INSTRUCTION MANUAL

NETWORK MODULE
(OPC UA)

MODEL **R30NOUA1**

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:

Network module.....(1)

■ MODEL NO.

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

■ INSTRUCTION MANUAL

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

POINTS OF CAUTION

■ CONFORMITY WITH EU DIRECTIVES

- This unit must be mounted inside the instrument panel of a metal enclosure.
- The actual installation environments such as panel configurations, connected devices, connected wires, may affect the protection level of this unit when it is integrated in a panel system. The user may have to review the CE requirements in regard to the whole system and employ additional protective measures to ensure the CE conformity.

■ GENERAL PRECAUTIONS

- When mounting or removing the unit to or from the installation base, be sure to 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 0 to +50°C (32 to 122°F) with relative humidity within 10 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.

■ R3 I/O MODULE EXTENSION

- R30NOUA1 cannot be used in combination with R3 I/O modules for extension.

■ 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.

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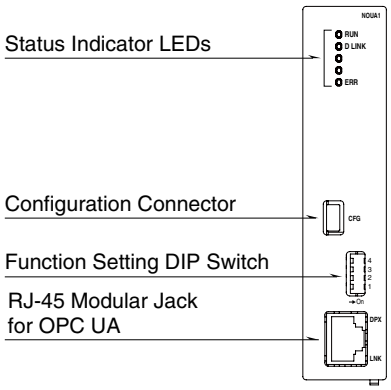
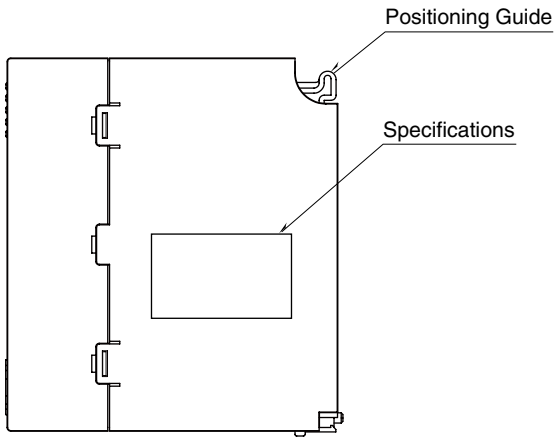
COMPONENT IDENTIFICATION

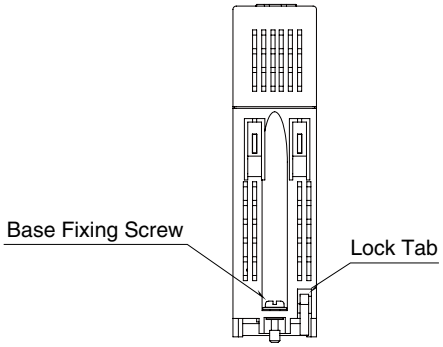
■ **FRONT VIEW**



■ **SIDE VIEW**



■ **BOTTOM VIEW**



■ **STATUS INDICATOR LED**

ID	FUNCTION	COLOR	STATUS	
RUN	OPC UA data access	Green	ON	Normal communication (data being accessed)
			OFF	Communication session not established / Communication error
D LINK	OPC UA session	Green	ON	Communication session established
			OFF	Communication session not established
ERR	Error Status	Red	ON	Error (including loss of communication)
			Blinking	EEPROM data error
			OFF	Normal

■ **ETHERNET INDICATOR LED**

ID	FUNCTION	COLOR	STATUS
DPX	Full duplex communication	Green	ON when communicating at full duplex
LNK	Ethernet link	Amber	ON when link is established

■ **DIP SW**

SW4	CALENDAR CLOCK BATTERY BACKUP
OFF	Disable (*)
ON	Enable

(*) Factory setting

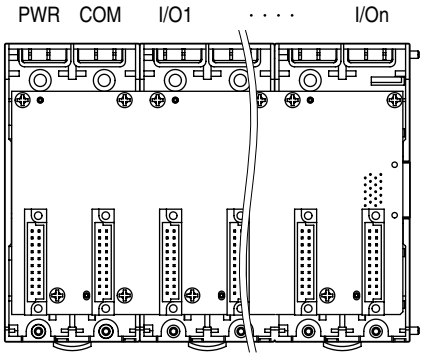
Note 1: Be sure to set unused SW1 to 3 to OFF.

Note 2: In order to prevent battery drain, battery back up is OFF at factory default.
Turn it ON prior to start using.

INSTALLATION

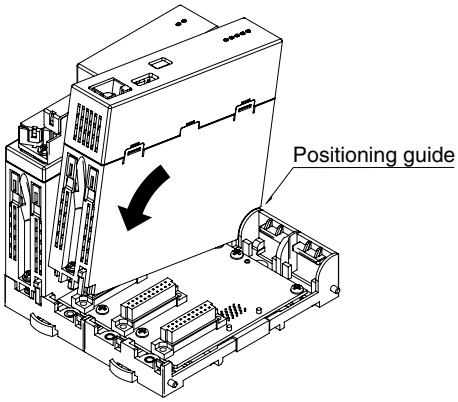
■ INSTALLATION TO THE BASE

Use the Installation Base (model: R30BS).
The mounting slot for a network module is fixed to COM.
Do not mount the network module to any other slot.

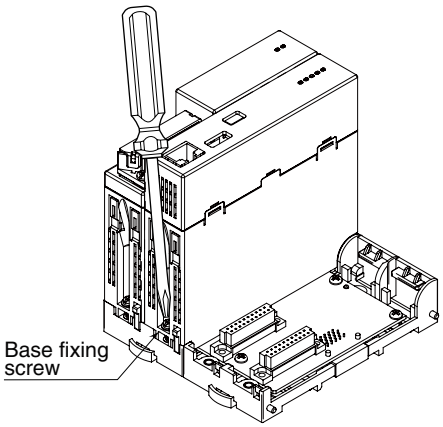


■ HOW TO MOUNT THE MODULE

1) Engage the positioning guide of the module with the Installation Base.
2) Pivot the module on the positioning guide and press it down until the lock tab sits into place.

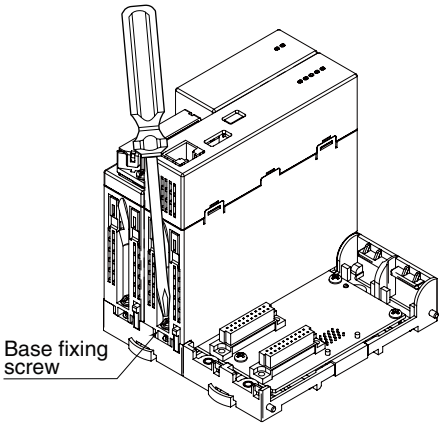


3) Tighten the base fixing screw using a screwdriver (stem length: 70 mm/2.76" or more) (torque 0.5 N·m).

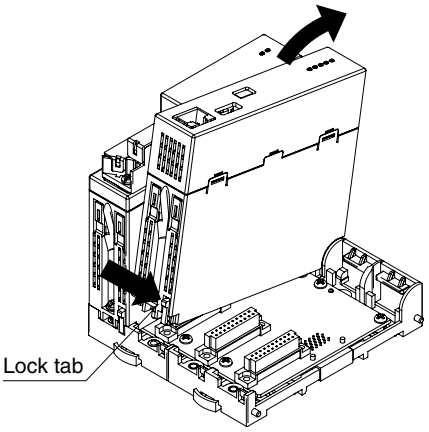


■ HOW TO REMOVE THE MODULE

1) Loosen the base fixing screw using a screwdriver (stem length: 70 mm/2.76" or more).



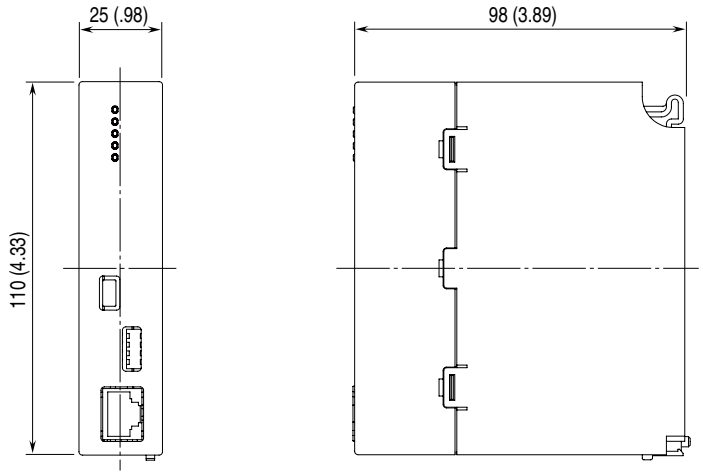
2) While pressing the projection on the lock tab, push the module upward.
3) Detach the positioning guide of the module from the Installation Base.



