

iQ Platform-compatible PAC CPU Module Internal Database

MELSEC iQ-R series

Tech-note



MELSEC iQ-R Series Broadcast

Production data management utilizing CPU module internal database

The MELSEC iQ-R Series CPU module is equipped with an internal database that can be installed into the SD memory card. This enables the CPU to manage production and recipe data directly instead of requiring a computer-managed database, thereby reducing hardware cost and improving data management performance.

Data correlation with database from the ladder program

Database record management such as add, change, search, and delete is easy utilizing dedicated instructions in the ladder program.

Convenience

- Production data managed by CPU module
- Execute from ladder program or application without using SQL*1 statements
- Utilize custom applications written in SQL

*1. Structured Query Language is a programming language designed for managing data in a relational database.

Easier data operation using Microsoft® Access® or Excel®

Directly access CPU internal database data from a computer equipped with Microsoft® Access® or Excel® via Ethernet without requiring SQL statements.

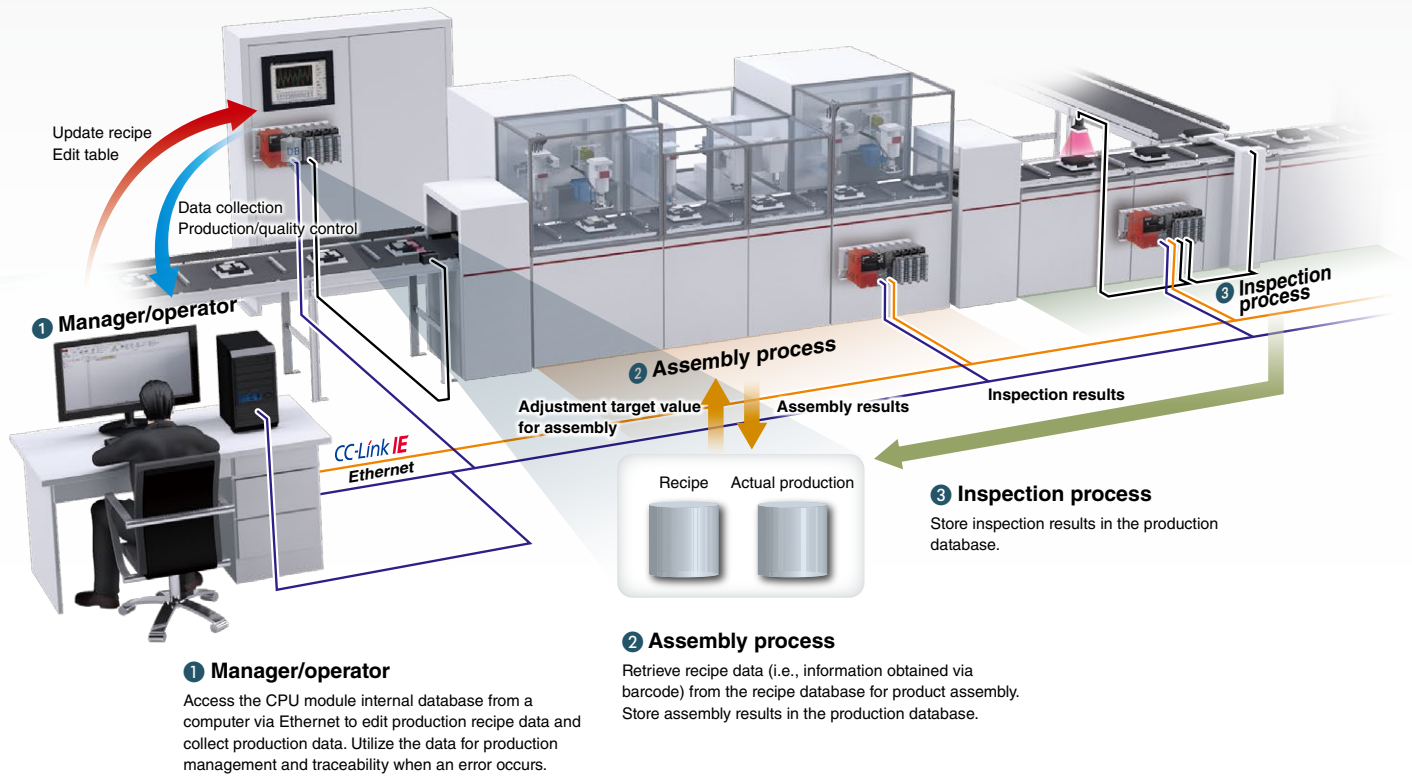
Utilize existing assets by using custom applications written in SQL

