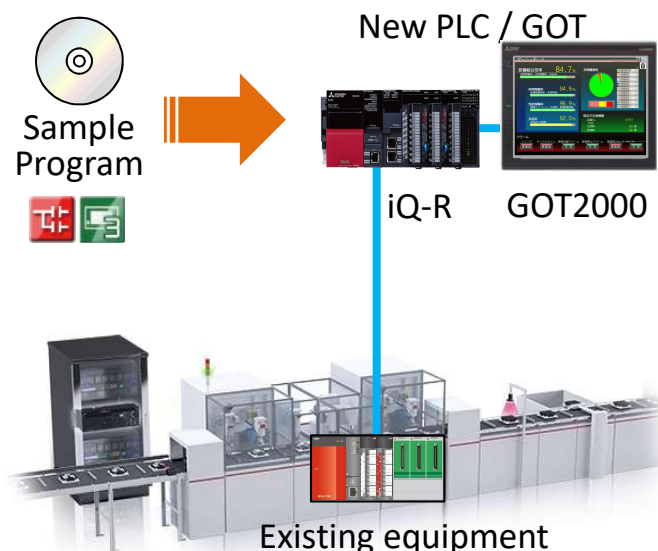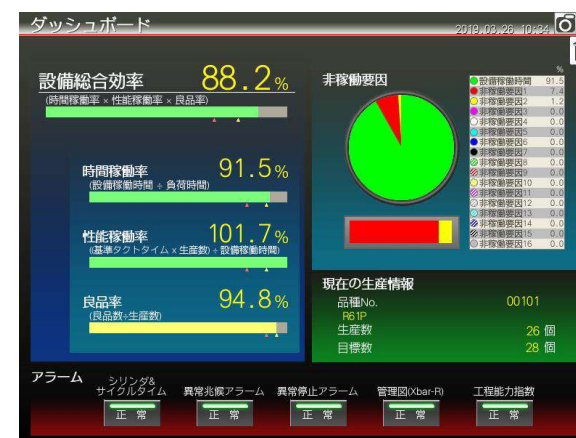
Dashboard screen

Integrated display of overall equipment efficiency, production number etc., equipment production/operation status. As transition to each function screen from the dashboard screen is possible, checking the points of alarm occurrence, checking the detailed status in each function screen is possible.

Products

① e-F@ctory Support module Equipment operation monitoring solutions
② PLC CPU : iQ-R series (R16CPU or higher capacity CPU)*1
③ GOT : GOT2000 series resolution SVGA(800×600) main body unit *2
  *1 In case all functions are utilized
  *2 Can also be used in WXGA(1280×800) or XGA(1024×768) with GOT type change (Minute modifications like object position etc. are necessary)

Adoption points

① By installing the e-F@ctory Support module in the PLC or GOT, equipment operation monitoring can be easily implemented.
② By understanding the operating time or frequency of the air cylinder, the cycle time or frequency of the equipment, abnormal signs are caught and equipment troubles are prevented.
③ As the e-F@ctory Support module can be remodeled/changed at the customer side, setting of optimum monitoring items in one's company equipment is also possible.

3 How is problem occurrence **prevented** ?

Operation monitoring and preventive maintenance of existing equipment

Realization on PLC	Realization on HMI	Realization on PC

Production counting

Production information (production quantity, no. of good good products etc.) is visualized. Production information of today and production information from the past till now can be displayed by type of product or time band.

No. of types of products : Maximum 100

Processing ability index *1 (Histogram display)

Function to monitor the stability of the manufacturing process in real time.
Visual checking of the distribution, alarm monitoring of processing ability index can lead to real-time improvement.

*1   Processing ability index:Index to quantitatively evaluate ability to manufacture product within the standard price

Operation status monitor

Function to visualize equipment status.
Equipment operation status (operation, stoppage, faulty operation) is displayed in a time lapse graph, and real-time status monitoring of equipment is implemented.

Cylinder & Cycle time *2 Measurement monitor

Function to measure the operation cycle time of the cylinder or equipment, and can be applied in predictive maintenance or abnormality detection.
Measures the operation time or operation frequency, and implements status monitoring and alarm monitoring due to set threshold.

No. of possible monitors : 500

*2   Cycle time is the operation time for a single process in the production line.