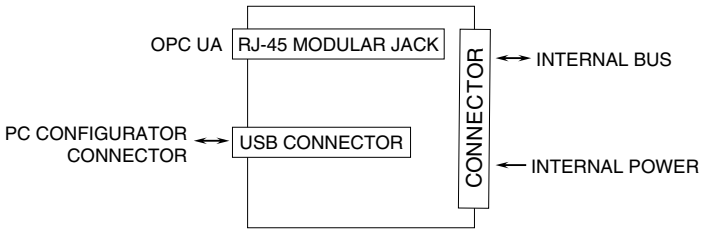
TERMINAL CONNECTIONS

Connect the unit as in the diagram below.

■ **EXTERNAL DIMENSIONS unit: mm (inch)**



■ **CONNECTION DIAGRAM**



OPC UA SPECIFICATIONS

■ **SECURITY**

• SERVER AUTHENTICATION

No authentication by X509 Certificates.
Any client is allowed to connect.

• USER AUTHENTICATION

Anonymous authentication

No user authentication required.
Select whether or not to allow anonymous login on R30CFG.

User authentication

Authentication by username and password.
Select whether or not to allow user login on R30CFG.
When user login is allowed, up to 2 sets of user name and password can be set.
Both anonymous login and user login can be allowed.

• USER ACCESS LEVEL

Data access level can be set on R30 CFG.

AUTHENTICATION	DATA ACCESS LEVEL
Anonymous	Anonymous login allowed (Read only) / (Read/Write)
UserName	User login allowed (Read only) / (Read/Write)

■ ADDRESS SPACE

The R30NOUA1 server generates nodes of the installed R30 series remote I/O modules (hereinafter referred to as 'I/O modules') in the address space

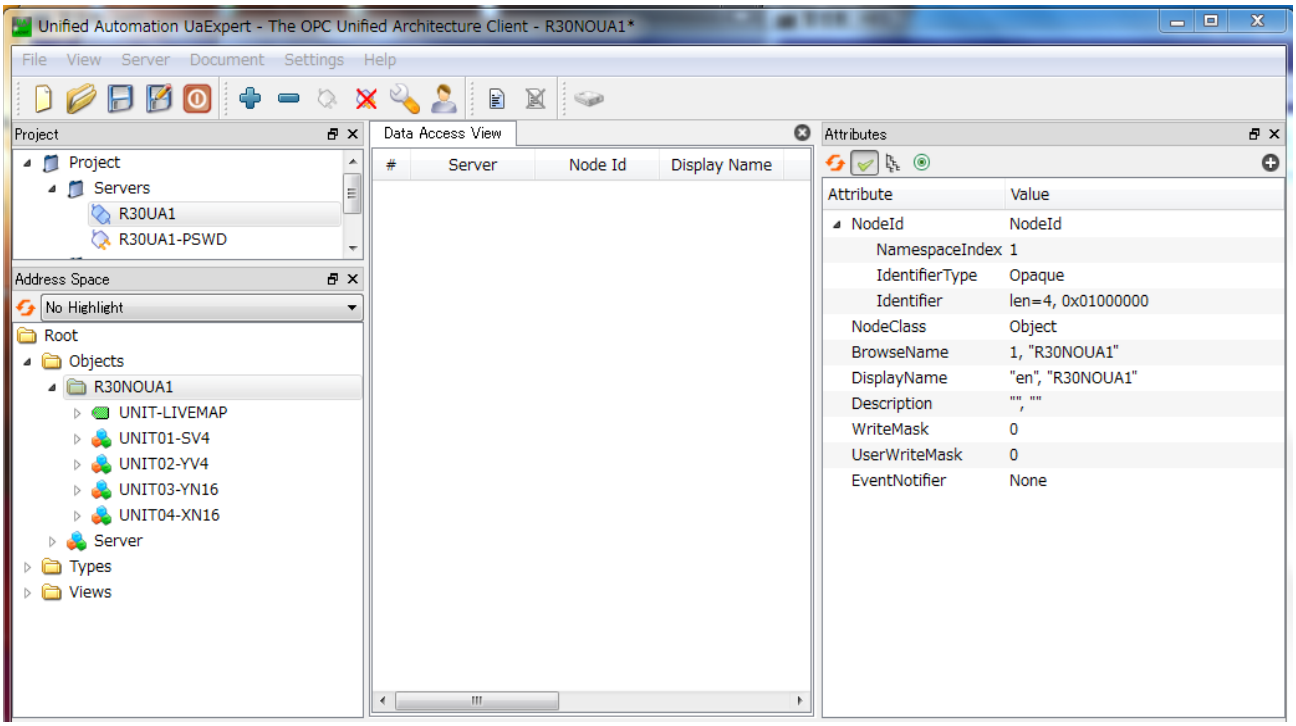
The table below shows how the address space of the R30NOUA1 server is represented by the UAExpert program.

Nodes related to the I/O modules are generated under the R30NOUA1 object node.
Nodes are generated for the I/O modules which are detected when power is turned on and not for those installed thereafter.

DISPLAY NAME	DATA TYPE	DESCRIPTION
R30NOUA1		Address space of R30NOUA1. I/O module-related nodes are generated in the address space. Nodes are generated for modules detected at power up.
UNIT-LIVEMAP	UINT16	Variable node for map data of existing I/O modules. 1 is set to the bit position (slot number - 1) of an existing module. For example, 1 is set to each of bits 2, 3 when I/O modules are present in the slot Nos. 3, 4.
UNITxx-yyy		Object node of an I/O module detected at power up. An object node is generated in the following format. xx: slot No. yyy: I/O module name (model) ex) UNIT01-SV4
input		Input object node. When an input module or I/O module is mounted, variable nodes are generated for various input data and status data.
output		Output object node. When an output module or I/O module is mounted, variable nodes are generated for various output data.
CHx-DATA		Variable node for discrete, analog, pulse input, etc. x= channel number
	Boolean	Bit type variable node. Used when discrete data is written / read by one bit.
	INT16	Signed 16 bit integer type variable node. Used when analog data is written / read by one point. % data (0 – 10000), temperature data, etc.
	UINT16	Unsigned 16 bit integer type variable node. Used when discrete data is written / read by 16 bits.
	INT32	Signed 32 bit integer type variable node. Not used.
	UINT32	Unsigned 32 bit integer type variable node. Used for reading, and resetting/presetting totalized pulse count.
	INT64	Signed 64 bit integer type variable node. Not used.
	UINT64	Unsigned 64 bit integer type variable node. When accessing INT16 or UINT16 type data for four channels, data is represented in little endian format as follows. Address + 0: channel 1 data; UINT16 data; bits 00 to 15 Address + 1: channel 2 data; UINT16 data; bits 16 to 31 Address + 2: channel 3 data; UINT16 data; bits 32 to 47 Address + 3: channel 4 data; UINT16 data; bits 48 to 63
DATA-ERROR	UNIT16	Variable node for data error status. For an analog module or pulse module, b0 to b15 correspond to channels 1 to 16, respectively. For a discrete module, b0 corresponds to channels 1 to 16. 0 = no error, 1 = error
DATA-STATUS	UNIT16	Variable node for data validity or invalidity. For an analog module or pulse module, b0 to b15 correspond to channels 1 to 16, respectively. For a discrete module, b0 corresponds to channels 1 to 16. 0 = data invalid, 1 = data valid
HW-ERROR	UNIT16	Variable node for HW error status. For an analog module or pulse module, b0 to b15 correspond to channels 1 to 16, respectively. For a discrete module, b0 corresponds to channels 1 to 16. 0 = no HW error, 1 = HW error

