OPERATING MANUAL

POWER/NETWORK MODULE
(EtherCAT)

MODEL **R80NECT1**

CONTENTS

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BEFORE USE ....

Thank you for choosing M-System. Before use, please check contents of the package you received as outlined below.
If you have any problems or questions with the product, please contact M-System's Sales Office or representatives.

■ PACKAGE INCLUDES:

Power/network module .....(1)
Protective cover.....(1)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ OPERATING MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures.

POINTS OF CAUTION

■ POWER INPUT RATING & OPERATIONAL RANGE

- Locate the power input rating marked on the product and confirm its operational range as indicated below:
  DC Power supply: 24V DC rating
  24V DC ± 10%, approx. 12W
  (@ internal power max. current 1.6 A)
  Excitation supply (excitation for I/O module):
  24V DC ± 10%, operational current 10 A
  (From power supply/excitation supply connector, via connector for internal bus, supplied to each I/O module. Power output current consumption must be under operational current.)

■ GENERAL PRECAUTIONS

- Before you remove or mount the unit, turn off the power supply for safety.

■ ENVIRONMENT

- Indoor use.
- When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -10 to +55°C (14 to 131°F) with relative humidity within 30 to 90% RH in order to ensure adequate life span and operation.

■ WIRING

- Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

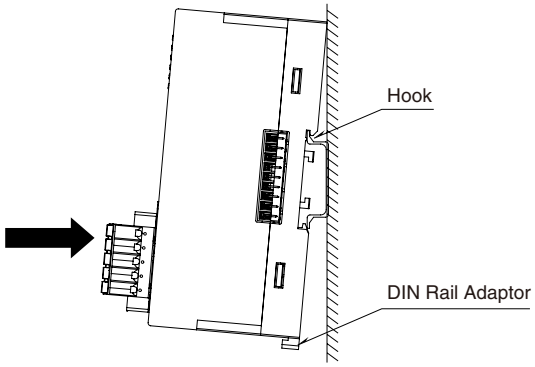
■ AND ....

- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

INSTALLATION

Internal power supply/communication is connected via each module's connector, therefore no backplane base is required, however, hot-swapping of modules is not possible.

■ HOW TO MOUNT THE MODULE ON DIN RAIL



Position the upper hook at the rear on the DIN rail and push in the lower. When removing the module, push down the DIN rail adaptor utilizing a flat-blade screwdriver and pull.

EtherCAT®

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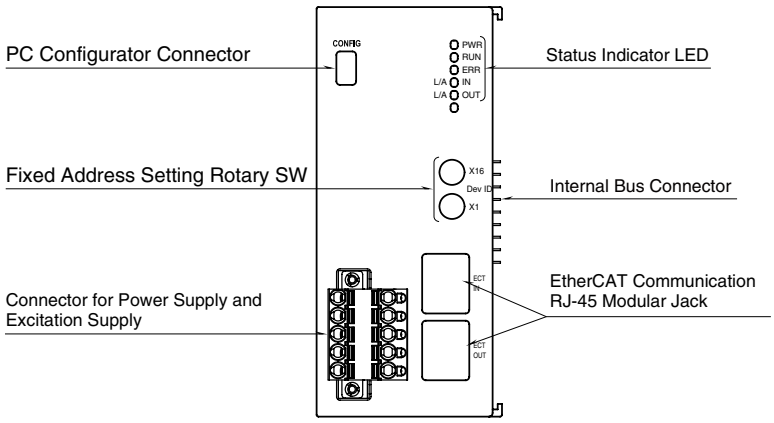
COMPONENT IDENTIFICATION



■ STATUS INDICATOR LED

ID	FUNCTION	COLOR	STATUS	
PWR	Main unit internal power	Green	Off	Error
			On	Normal
RUN	Device state	Green	Off	INIT
			Blinking	PRE-OPERATIONAL
			Single Flash	SAFE-OPERATIONAL
			On	OPERATIONAL
ERR	Error	Red	Off	No error
			Blinking	Invalid Configuration
			Single Flash	Local error
			On	Application Controller failure
L/A IN	IN port status	Green	Off	No Link
			Flickering	Link and activity
			On	Link without activity
L/A OUT	OUT port status	Green	Off	No Link
			Flickering	Link and activity
			On	Link without activity

Blinking	200ms-On, 200ms-Off
Single Flash	200ms-On, 1000ms-Off
Flickering	50ms-On, 50ms-Off