CPU module internal database management from custom applications based on Microsoft® .NET framework using ODBC communications driver.



Implement easier production management at a lower cost

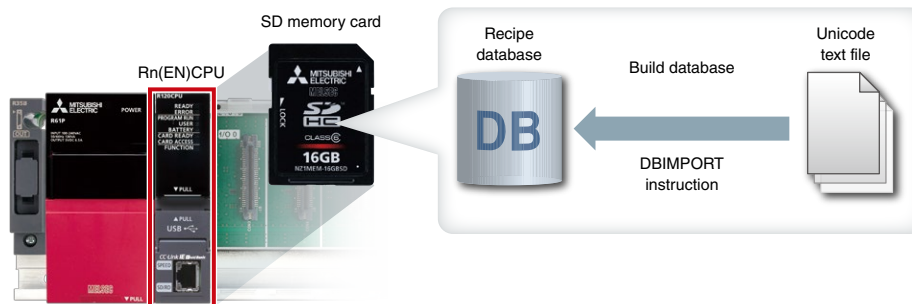
The MELSEC iQ-R Series CPU module is equipped with an internal database that enables management of production data and recipe data, eliminating the need of an external computer. Access database records directly from the control ladder program using dedicated instructions such as search, add, and update. Since connection to an external computer is not required, pre- and post-processing of production data are performed in the CPU, improving data processing performance. The CPU database is highly scalable and ideal for small control systems that can utilize local production data management instead of a dedicated database server.



Building a database

Databases can be built utilizing one of the two following methods.

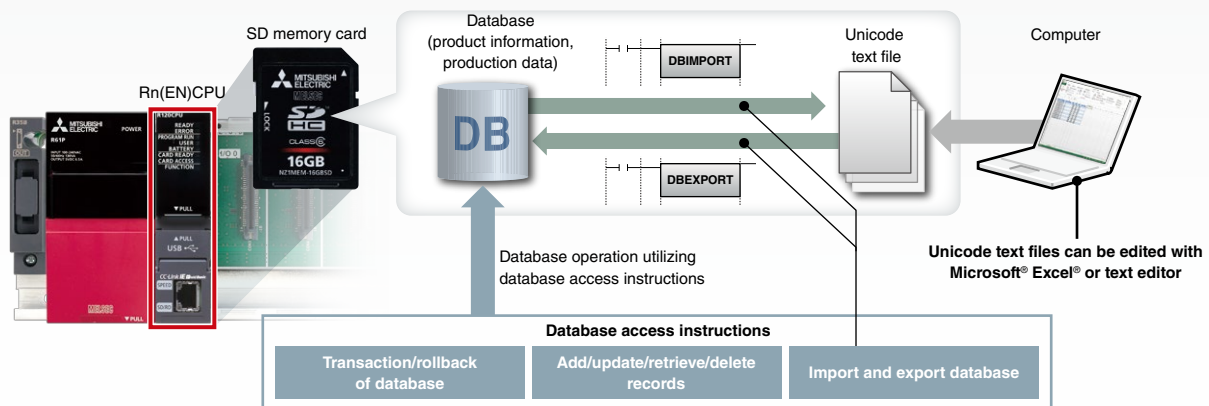
- 1 First create a definition file on a computer and then build the internal database using the DBIMPORT dedicated instruction.