■ NODE EXAMPLES

• OBJECT NODE; R30NOUA1

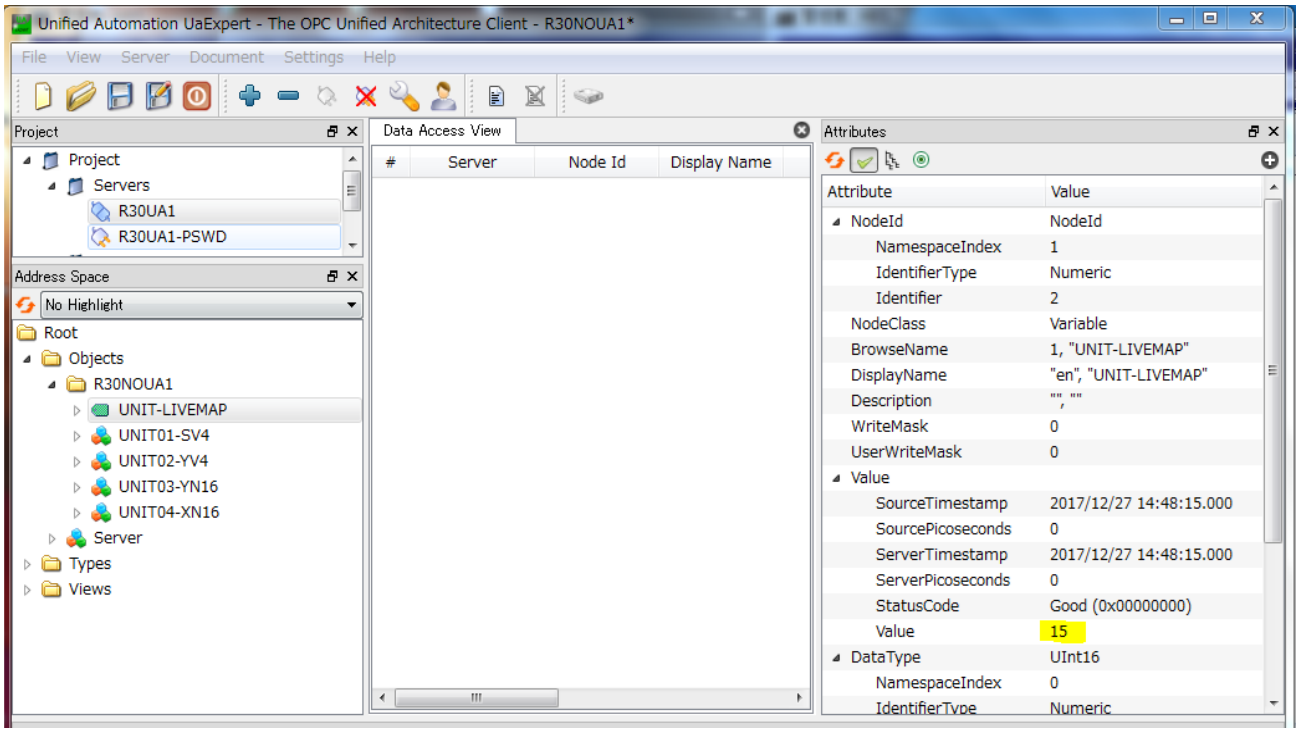


Object nodes of respective I/O modules which are detected at power up and a variable node indicating I/O module status (UNIT_LIVEMAP) are created in the address space of R30NOUA1.

Note that nodes are not created for those modules mounted after power up.

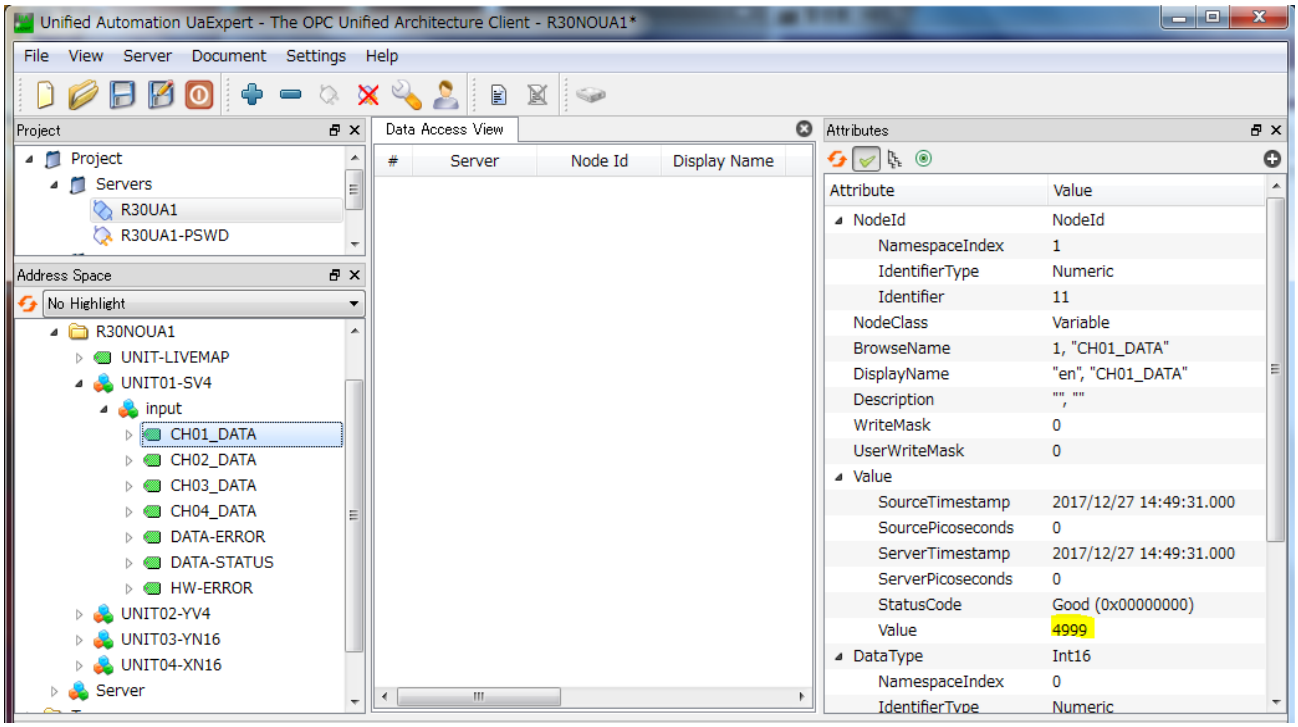
Also note that even if a module is replaced with another type of module, the newly mounted module is still recognized as the type of the previously mounted module. For example, if an R30YV4 is replaced with an R30SV4 module, the R3SV4 is handled as the R30YV4.

• VARIABLE NODE; UNIT-LIVEMAP (UINT16)



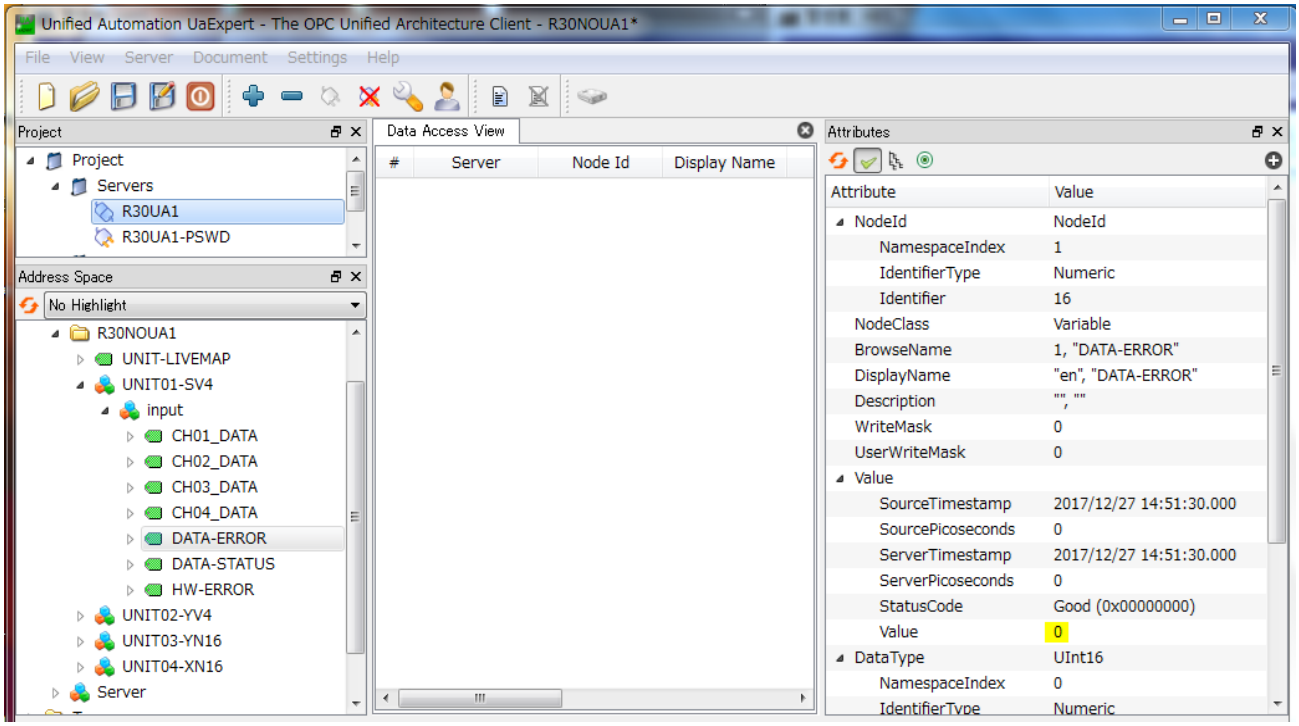
In this example, the value of UNIT_LIVEMAP is '15 (000FH)', indicating that I/O modules are mounted in the slot Nos. 1 through 4.