■ FIXED ADDRESS

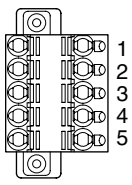
For R80NECT1, fixed address mode using ID selector is supported. Fixed address 1 to 255 can be used by combining with two rotary switches which have address 0 to F. When fixed address is not used, set the ID selector to 0. (Factory setting: 0)

■ POWER SUPPLY, EXCITATION SUPPLY CONNECTOR ASSIGNMENT

Printed-circuit board connector (Phoenix Contact)

Unit side connector: MSTBV2,5/5-GF-5,08AU

Cable side connector: TFKC2,5/5-STF-5,08AU



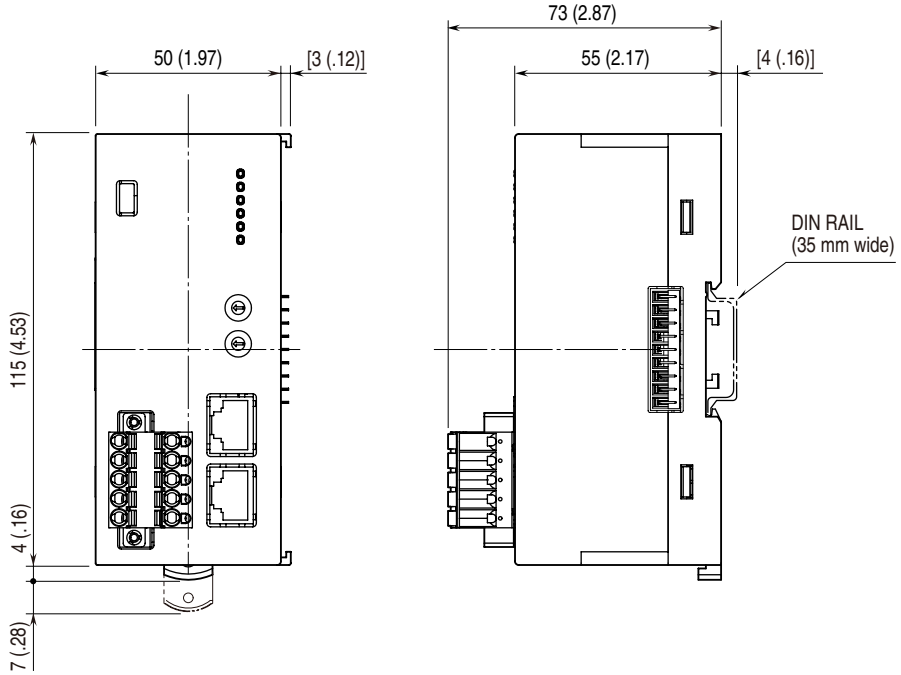
PIN No.	ID	FUNCTION
1	24V	Power supply 24V DC
2	0V	Power supply 0V DC
3	+	Excitation supply 24V DC
4	–	Excitation supply 0V DC
5	FE1	Grounding

TERMINAL CONNECTIONS

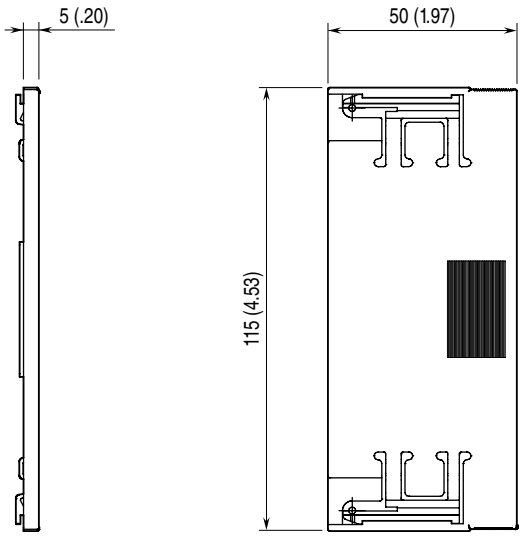
Connect the unit as in the diagram below.