- 2 Obtain a sample database from the local Mitsubishi Electric sales office or representative and copy it directly to the SD card.

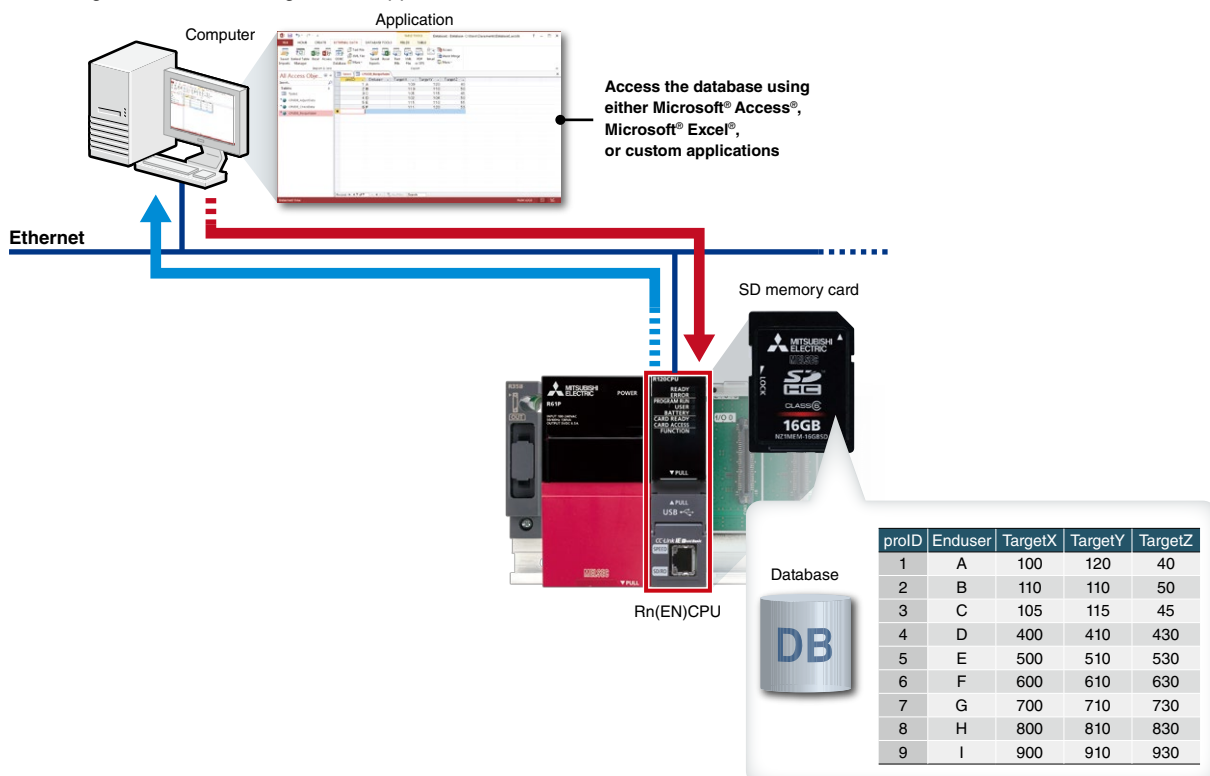
Database operation using a ladder program

- 1 Building a database using the DBIMPORT instruction, and exporting a database using the DBEXPORT instruction
Build databases in the CPU simply by importing a definitions file created on a computer in Unicode. Databases stored on the SD card can also be viewed and edited on the computer.
- 2 Accessing records
Utilize dedicated database access instructions to add (DBINSERT), update (DBUPDATE), retrieve (DBSELECT), and delete (DBDELETE) records.
- 3 Transaction/rollback function
Protect data when updating records.