• VARIABLE NODE; SV4 INPUT DATA (INT16)



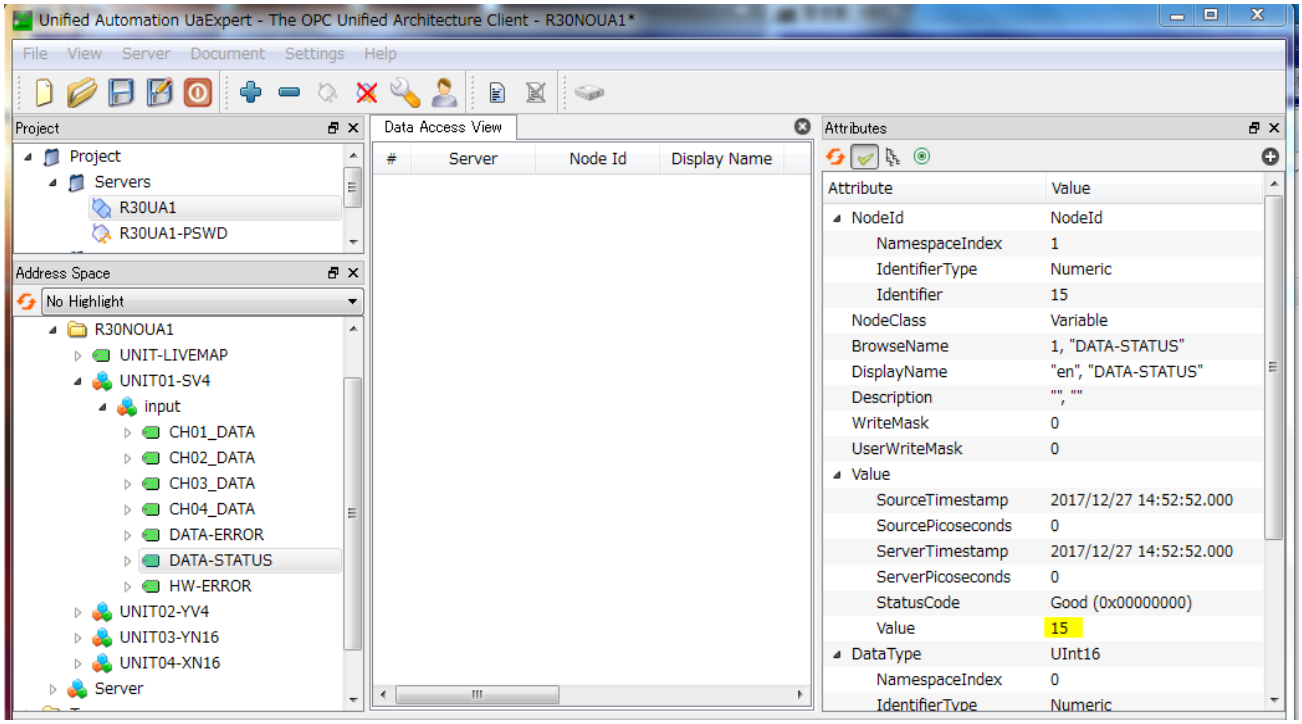
In this example, the value of CH01_DATA of the SV4 module is '4999' in INT16 form, indicating that the input value of CH01 is 4999.

• VARIABLE NODE; SV4 DATA-ERROR (UINT16)



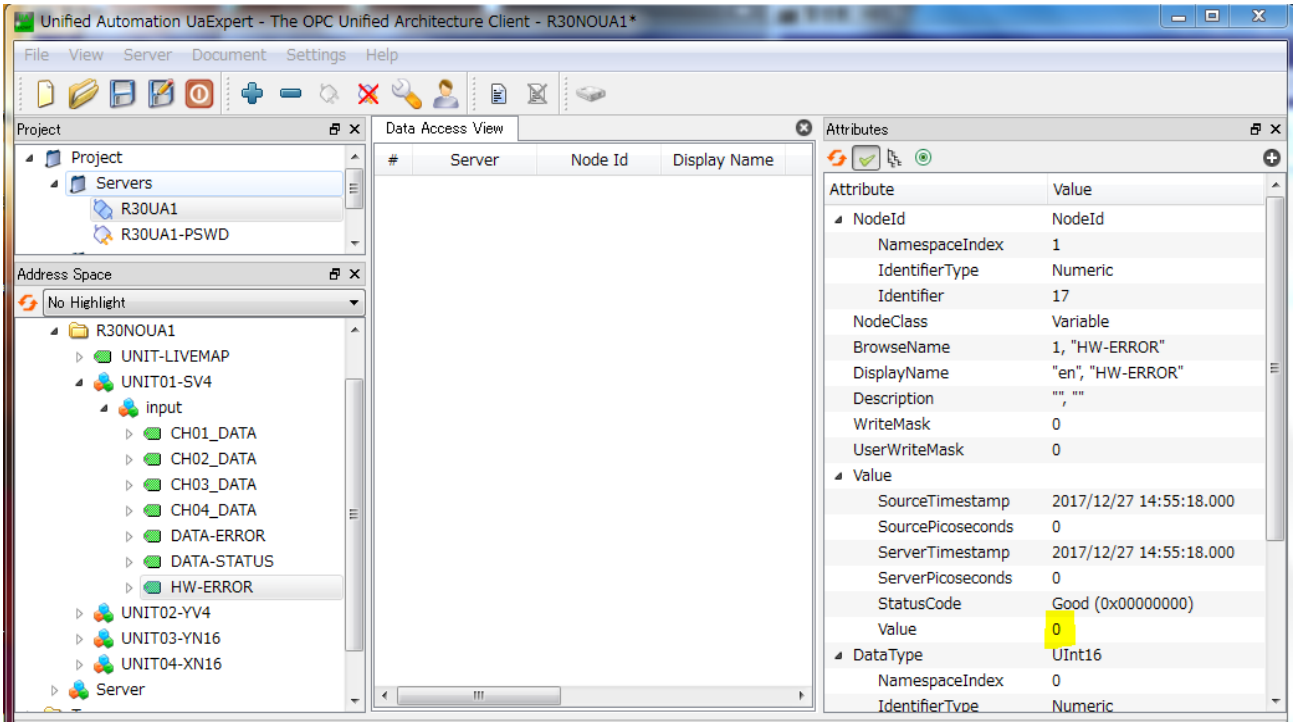
In this example, the value of DATA-ERROR is '0 (0000H)', indicating that the input values of CH01 to CH04 are normal.