■ EXTERNAL DIMENSIONS unit: mm (inch)

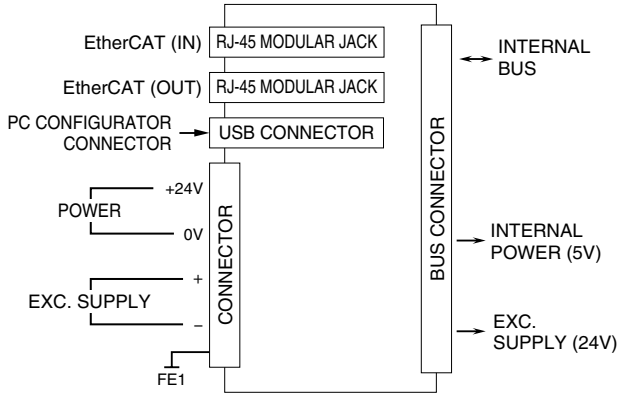
• UNIT



• PROTECTIVE COVER



■ **CONNECTION DIAGRAM**



WIRING INSTRUCTIONS

■ **TENSION CLAMP TERMINAL**

Applicable wire size : 0.2 – 2.5 mm²
Stripped length : 10 mm
Recommended solderless terminal
AI0,25-10YE 0.25 mm² (Phoenix Contact)
AI0,34-10TQ 0.34 mm² (Phoenix Contact)
AI0,5-10WH 0.5 mm² (Phoenix Contact)
AI0,75-10GY 0.75 mm² (Phoenix Contact)
AI1-10RD 1.0 mm² (Phoenix Contact)
AI1,5-10BK 1.5 mm² (Phoenix Contact)
AI2,5-10BU 2.5 mm² (Phoenix Contact)

EtherCAT SPECIFICATIONS

■ **Modular Device Profile**

R80NECT1 complies with Modular Device Profile (MDP) standard, ETG.5001.1 of EtherCAT standard. Use master device supported MDP standard.

■ **Fixed address**

For R80NECT1, fixed address mode (Explicit Device Identification) using fixed address setting rotary switches (ID selector) is supported. Fixed address 1 to 255 can be used by combining with two rotary switches which have address 0 to F. When fixed address is not used, set the ID selector to 0.

When the power is turned on with ID selector set to other than 0, the address set in the resistor 0x0012 of ESC (EtherCAT Slave Controller) is written at boot up.

■ **Initialization**

When the R80NECT1 boots up, the process data is configured according to the configuration of connected I/O card. Then the object of process data mapping (RxPDO, TxPDO) corresponding to the I/O data of devices and the object of various information for R80 are created in the object dictionary. The configuration of process data is fixed at the time only when the R80NECT1 boots up.

After initialization, master can make a demand to slave (R80NECT1) to switch from INIT state to PREOP state. If initialization is failed with some abnormality of R80NECT1, it is denied by using AL status code when transition from INIT to PREOP.

■ Process Data Configuration

After boot up, the R80NECT1 identifies all connected I/O cards. Set the address for each I/O cards in advance.
For I/O cards, 1 address is allocated to one card.

R80 configures process data by module, as '1 address = 1 module'. One R80NECT1 can manage max. 32 modules. However, max. number of connectable I/O cards is 16.

R80's I/O modules and their respective module types are shown in the table below. (Refer to Table 1)
For module type of each I/O card, refer to the specification of each I/O card.

Table 1: I/O Module And Module Type

I/O MODULE	MODULE TYPE
DI8	Discrete input, 8 points
DO8	Discrete output, 8 points

■ Data Configuration

The data configuration is in accordance with the EtherCAT Modular Device Profile (MDP) specifications.
The data configurations of R80NECT1 are shown below. (Refer to Table 2.)

Table 2: Data Configuration

OBJECT	ADDRESS	CONTENT
Input Area Objects	0x6000 to 0x61F0	Input data
Output Area Objects	0x7000 to 0x71F0	Output data
PDO Mapping Objects (TxPDO)	0x1A00 to 0x1A1F	Input data list
PDO Mapping Objects (TxPDO)	0x1AFF	Status data list
PDO Mapping Objects (RxPDO)	0x1600 to 0x161F	Output data list
Manufacturer Specific Objects	0x2000, 0x2001	Module status
PDO Assign (IN)	0x1C13	Input data transmission order
PDO Assign (OUT)	0x1C12	Output data transmission order
Sync Manager Type	0x1C00	Sync manager type
Sync Manager Parameter Objects	0x1C32, 0x1C33	Sync mode
Information Data Objects	0x9000 to 0x91F0	Module information
Modular Device Profile Objects	0xF000	MDP information
Detected Module Ident List	0xF050	Module information list
Configured Module Ident List	0xF030	Card information collation by master module
Detected Address List	0xF040	Module address
Device Type	0x1000	Device type
Manufacturer Device Name	0x1008	Device name
Manufacturer Hardware Version	0x1009	Hardware version
Manufacturer Software Version	0x100A	Software version
Identity Objects	0x1018	Vendor information

■ EtherCAT State

EtherCAT has four states: INIT, PREOP, SAFEOP and OP. TxPDO (input configuration data) is updated with SAFEOP or OP, and RxPDO (output configuration data) is updated with OP.