Operation monitoring and preventive maintenance of existing equipment

Realization on PLC | **Realization on HMI** | Realization on PC

Abnormal signs inspection / Abnormal stop step

Function to digitize troubleshooting during occurrence of abnormalities in equipment and history of countermeasures. Registers the countermeasure details of each item during abnormality occurrence in advance, and displays according to the abnormality that occurred. Also saves the date of abnormality occurrence and the countermeasure details in the history.

Registration quantity : Each 50 points

Pareto graph of equipment trouble
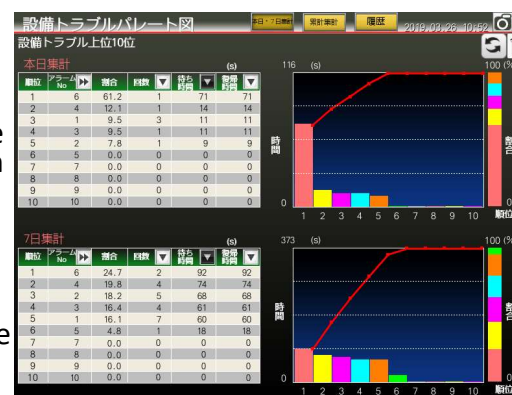
Function to visualize occurrence status of equipment trouble. By sorting and displaying the generated alarm in Pareto image, sampling of the extraction of the root cause of the trouble that is reducing production efficiency is easy.

Control chart (X bar R)

Function to monitor the stability of the manufacturing process in real time. Visual checking of the scattering of quality with Xbar-RControl chart*3, alarm monitoring can lead to real-time improvement.

Loss time analysis

Function to apply in analysis of 16 big loss, 7 big loss causing deterioration of manufacturing efficiency. The proportion of faulty operation time by cause of faulty operation of equipment is measured/displayed in the 3 formats of total/time band wise/past 14 days.

*3 Xbar-RControl chart can be used to check if the range(R) and average value (Xbar) of measured value are within range of scattering due to chance causes.

© Mitsubishi Electric Corporation

Preventive maintenance of equipment with Vibration analysis (FFT)

Realization on PLC	Realization on HMI	Realization on PC

Detection of increase in wear of machine components, prevention of chance failure of equipment in cutting equipment, compressor etc. can be implemented by collecting the vibration data arising from the manufacturing process.

e-F@ctory Support module
Vibration analysis (FFT analysis)

① シーケンサCPU
振動解析
（CPUユニット R08CPUなど）
サンプリング・ロギング
（高速アナログ入力ユニット R60ADH4）
振動センサ

② C言語コントローラ
振動解析
（C言語コントローラ R12CCPU-V）
サンプリング・ロギング
（高速アナログ入力ユニット R60ADH4）
振動センサ

③ C言語インテリジェント機能ユニット
振動解析
（C言語インテリジェント機能ユニット RD55UP06-V）
CPUユニット R04CPUなど
サンプリング・ロギング
（高速アナログ入力ユニット R60ADH4）
振動センサ

Glass cutting equipment adoption example

・Wear detection of glass cutter edge

Compressor adoption example

・V belt wear, tension detection
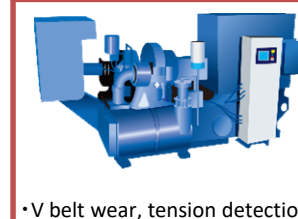
Example of the twist of the ball screw

・Wear increase, twist detection

Products

①PLC CPU configuration (example)
  [R08CPU] [R35B] [R61P] [R60ADH4] [NZ2MC-16MBS]
②C language controller configuration (example)
  [RD55UP06-V] [R04CPU] [R35B] [R61P] [R60ADH4]
③C language intelligent function unit configuration (example)
  [R12CCPU-V] [R35B] [R61P] [R60ADH4]
*Vibration Sensor (Introductory products) Tokin corporation [VS-JV10A]