• VARIABLE NODE; SV4 DATA STATUS (UINT16)



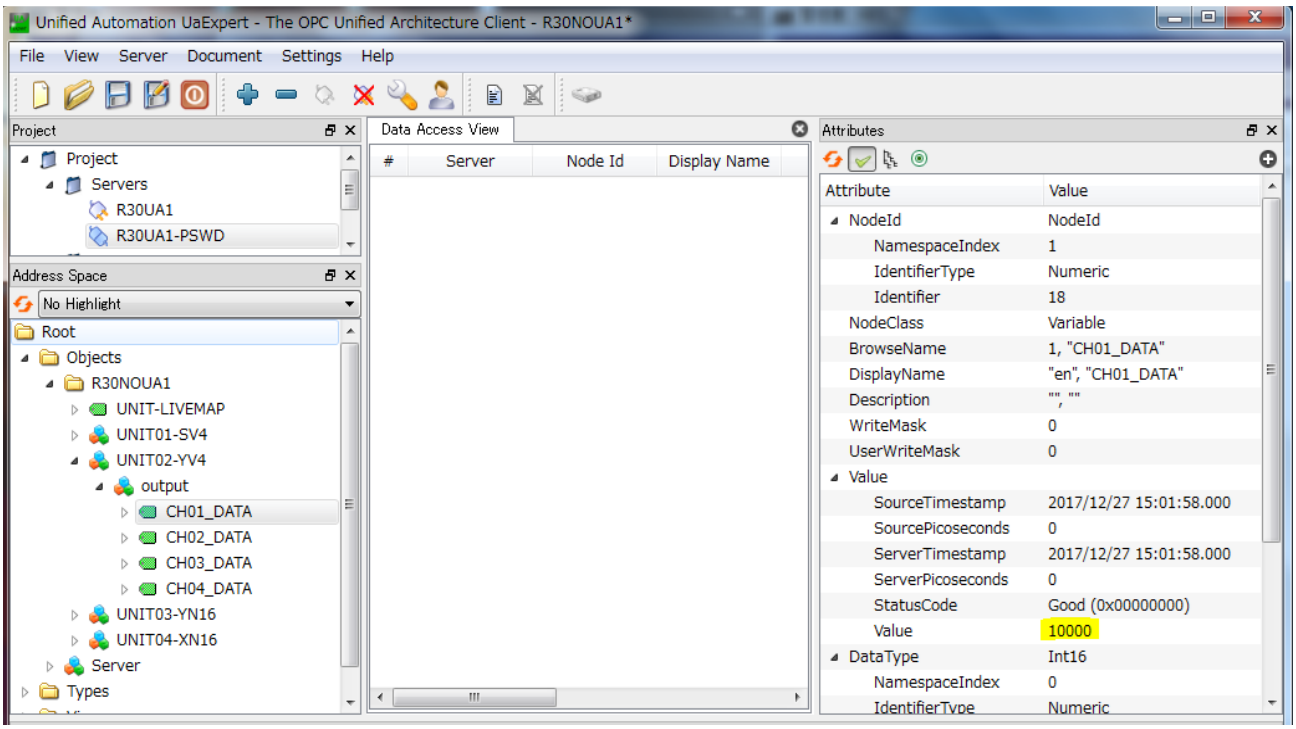
In this example, the value of DATA-STATUS is '15 (000FH)', indicating that the input values of CH01 to CH04 are valid.

• VARIABLE NODE; SV4 HW ERROR (UINT16)



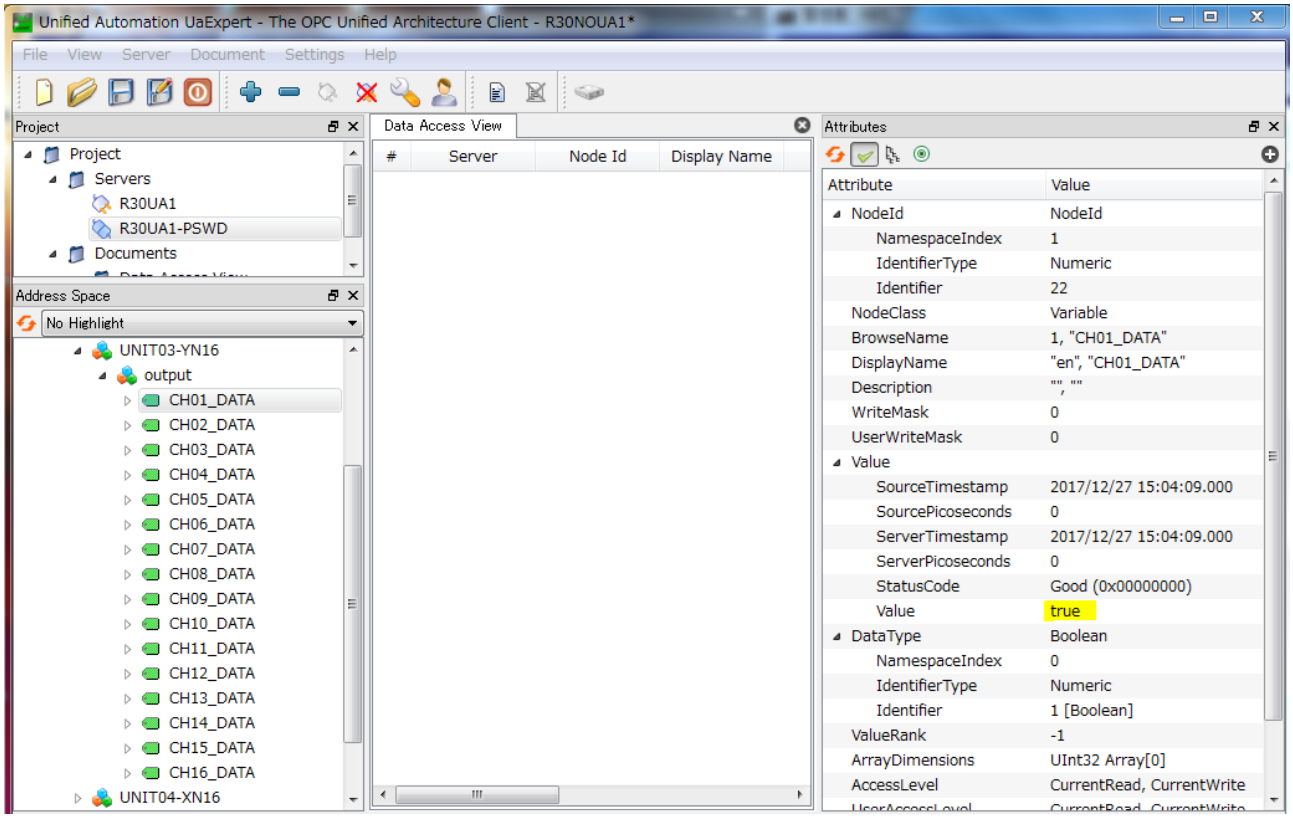
In this example, the value of HW-ERROR is '0 (0000H)', indicating that no HW error is occurring on CH01 to CH04.

• VARIABLE NODE; YV4 OUTPUT DATA (INT16)



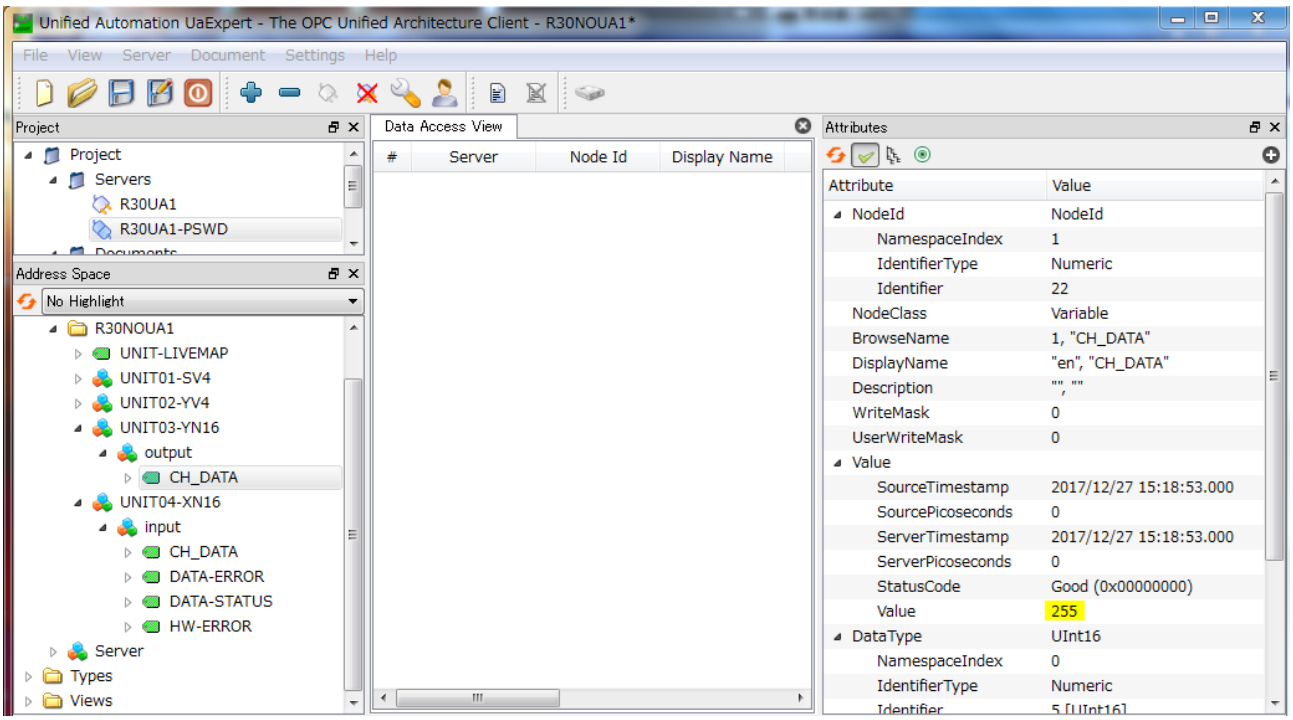
In this example, the value '10000' is written in CH01_DATA in INT16 form, indicating that the YV4 module outputs 100.00% from CH01.