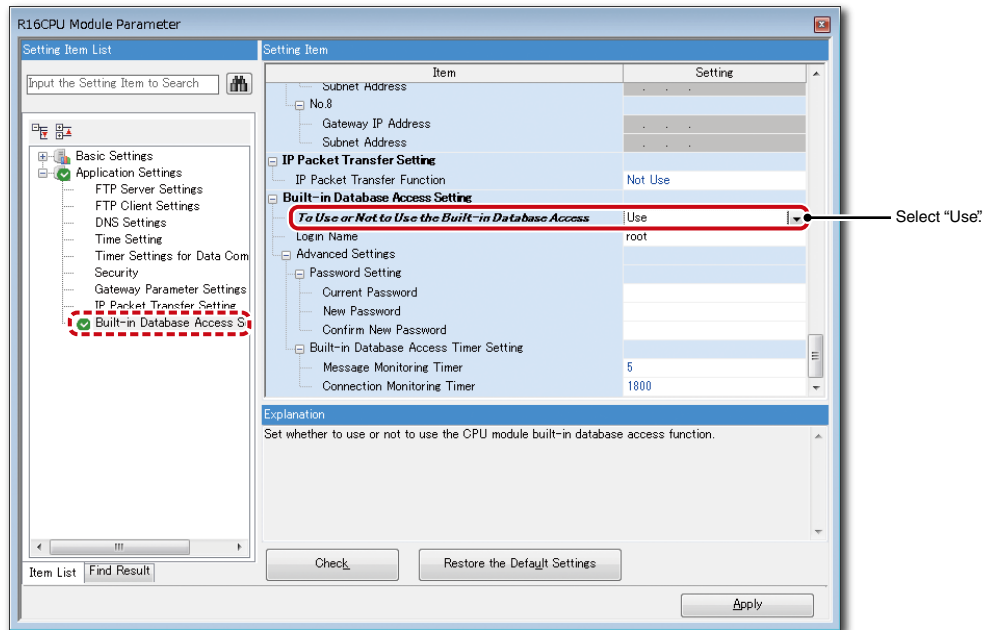
Database operation using the database access function

- 1 Adding tables
Add tables to the database using Microsoft® Access®.
- 2 Accessing records
Add, update, retrieve and delete records in tables using Microsoft® Access®.
- 3 Searching records
Records can be searched using Microsoft® Excel® simply by following the setup wizard.
- 4 Access database using SQL statements
Manage databases utilizing custom applications written in SQL.

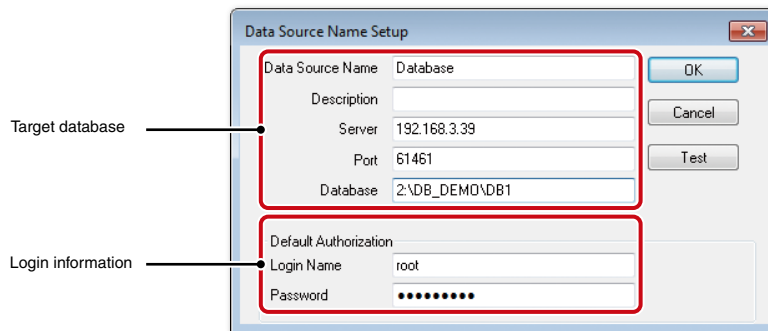


Access CPU module internal database from external computer

- 1 Utilize GX Works3 CPU module parameter settings to access the CPU module internal database.