Adoption points

①Frequency analysis is possible in the sequencer by executing Fast Fourier Transform (FFT).
②All kinds of analyses are possible with the data analysis library built in the products C language controller/C language intelligent function unit.
③Data analysis FB(Function block) for the PLC CPU or sample screens for GOT2000 provided.
④Rapid FFT analysis, simultaneous analysis of multiple devices etc. possible.Digital filter function is built in and de-noising is also possible.
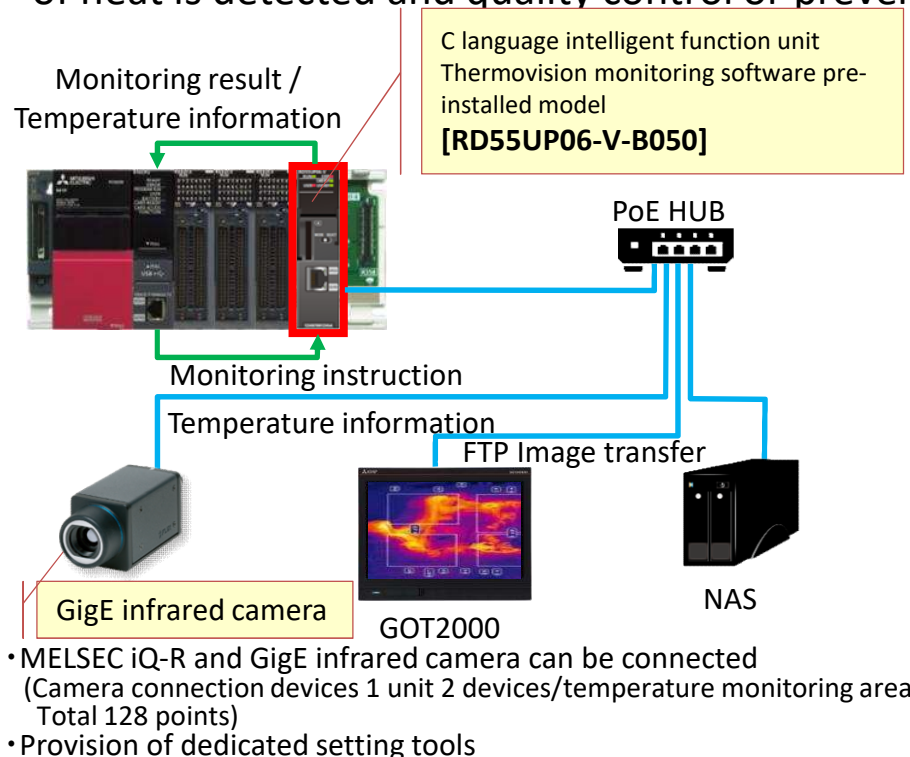
Quality control / Preventive maintenance with temperature monitoring

| Realization on PLC	Realization on HMI	Realization on PC

By continuously monitoring the heating of the equipment itself or temperature arising from the manufacturing process in the production facilities, irregular temperature or abnormal generation of heat is detected and quality control or preventive maintenance can be implemented.
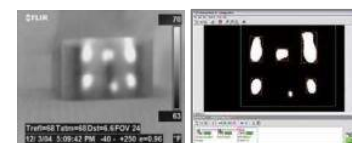
Monitoring result / Temperature information

C language intelligent function unit Thermovision monitoring software pre-installed model
[RD55UP06-V-B050]

PoE HUB

Monitoring instruction

Temperature information

FTP Image transfer

GigE infrared camera

GOT2000

NAS

・MELSEC iQ-R and GigE infrared camera can be connected
 (Camera connection devices 1 unit 2 devices/temperature monitoring area Total 128 points)
・Provision of dedicated setting tools

Quality control adoption example
・Monitoring of filling quantity and heating quantity
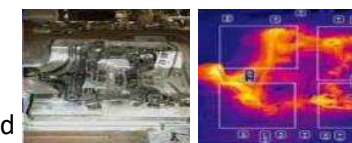・Coating process operation monitoring
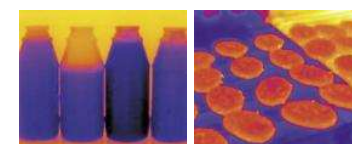
Quality control (inspection) adoption example
・Inspection of hot melt application in the packaging process

Quality control (monitoring) adoption example
・Monitoring the occurrence of surface defects due to inconsistent temperatures of the mould

Adoption example of preventive maintenance of motor
・Monitoring of filling quantity and heating quantity
・Coating process operation monitoring

Products
①C language intelligent function unit
   Thermovision monitoring software pre-installed model
   [RD55UP06-V-B050]
  *GigE infrared camera (Introductory products)
   FLIR Systems Japan K.K [AX35]

Adoption points
①Till now temperature monitoring was independent and continuous control/ monitoring of thermography monitoring with PLC is possible by installing the infrared camera.
②Thermovision monitoring software is compatible with GigE infrared camera, functions necessary for monitoring like thermal image acquisition function, field temperature monitoring function, thermal image transfer function, thermo viewer image transfer function etc. are built-in.