• VARIABLE NODE; YN16 OUTPUT DATA (BOOLEAN)



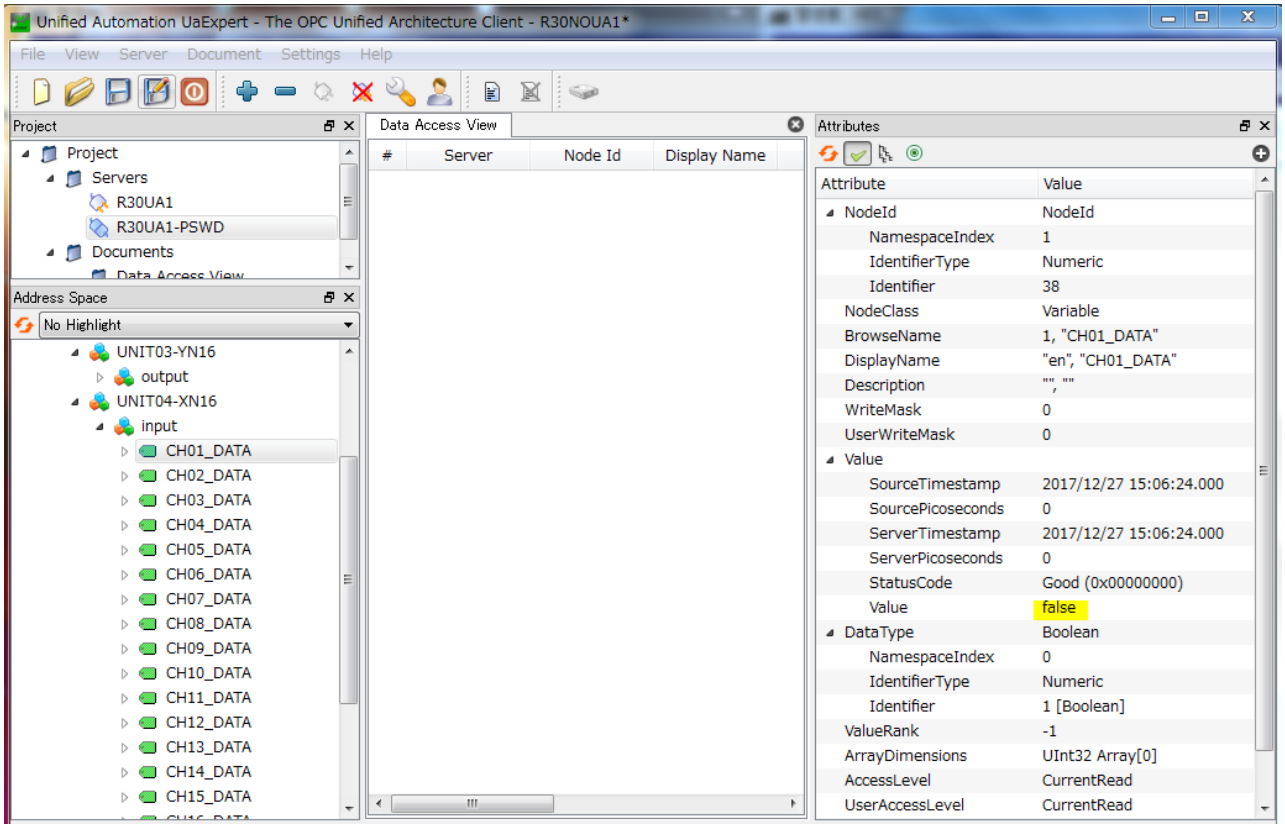
In this example, the value 'true' is written in CH01_DATA in BOOLEAN form, indicating that output of CH01 of the YN16 module is ON.

• VARIABLE NODE; YN16 OUTPUT DATA (UINT16)



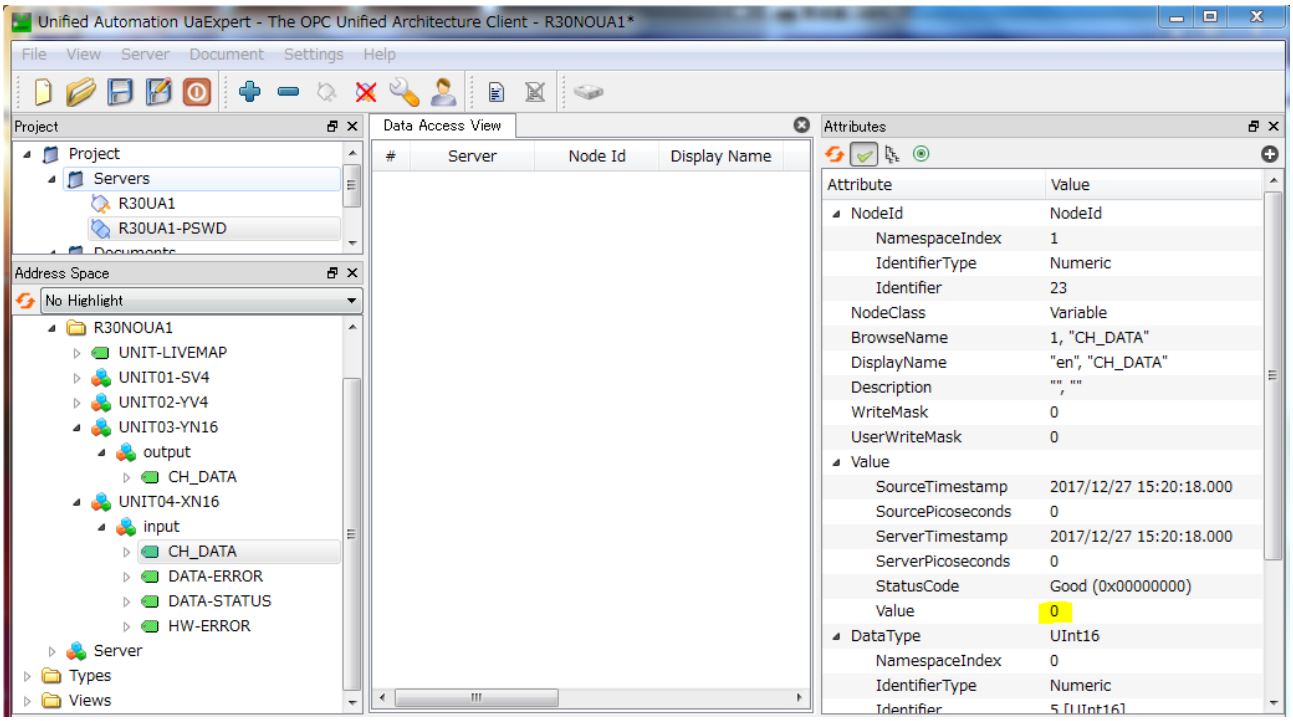
In this example, the value '255 (00FFH)' is written in CH01_DATA in UINT16 form, indicating that outputs of CH01 to CH16 of the YN16 module are ON.