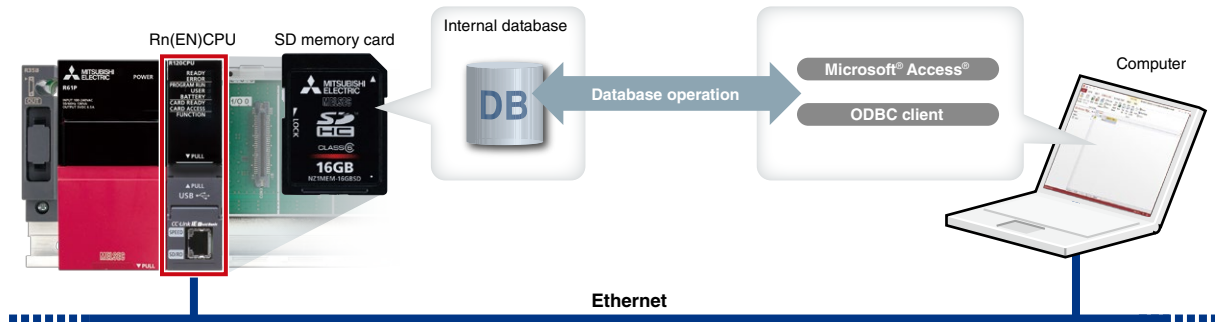


- 2 CPU module internal database access tool (available from the local Mitsubishi Electric sales office or representative) must be installed on the computer.
- 3 Enter database information in the database settings window to complete the setup.



Editing the database with Microsoft® Access®

■ Small-scale system configuration



• Access internal database and synchronize data without additional programming

Easily connect the database and Microsoft® Access® utilizing standard functions without additional programming. Table values are also easily updated to the computer.

The screenshot shows the Microsoft Access interface with three numbered steps:

- Select ODBC database from the menu bar:** The 'ODBC Database' option is selected in the 'EXTERNAL DATA' ribbon.
- Select the connection target data source:** The 'Select Data Source' dialog box is open, showing 'Database1' as the selected data source. The 'Database Access Server Login' dialog box is also open, showing the login credentials.
- Update table values:** The 'CPUDB_RecipeTable' is open in a table view, showing the following data:

proID	Enduser	TargetX	TargetY	TargetZ
1	A	100	120	40
2	B	110	110	50
3	C	105	115	45

• Editing records

Editing records (add, update and delete) is easy, especially for users familiar with Microsoft® Excel®.

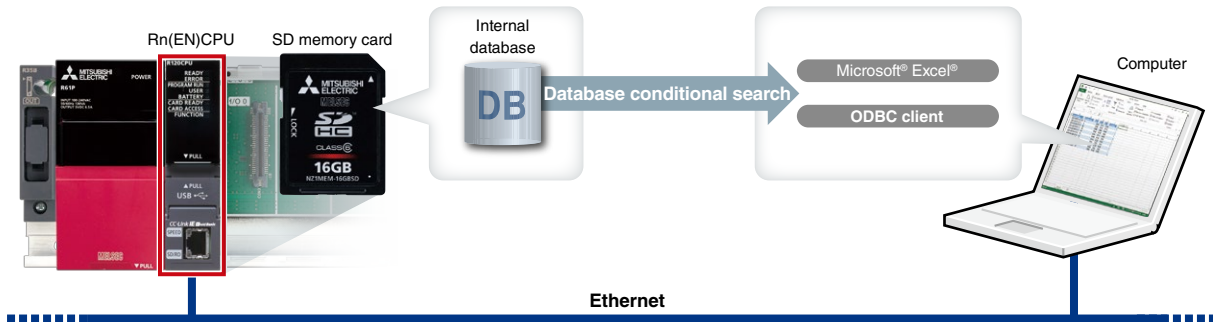
The screenshot shows the Microsoft Access interface with the 'CPUDB_RecipeTable' open in a table view. The table contains the following data:

proID	Enduser	TargetX	TargetY	TargetZ
1	A	100	120	40
2	B	110	110	50
3	C	105	115	45
4	D	102	104	50
5	E	115	110	55
6	F	111	120	53

The text 'Easy editing of database records' is shown below the table, indicating that records can be easily added, updated, or deleted.

Searching data using Microsoft® Excel®

■ Small-scale system configuration



• Database conditional search

Conditional searching of records within the database can be done from Microsoft® Excel® using standard functions, without requiring additional programming.