Preventive maintenance of motor due to electric current monitoring

Realization on PLC	Realization on PLC	Realization on PC

By continuously measuring the ampere value in production facilities driven by motors like pump, conveyor etc., prevention of sudden equipment stoppage or production loss due to motor bearing deterioration etc. can be implemented.
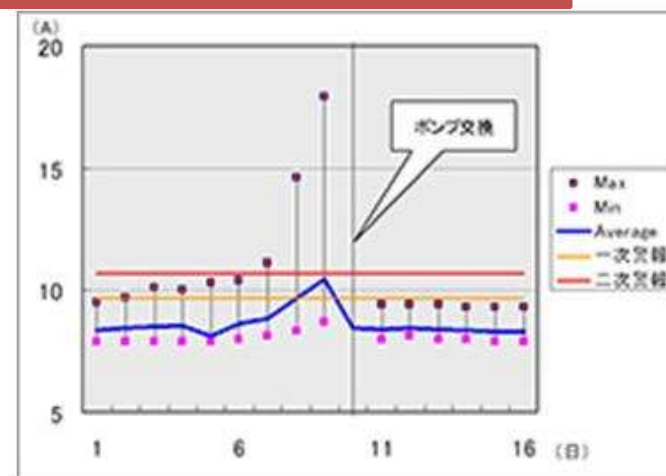

PLC Energy measuring unit
[RE81WH] [QE81WH]
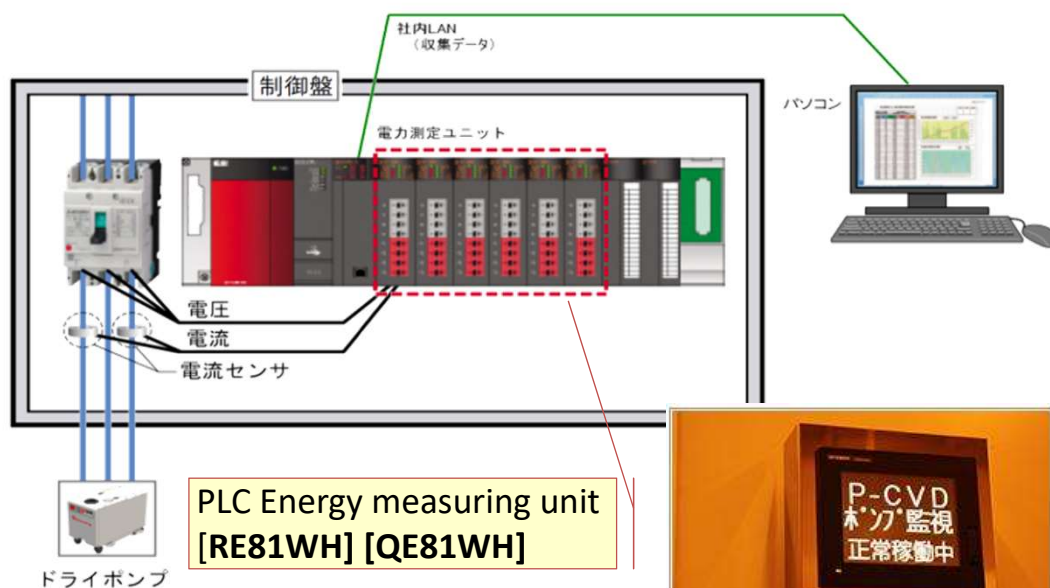
Dry pump adoption example

- Sampling of the electric current value in the motor in units of 1 second
- Calculating the average every 10 seconds, automatic monitoring of change, growth trend monitoring of electric current value, counting the number of times exceeding the threshold

Products

① PLC Energy measuring unit   iQ-R series [RE81WH]
              or   Q series   [QE81WH]
② Split-type current sensor   [EMU-CT□]