• VARIABLE NODE; XN16 INPUT DATA (BOOLEAN)



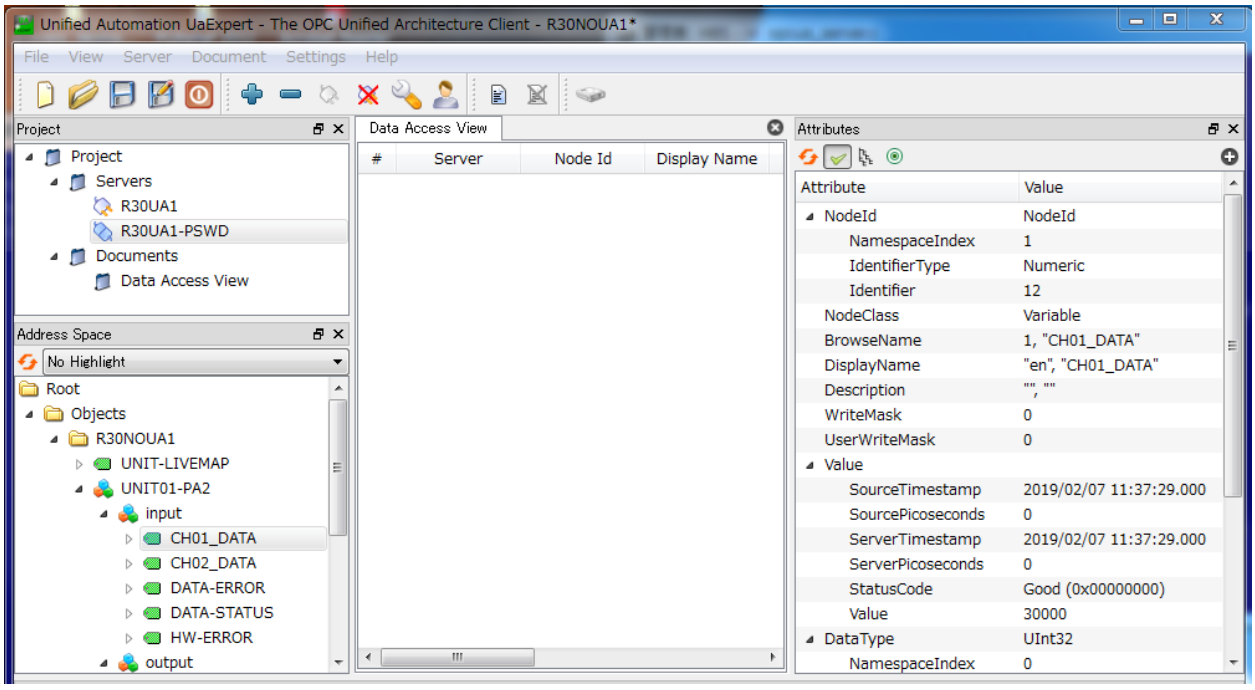
In this example, the value 'false' is written in CH01_DATA in BOOLEAN form, indicating that input of CH01 of the XN16 module is OFF.

• VARIABLE NODE; XN16 INPUT DATA (UINT16)



In this example, the value '0 (0000H)' is written in CH_DATA in UINT16 form, indicating that inputs of all channels of the XN16 module are OFF.

• VARIABLE NODE; PA2 INPUT DATA (UINT32)

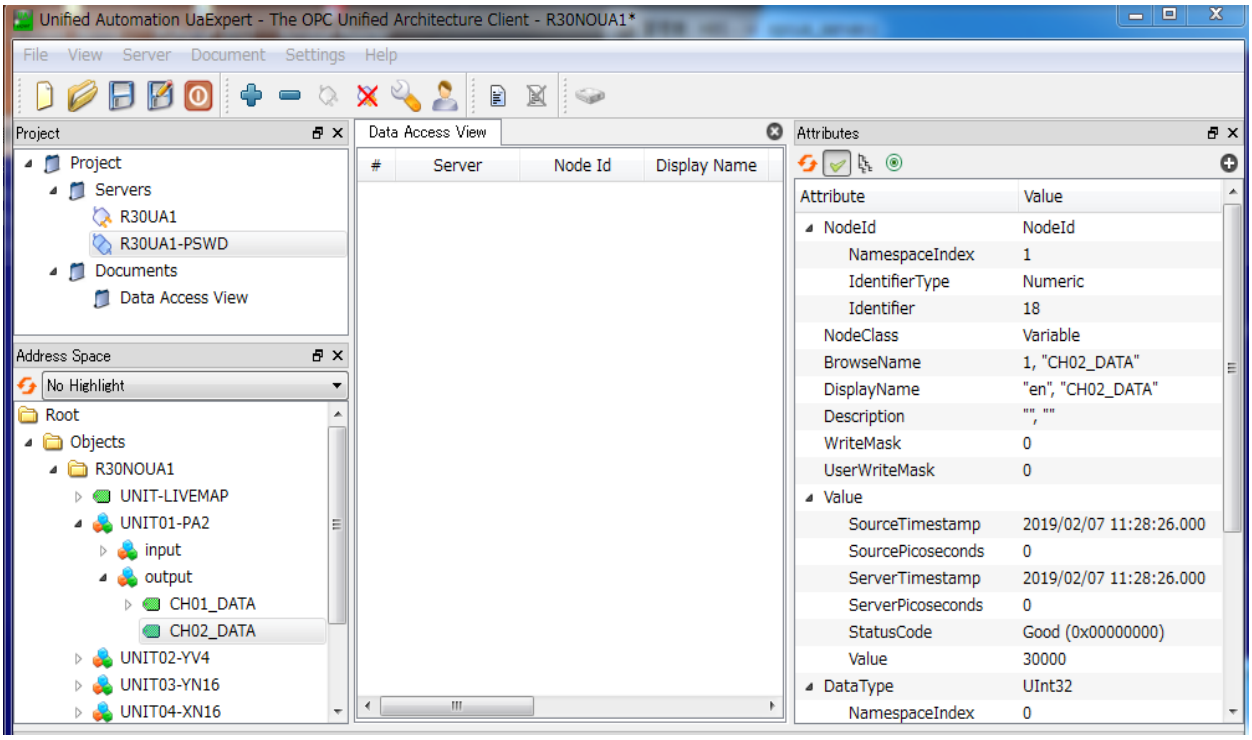


In this example, the value of CH01_DATA of the PA2 module is '30000' in UINT32 form, indicating that the value of the totalized pulse count of CH01 is 30000.

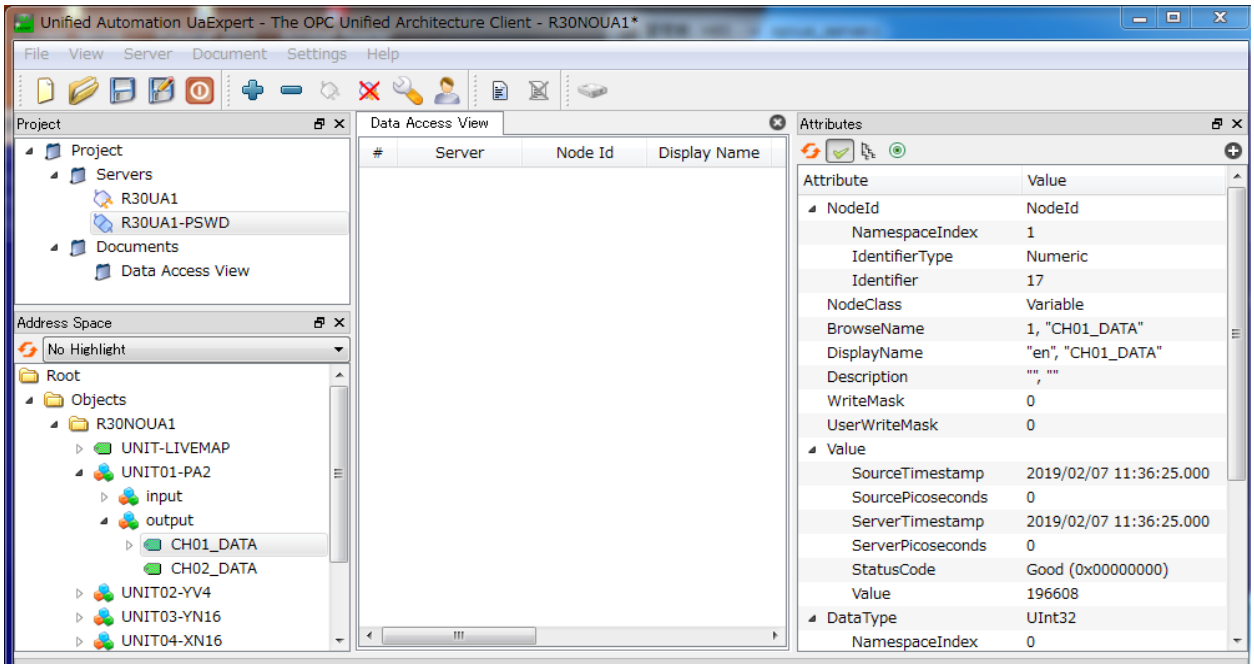
• VARIABLE NODE; PA2 OUTPUT DATA (UINT32)

The below examples respectively show cases where the totalized pulse count of CH02 is preset by setting a preset value in CH02_DATA and where that of CH01 is preset by allocating presetting bits in CH01_DATA.