For connected I/O cards, the RUN LED turns on and data is updated only with OP.

■ EtherCAT Diagnostics

• AL Status Code

When normal reception is not available on R80NECT1 upon request from the master or when there is a problem with a slave during normal communication, an error code is set to registers 0x0134 and 0x0135 (AL Status Code) of ESC.
The error codes of R80NECT1 are shown below. (Refer to Table 3.)

Table 3: Error Codes of AL Status Code

CODE	ERROR
0x0000	No error
0x0011	Invalid requested state change
0x0012	Unknown requested state
0x0013	BOOT state not supported
0x0016	Invalid MailBox configuration (PREOP)
0x0017	Invalid SyncManager configuration
0x001B	SyncManager Watchdog Timeout
0x001D	Invalid Output Configuration
0x001E	Invalid Input Configuration
0x001F	Invalid Watchdog Configuration
0x0029	FreeRun needs 3Buffer mode
0x8000	Internal bus error at power on (vendor option)
0x8001	Internal bus error during communication (vendor option)

• SDO Abort Code

If a slave cannot accept during SDO access to object dictionary by the master, the slave sends the error code (SDO Abort Code) to the master and denies access.
The following error codes are used. (Refer to Table 4.)

Table 4: Error Codes of SDO Abort Code

CODE	ERROR
0x05030000	Toggle bit not changed
0x05040001	Client/Server command specifier not valid or unknown
0x05040005	Out of memory
0x06010000	Unsupported access to an object
0x06010002	Attempt to a read-only object
0x06020000	The object does not exist in the object directory
0x06070010	Data type does not match, length of service parameter does not match
0x06090011	Sub-index does not exist
0x08000020	Data cannot be transferred or stored to the application
0x08000022	Data cannot be transferred or stored to the application because of the present device state

OBJECT DICTIONARY (DATA DESCRIPTION)

■ Input Area objects (0x6000 to 0x61F0)

In the object 0x6000 to 0x61F0, input data of I/O module is allocated. For one input module, one object exists. Index of the object (address) is fixed by module number (0 to 15 = I/O card address. 16 to 31 are reserves).

Object index = 0x6000 + (module number) × 0x0010

The configuration of the object is fixed by the number of input points and the data type per input point.
Sub-Indexes correspond to channel numbers. (Refer to Table 5 and 6.)

■ Output Area objects (Output Data Area:0x7000 to 0x71F0)

In the object 0x7000 to 0x71F0, output data of I/O module is allocated. For one output module, one object exists. Index of the object (address) is fixed by module number.

Object index = 0x7000 + (module number) × 0x0010

The configuration of the object is fixed by the number of output points and the data type per output point.
Sub-Indexes correspond to channel numbers. (Refer to Table 5 and 6.)

Table 5: Object Configuration Example For I/O Card

MODULE NO.	MODEL	I/O MODULE	MODULE TYPE	OBJECT INDEX	DATA TYPE
0	R80DAT8A	DI8	Discrete input, 8 points	0x6000	1 bit × 8
1	R80DCT8A	DO8	Discrete output, 8 points	0x7010	1 bit × 8
2	R80DCT8A	DO8	Discrete output, 8 points	0x7020	1 bit × 8
3	R80DAT8A	DI8	Discrete input, 8 points	0x6030	1 bit × 8

Table 6: Sub-Index Configuration By Module Type

MODULE TYPE	INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
Discrete input, 8 points	0x6nn0	0	UINT8	8	RO	8	Number of items
		1	BOOL	1	RO	TRUE/FALSE	First point input data
		2	BOOL	1	RO	TRUE/FALSE	Second point input data
		:	:	:	:	:	:
		8	BOOL	1	RO	TRUE/FALSE	8th point input data
Discrete output, 8 points	0x7nn0	0	UINT8	8	RO	8	Number of items
		1	BOOL	1	RO	TRUE/FALSE	First point output data
		2	BOOL	1	RO	TRUE/FALSE	Second point output data
		:	:	:	:	:	:
		8	BOOL	1	RO	TRUE/FALSE	8th point output data

■ Manufacturer Specific Objects (Module Status: 0x2000, 0x2001)

Status information of I/O module is allocated to 0x2000 and mounting information of I/O module is allocated to 0x2001.