Adoption points

① Custom installation of existing PLC is possible.
② In case of iQ-R series, fast measurement data update period (10 ms), waveform monitoring with waveform data acquisition of voltage/electric current is also possible.
③ In case of GOT2000, measured energy data (electric energy, electric current etc.)] monitor, waveform data of voltage/electric current, sample screen of monitor can be downloaded free of charge.
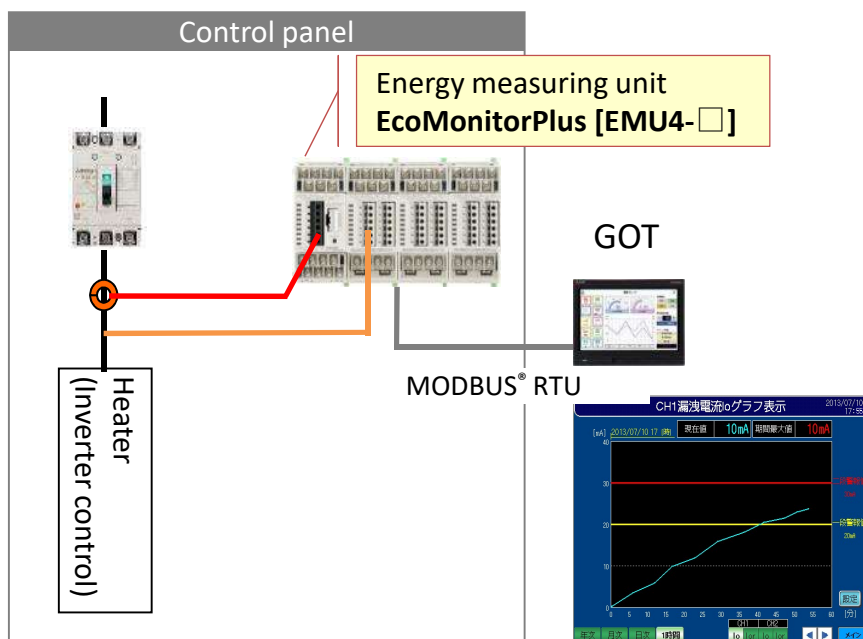
Preventive maintenance of the heater due to electric leakage monitoring
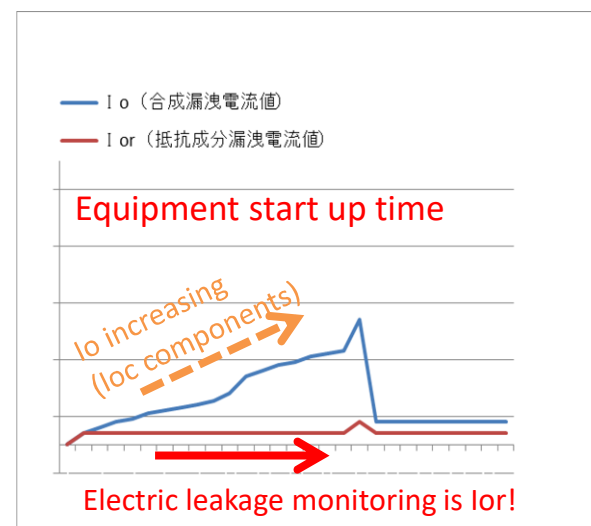
Realization on **PLC**

Realization on HMI

Realization on **PC**

For production facilities like moulding machine, electric furnace etc., production loss due to chance failure or equipment stoppage is prevented by constantly measuring the leakage current (Ior) of heater.

Control panel

Energy measuring unit
EcoMonitorPlus [EMU4-□]

GOT

MODBUS® RTU

Heater (Inverter control)

CH1漏洩電流ioグラフ表示

Inverter style soldering furnace application example

Io（合成漏洩電流値）

Ior（抵抗成分漏洩電流値）

Equipment start up time

Io increasing (Ioc components)

Electric leakage monitoring is Ior!

Products

①Energy measuring unit Insulation monitors model [EMU4-LG1-MB]
②Energy measuring extension unit for same voltage system [EMU4-A2]
③Split-type current sensor   [EMU-CT□]
④Zero-phase current transformer
　Penetrating style[ZCT□]   or   Splitting style[CZ-□]
⑤GOT2000

Adoption points

①In case of GOT2000,making a direct connection with EcoMonitorPlus is possible with MODBUS®RTU.
　Also, the sample screens of electric current, electric power, electric energy monitors etc. can be downloaded free of charge.
②In case of EcoMonitorPlus, first of all, customer installation is possible depending on measurement and application. Extension units(Same voltage system as amp meter, Different voltage system, Analog input, Pulse input) Optional units(Logging unit, CC-Link communication unit etc.)