5 Search results are displayed

SerialNo	Enduser	X	Y	Z	Judge
20160711010	A	500	504	494	1
20160711011	A	495	504	510	1
20160711012	B	508	494	494	1
20160711013	B	504	506	492	1
20160711015	B	491	507	506	1
20160711018	C	500	506	501	1
20160711019	C	510	508	494	1
20160711021	D	491	492	499	1
20160711022	D	506	506	504	1
20160711023	D	500	492	492	1
20160711025	E	493	506	508	1

1 Select Microsoft® Query® from menu bar

2 Select required fields

3 Set search conditions

4 Set output sorting conditions

• Utilize conditional search data as a management tool

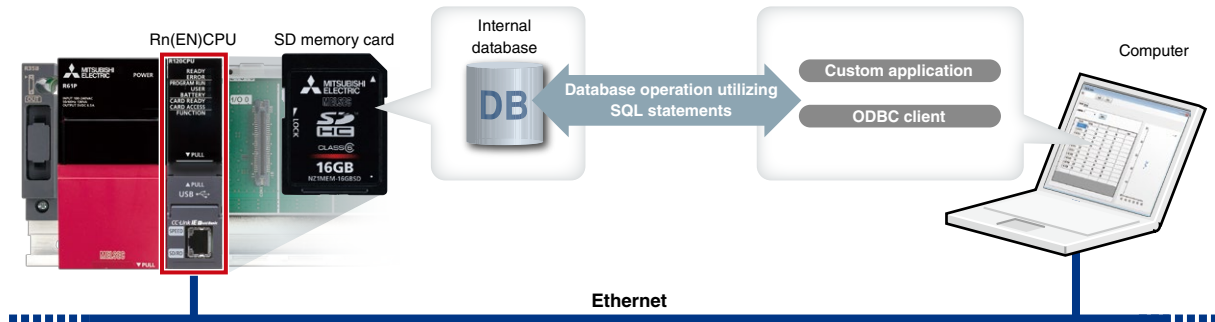
Conditional search data is also retained when saving the file used for conditional search, enabling utilization of search data.

Clicking "refresh all" will update to the latest data

SerialNo	Enduser	X	Y	Z	Judge
20160711010	A	500	504	494	1
20160711011	A	495	504	510	1
20160711012	B	508	494	494	1
20160711013	B	504	506	492	1
20160711015	B	491	507	506	1
20160711018	C	500	506	501	1
20160711019	C	510	508	494	1
20160711021	D	491	492	499	1
20160711022	D	506	506	504	1
20160711023	D	500	492	492	1
20160711025	E	493	506	508	1
20160711100	F	491	494	504	1
20160711101	G	502	498	504	1
20160711105	H	505	491	508	1
20160711106	H	494	499	494	1
20160711107	H	507	496	494	1
20160711109	H	494	499	498	1
20160711110	I	505	493	500	1
20160711112	I	505	491	491	1
20160711115	J	505	507	507	1

Database operation with applications based on SQL using Microsoft® .NET Framework

■ System configuration



• Database operation using SQL statements

Database operations created in SQL can be embedded into custom applications based on C++/C#/VB.NET.