Input abnormal data of module 0 to 31 (I/O card address 0 to 15) is stored in 0x2000 as 1 bit per channel (for 4 channels, 4 bits). When the corresponding module is analog input module and first point or second point input is out of -15 to +105% range, out of temperature table range or burnout state, the bit [second point: first point] of corresponding input is set to 1. When the corresponding module is other than the analog input module, [0:0] is set.

Status data of module 0 to 31 is stored in 0x2001 as 32 bits. LSB corresponds to module 0, MSB corresponds to module 31. A bit for normally existing module is set to 1, a bit for not existing module or module having hardware error (including communication error) set to 0. (Refer to Table 7)

Table 7: Object For I/O Module Status

INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0x2000	0	UINT8	8	RO	32	Number of items
	1	UINT16	16	RO	n	Module 0 input abnormal
	2	UINT16	16	RO	n	Module 1 input abnormal
	:	:	:	:	:	:
	16	UINT16	16	RO	n	Module 15 input abnormal
	17 – 32	UINT16	16	RO	0	Unused
0x2001	0	UINT8	8	RO	1	Number of items
	1	UINT32	32	RO	0xnnnnnnnn	Status for all modules (For valid module, corresponding bit is 1)

■ PDO Mapping objects (Data List: 0x1600 to 0x1701, 0x1A00 to 0x1B01)

• Object 0x1600 to 0x161F, 0x1A00 to 0x1A1F

RxPDO (from 0x1600) is used for output module, TxPDO (from 0x1A00) is used for input module.

Object index of RxPDO is allocated according to the number of output module in compliance with MDP specification.
Index = 0x1600 + (module number of output module)

Object index of TxPDO is allocated according to the number of input module in compliance with MDP specification.
Index = 0x1A00 + (module number of input module)

In the data of RxPDO and TxPDO, object index, sub-index and number of bit, which are referred by each RxPDO and TxPDO, are stored. For data of input module, it refers to objects in the addresses starting with 0x6000. For data of output module, it refers to objects in the addresses starting with 0x7000. (Refer to Table 8)

Table 8: Object Configuration For RxPDO And TxPDO

INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0x16nn(RxPDO) (For output)	0	UINT8	8	RO	1 to 16	Number of items
	1	UINT32	32	RO	0xaaaabbcc	aaaa: Index for referred object bb: Sub-index for referred object cc: Number of bit for referred object
	2	UINT32	32	RO		
	:	:	:	:		
	m	UINT32	32	RO		
0x1Ann(TxPDO) (For input)	0	UINT8	8	RO	1 to 16	Number of items
	1	UINT32	32	RO	0xaaaabbcc	aaaa: Index for referred object bb: Sub-index for referred object cc: Number of bit for referred object
	2	UINT32	32	RO		
	:	:	:	:		
	m	UINT32	32	RO		

• Object 0x1AFF

0x1AFF of TxPDO refers to the object of 0x2001 and 0x2001. (Refer to Table 9)

Table 9: Configuration For Object 0x1AFF

INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0x1AFF	0	UINT8	8	RO	33	Number of items
	1	UINT32	32	RO	0x20000110	Referred object
	2	UINT32	32	RO	0x20000210	
	:	:	:	:	:	
	32	UINT32	32	RO	0x20002010	
	33	UINT32	32	RO	0x20010120	

• Object 0x1701, 0x1B01

0x1701 of RxPDO and 0x1B01 of TxPDO are used to add empty bit in the end of periodically updated process data. As some discrete modules have 8 bits data on the other hand analog modules have 16 bit data, bit length is fixed at the time PDO is configured so that the end of consecutively configured process data terminate just on the border of 16 bits. (Refer to Table 10)

Table 10: Object Configuration For RxPDO (0x1701) And TxPDO (0x1B01)

INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0x1701 (RxPDO)	0	UINT8	8	RO	1	Number of items
	1	UINT32	32	RO	0x0000000n n: number of empty bits	Referred object (Refer to non-existing object)
0x1B01 (TxPDO)	0	UINT8	8	RO	1	Number of items
	1	UINT32	32	RO	0x0000000n n: number of empty bits	Referred object (Refer to non-existing object)

■ PDO Assign objects (Data Transmission Order, Output: 0x1C12, Input: 0x1C13)

Allocation list for PDO is created in 0x1C12 and 0x1C13. The entire list for RxPDO is stored in 0x1C12, the entire list for TxPDO is stored in 0x1C13. The indexes stored in 0x1C12 and 0x1C13 are placed in the order in which they are transferred by PDO.