Version update of the existing units is possible

Realization on PLC	Realization on HMI	Realization on PC

By downloading the latest firmware from FA site in Mitsubishi Electric, and installing the SD memory card storing the firmware data in the CPU unit, it is possible to update the version (feature addition) of the units.

FA site in Mitsubishi Electric

MELSEC iQ-R series
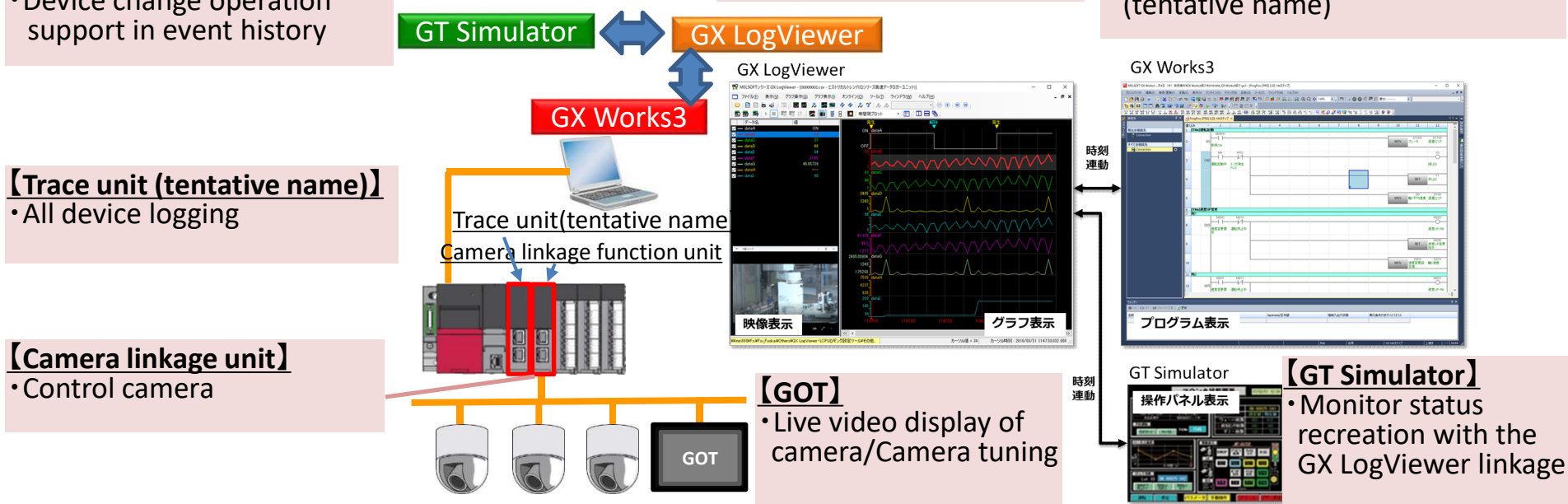
MELSEC iQ-F series

①Download firmware

②Writing to the SD memory Card in the PC

③Update of firmware after installing SD memory card in CPU unit, by turning the electric power OFF→ON

Firmware data

SD memory card

The firmware version update of the existing units is possible at the customer side.

【RCPU】
・All device logging with the application of the trace unit
・Device change operation support in event history

【GX LogViewer】
・GX Works3 offline monitor, image data linkage

【GX Works3】
・Offline monitor feature expansion
・Device flow analysis function (tentative name)

GT Simulator ⟷ GX LogViewer

GX LogViewer

GX Works3

【Trace unit (tentative name)】
・All device logging

Trace unit(tentative name)
Camera linkage function unit

時刻連動

映像表示 | グラフ表示

プログラム表示

【Camera linkage unit】
・Control camera

【GOT】
・Live video display of camera/Camera tuning

時刻連動

GT Simulator
操作パネル表示

【GT Simulator】
・Monitor status recreation with the GX LogViewer linkage

GOT

Development enhancement of the downtime reduction function

・All device logging function with the trace unit (tentative name)
・Device / Label value revision history function
・Linked display of program,waveform,video with GX Works3/GX LogViewer
・Status recreation in the GT Simulator linked to program, waveform, video
・Ladder analysis support enhancement with the device flow analysis function (tentative name)
　(Simplification of investigation to determine the cause of trouble)
・Camera control with the camera linkage function unit, Live video display in GOT

Contributes to the downtime reduction for customer due to further products / functional enhancement.