Internal database

SQL

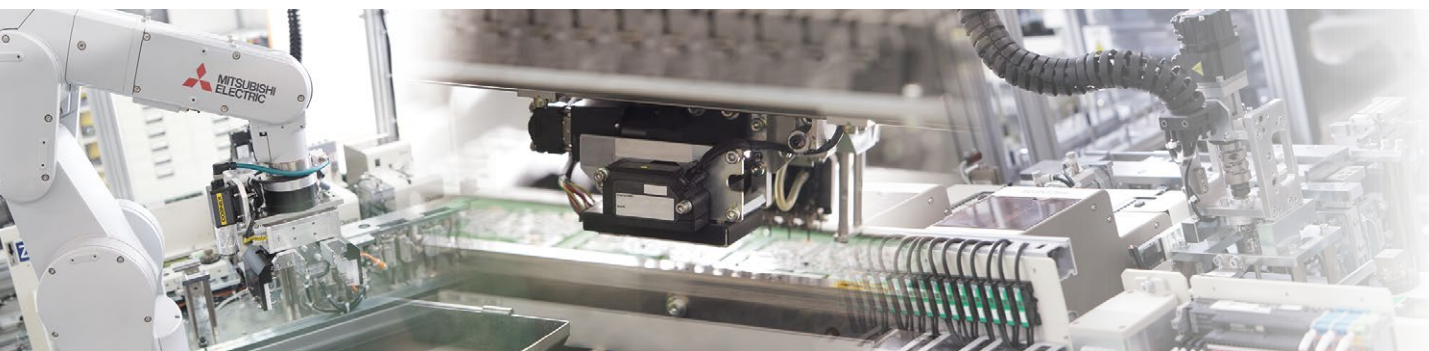
```

// Retrieve data source name
string strConnect = txtDataSourceName.Text.ToString();
// ODBC connection information management class
OdbcConnectionStringBuilder o = new OdbcConnectionStringBuilder();
o.Dsn = strConnect;
// Connection object creation
OdbcConnection cn = new OdbcConnection(o.ConnectionString);

// SQL statement
string strQuery = GetSQL();
// Command object creation
OdbcCommand cmd = new OdbcCommand(strQuery, cn);
                    
```

SerialNo	Enduser	X	Y	Z	Judge
20160711010	T	494	500	497	I
20160711011	S	500	495	492	I
20160711012	P	493	510	510	I
20160711013	O	492	490	510	I
20160711015	T	509	508	501	I
20160711019	O	501	499	509	I
20160711019	H	493	502	497	I
20160711021	S	508	497	493	I
20160711022	P	495	506	504	I
20160711023	O	506	505	490	I
20160711025	P	507	509	509	I

Applications in C++/ C#/ VB.NET for database operation



Rn(EN)CPU common database specifications

Item	Description
Max. number of tables	32 per database
Max. number of fields	128 per table
Max. number of characters within field name	32 characters
Corresponding data type	BOOL: Bit
	WORD: Unsigned 16-bit numerical value
	DWORD: Unsigned 32-bit numerical value
	INT: Signed 16-bit numerical value
	DINT: Signed 32-bit numerical value
	REAL: Single-precision real number
	LREAL: Double-precision real number
Max. number of concurrently connectable databases	STRING: Character string (Shift-JIS code)
	WSTRING: Character string (Unicode)
	4

Modules supporting internal database

Item	Model
MELSEC iQ-R Series Programmable controller CPU*1	R04CPU R04ENCPU
	R08CPU R08ENCPU
	R16CPU R16ENCPU
	R32CPU R32ENCPU
	R120CPU R120ENCPU

*1. CPU module database access (from external device) function is available with Ver.28 or later.

Relevant manual

Manual name	Manual number	Language
MELSEC iQ-R CPU Module User's Manual (Application)	SH-081264ENG	English

Country/Region Sales Office
 USA+1-847-478-2100
 Mexico+52-55-3067-7500
 Brazil+55-11-4689-3000
 Germany+49-2102-486-0
 UK+44-1707-28-8780
 Ireland+353-1-4198800
 Italy+39-039-60531
 Spain+34-935-65-3131
 France+33-1-55-68-55-68

Czech Republic ...+420-251-551-470
 Poland+48-12-347-65-00
 Sweden+46-8-625-10-00
 Russia+7-812-633-3497
 Turkey+90-216-526-3990
 UAE+971-4-3724716
 South Africa+27-11-658-8100
 China+86-21-2322-3030
 Taiwan+886-2-2299-2499

Korea+82-2-3660-9530
 Singapore+65-6473-2308
 Thailand+66-2682-6522
 Vietnam+84-4-3937-8075
 Indonesia+62-21-3192-6461
 India+91-20-2710-2000
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MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
www.MitsubishiElectric.com