• PDO group

In R80, PDO groups defined by Modular Device Profile (MDP) are sorted by I/O module type. The sorting is defined by the Information Data Objects (object 0x9000).

- PDO group 0: PDO for status
- PDO group 1: PDO for analog input module and analog output module
- PDO group 2: PDO for discrete input module and discrete output module

• Allocation of PDO list

The order in the list for RxPDO and TxPDO is as follows.

Group 0 => Group 1 => Group 2 => empty bit PDO

The order in the same group is in ascending order of object index (I/O module number).
(As a reference, the PDO list for the configuration example of Table 5 is shown in Table 11)

Table 11: PDO List For The Configuration Example Of Table 5

INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	PDO GROUP	VALUE	CONTENT
0x1C12	0	UINT8	8	RO	–	2	Number of items
	1	UINT16	16	RO	2	0x1601	module 1 output data
	2	UINT16	16	RO	2	0x1602	module 2 output data
0x1C13	0	UINT8	8	RO	–	3	Number of items
	1	UINT16	16	RO	0	0x1AFF	Status data
	2	UINT16	16	RO	2	0x1A00	module 0 input data
	3	UINT16	16	RO	2	0x1A03	module 3 input data

■ Sync Manager Type (0x1C00)

Sync Manager Type is allocated to object 0x1C00 based on EtherCAT specification. (Refer to Table 12)

Table 12: Object Configuration Of 0x1C00

INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0x1C00	0	UINT8	8	RO	4	Number of items
	1	UINT8	8	RO	1	Mailbox Write
	2	UINT8	8	RO	2	Mailbox Read
	3	UINT8	8	RO	3	Process Output Data
	4	UINT8	8	RO	4	Process Input Data

■ Sync Manager Parameter objects (0x1C32, 0x1C33)

These are Sync Mode setting objects. Objects 0x1C32 and 0x1C33 are fixed as R80NECT1 only supports the Free Run mode. Distributed Clock (DC) mode is not supported.

■ Information Data objects (0x9000 to 0x91F0)

For objects 0x9000 to 0x91F0, I/O module's Model name, PDO Group and Module Indent are allocated to each object.
The objects are allocated only for connected I/O modules.

Index = 0x9000 + module number × 0x0010

Sub-index is 3, 9 or 10. (Refer to Table 13)

Table 13: Object Configuration of 0x9nn0

INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0x9nn0	0	UINT8	8	RO	10	Number of items
	3	STRING	128	RO	R80xxxx	Model name (with 16 characters)
	9	UINT16	16	RO	1/2	PDO Group
	10	UINT32	32	RO	1 to n	Module Ident

Table 14: PDO Group & Module Indent

I/O Module	Module Type	PDO Group	Module Ident
DI8	Discrete Input, 8 points	2	318
DO8	Discrete Output, 8 points	2	319

■ Modular Device Profile objects (0xF000)

Object 0xF000 contains Modular Device Profile (MDP). The Index interval is allocated to Sub-Index 1. The maximum number of modules is allocated to Sub- Index 2. And, the PDO group parameter of the slave device is allocated to Sub-Index 5. (Refer to Table 15.)

Sub-Index 4 indicates the valid/invalid statuses of object 0x9nn0 Sub-Indexes.
The allocations are as follows:

bit 0 = 0x9nn0 Sub-Index 1
bit 1 = 0x9nn0 Sub-Index 2
:
1: Valid, 2: Invalid

Table 15: Object Configuration of 0xF000

INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0xF000	0	UINT8	8	RO	5	Number of items
	1	UINT16	16	RO	0x0010	Index Interval
	2	UINT16	16	RO	32	Maximum number of modules
	4	UINT32	32	RO	0x00000300	Valid Sub-Index of 0x9nn0
	5	UINT16	16	RO	0	PDO Group

■ Detected Module Ident List (0xF050)

The module ident lists of all I/O modules being connected are allocated to object 0xF050.
As Sub-index number = card address + 1, the list is created.
In the Sub-index corresponding to the address to which no card is assigned, 0 is entered. (Refer to Table 16.)