Overseas Technical Support Tools

■ e-Learning (Support for 17 languages)

e-Learning allows you to study with self-paced, interactive, and engaging online training available anytime, anywhere.
With videos and charts, it effectively helps you to acquire many skills including programming. Make the best use of this material to improve ability of your local staff members.

Language	Course	
English	Beginning series	9 courses
	Basic・Advanced	51 courses
Thai/Indonesian Spanish/Turkish	Beginning series	9 courses
	Basic・Advanced	47 courses
Slovakian/Hungarian	Beginning series	7 courses
	Basic・Advanced	32 courses
Portuguese	Beginning series	8 courses
	Basic・Advanced	46 courses
Russian	Beginning series	8 courses
	Basic・Advanced	43 courses
Polish	Beginning series	9 courses
	Basic・Advanced	44 courses
Czech	Beginning series	7 courses
	Basic・Advanced	33 courses
Malay/Hindi	Beginning series	7 courses
Burmese	Beginning series	8 courses

■ Satellite Training Series (Support for 6 languages)

We arrange Satellite Training Series that you can learn the FA products basics of electricity, wiring, and PLC with watching DVD instruction.
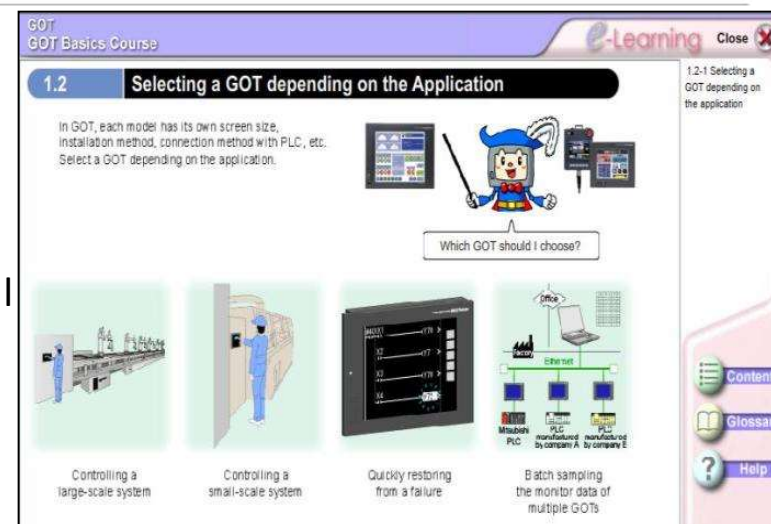It will help you to improve skill of local staff members.
【Available Languages】 Japanese / English / Chinese / Thai / Vietnamese / Indonesian
【Bundled items】
<Part1> Electricity, Wiring, PLC Basic DVD Training/Training Kit/Textbook(each language)/GX Works2
<Part2> Inverter Basic   DVD Training/ Textbook(each language)
<Part3> GOT Basic   DVD Training/ Textbook(each language)

Overseas Technical Support Tools

■ FA Term translation tool

The FA Term translation tool is a software that can translate global labels
created with iQ Works and labels/comments created with GX Works or GT Works.
A user dictionary can also be created and changed according to the application.
It can even be used in an environment where the PC is not connected
to the Internet so please make full use of it for creating multilingual project.

【FA Term translation tool】

■ FA Terminology dictionary (Support for 21 languages)

The FA Term dictionary contains over 4,000 practical terms that will help you to communicate with local staff
members at design sites and production sites in 21 languages.
Please utilize it during business trips to overseas and overseas assignment.
【Available Languages】
Japanese/English/Chinese (Simplified Chinese/Traditional Chinese)/
Korean/Thai/Indonesian/Vietnamese/Spanish (Castellano/Latin America Spanish)/
Portuguese (European Portuguese/Brazilian Portuguese)/German/Italian/French/
Russian/Polish /Czech/Slovak/Hungarian/Turkish

【FA Term dictionary】

■ FA Glossary (Support for 11 languages)

Over 750 technical words which are frequently used at design sites of manufacturers are contained in this FA
Glossary. It will help you to improve skill of local staff members.
【Available Languages】
Japanese/English/Chinese (Simplified Chinese/Traditional Chinese)/Korean/Thai/Indonesian/Vietnamese/Turkish/
Spanish (Latin America Spanish)/Portuguese (Brazilian Portuguese)