■ Configured Module Ident List (0xF030)

The master confirms the module configuration with object 0xF030.
As Sub-index number = card address + 1, the master writes Module Indents to the I/O modules whose existences have been acknowledged by the master. The slave confirms if the Module Ident is correct. When it is correct, the writing is done. If it is incorrect, it will be error.
When all is correct, the objects 0xF030 and 0xF050 have the same configuration.
The object 0xF030 is prepared for the confirmation from the master, but there is no problem even if not used. (Refer to Table 16.)

Table 16: Object Configuration of 0xF030 and 0xF050

INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0xF030	0	UINT8	8	RW	32	Number of items
	1	UINT32	32	RW	0 to n	Module Ident or 0
	2	UINT32	32	RW	0 to n	
	:	:	:	:	:	
	32	UINT32	32	RW	0 to n	
0xF050	0	UINT8	8	RO	32	Number of items
	1	UINT32	32	RO	0 to n	Module Ident or 0
	2	UINT32	32	RO	0 to n	
	:	:	:	:	:	
	32	UINT32	32	RO	0 to n	

■ Detected Address List (0xF040)

Each card address of all I/O modules being connected + 1 is allocated to 0xF040.
As Sub-index number = card address + 1, the list is created.
In the Sub-index corresponding to the address to which no card is assigned, 0 is entered. (Refer to Table 17.)

Table 17: Object Configuration of 0xF040

INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0xF040	0	UINT8	8	RO	32	Number of items
	1	UINT32	32	RO	0 to n	Card address+1 or 0
	2	UINT32	32	RO	0 to n	
	:	:	:	:	:	
	32	UINT32	32	RO	0 to n	

■ Device Type (0x1000)

The device type of this power/network module is allocated to object 0x1000
R80 series are compatible with Modular Device Profile (MDP). The device type is 5001. (Refer to Table 18.)

Table 18: Object Configuration of 0x1000

INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0x1000	UINT32	32	RO	5001	Device type

■ Manufacturer Device Name (0x1008)

The model number of this power/network module is allocated to object 0x1008 in String form. (Refer to Table 19.)

Table 19: Object Configuration of 0x1008

INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0x1008	STRING	32	RO	R80NECT1	Model number

■ Manufacturer Hardware Version (0x1009)

The hardware device version of this power/network module is allocated to object 0x1009 in String form. The format of version is “n.nn.” (Refer to Table 20.)

Table 20: Object Configuration of 0x1009

INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0x1009	STRING	32	RO	n.nn	Hardware version

■ Manufacturer Software Version (0x100A)

The software version of this power/network module is allocated to object 0x100A in String form. The format of version is "n.nn." (Refer to Table 21.)

Table 21: Object Configuration of 0x100A

INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0x100A	STRING	32	RO	n.nn	Software version

■ Identity Object (0x1018)

The unique information of this power/network module is allocated to object 0x1018. The vendor ID is allocated to Sub-Index 1. The product code is allocated to Sub- Index 2. And, the revision number is allocated to Sub-Index 3. The vendor ID and product code are fixed, but the revision number is incremented by 1 at each major version upgrade of the software. (Refer to Table 23.)

Converted from the R80NECT1's serial number (8 alpha-numeral characters), 32 bit data (which consists of 6 bits, 6 bits, 20 bits) is allocated to Sub-Index 4. The first and second characters of the serial number are respectively converted into 6 bit value. As the third to eighth characters consist of numerals only, which are used as they are and represented in 20 bits. (Refer to the Table 22.)

Table 22: Serial Number Conversion Table

6BIT	6BIT	20BIT
1st character	2nd character	3rd to 8th character (0 to 999999)

CHARACTER	DATA
0	0
1	1
:	:
9	9
A	10
B	11
:	:
Z	35

Table 23: Object Configuration of 0x1018

INDEX	SUB-INDEX	DATA TYPE	BIT	ACCESS	VALUE	CONTENT
0x1018	0	UINT8	8	RO	4	Number of items
	1	UINT32	32	RO	0x0000060C	Vendor ID
	2	UINT32	32	RO	0x52383001	Product code
	3	UINT32	32	RO	n	Revision number
	4	UINT32	32	RO	0 to n	Serial number