Refer to the specifications of R30PA2 for details.



In this example, the value '30000' is written in CH02_DATA in UINT32 form, thereby writing 30000 as the preset count value of the PA2 module.

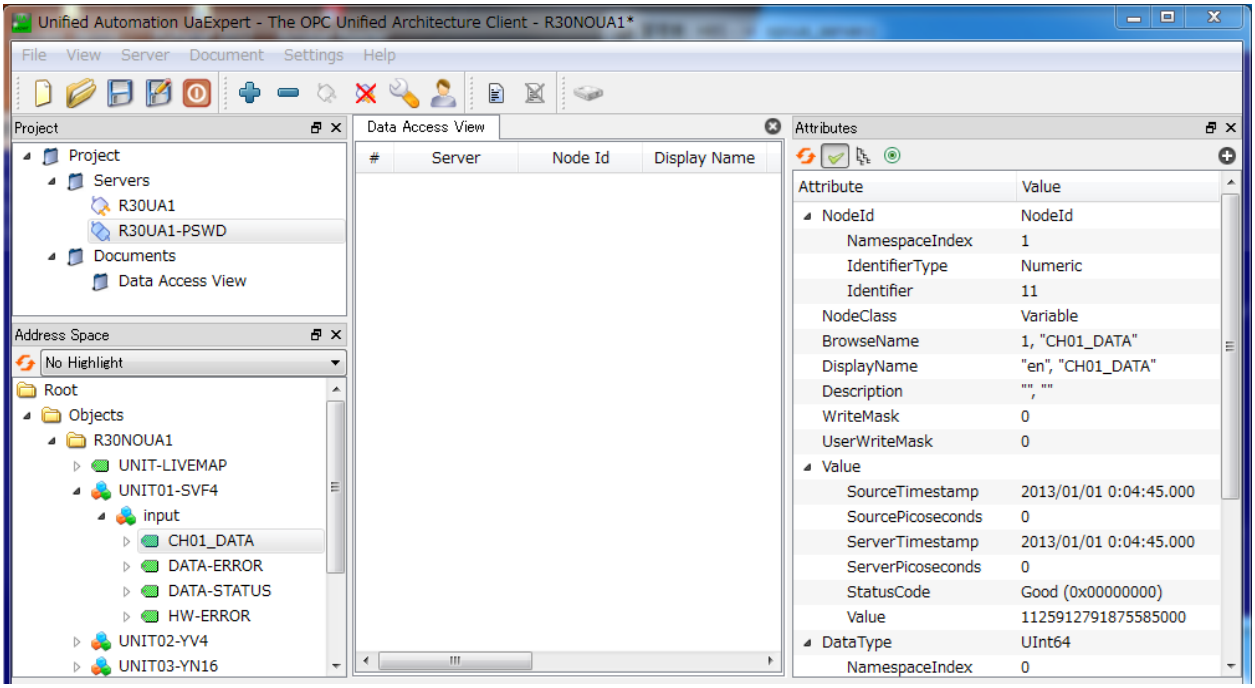


In this example, the value '196608 (30000H)' is written in CH01_DATA in UINT32 form to allocate presetting bits, thereby setting 30000 as the preset count value for the PA2 module.

• VARIABLE NODE; SVF4 INPUT DATA (UINT64)

Input data of CH01 to CH04 of the SVF4 module is read in UINT64 form (64 bits).

CH DATA	BIT POSITION
1	00 – 15
2	16 – 31
3	32 – 47
4	48 – 63



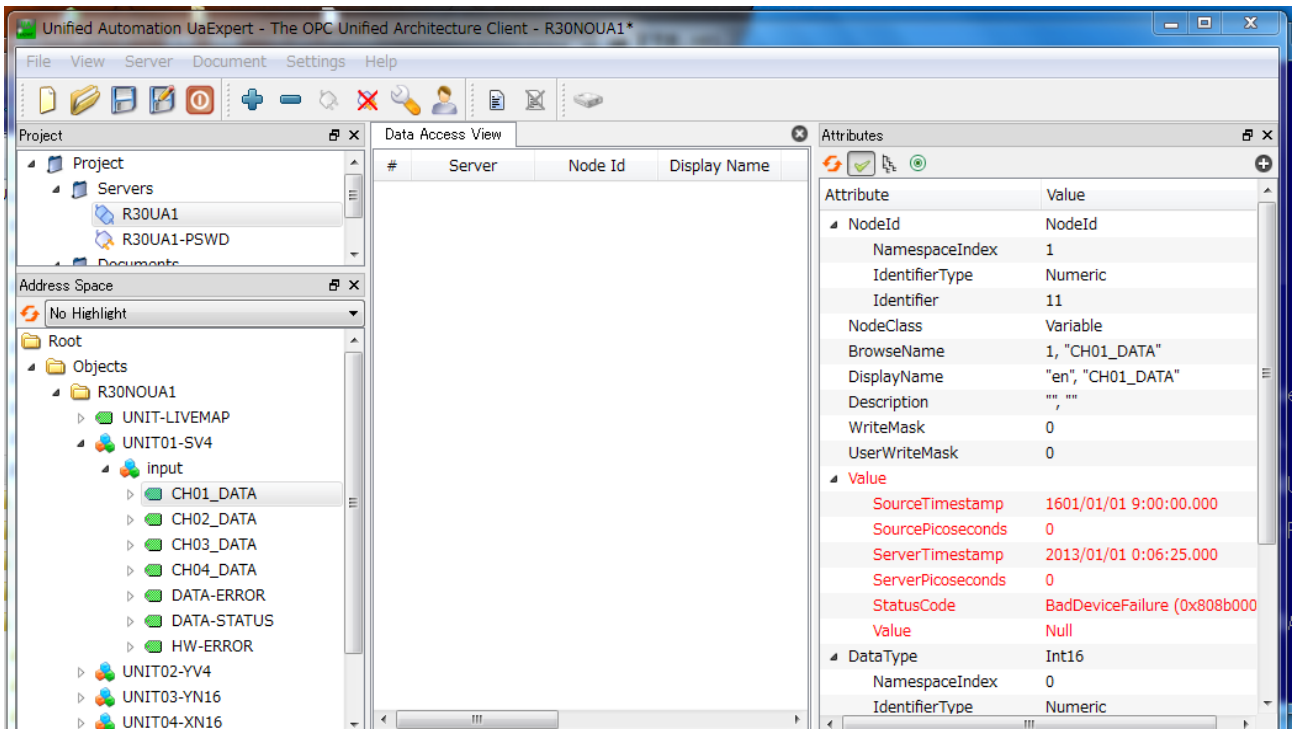
In this example, the value of CH01_DATA of the SVF4 module is '1125912791875585000 (0FA0 0BB8 07D0 03E8H)' in UINT64 form, indicating that the values of CH01, CH02, CH03, and CH04 are '03E8H', '07D0H', '0BB8H', and '0FA0H', respectively.

■ DATA QUALITY OF VARIABLE NODE

When an error is detected, one of the following StatusCodes is returned.

SYMBOL	STATUSCODE	STATUS DESCRIPTION
OpcUa_Good	0x00000000	Normal
OpcUa_BadDataUnavailable	0x809E0000	Uncertain data
OpcUa_BadSensorFailure	0x808C0000	AD / burnout error
OpcUa_BadOutOfRange	0x803C0000	Input overrange
OpcUa_BadNotTypeDefinition	0x80C80000	Data type error
OpcUa_BadNofound	0x803E0000	Undefined object
OpcUa_BadDeviceFailure	0x808B0000	I/O module removed / absent
OpcUa_NodeIdUnknown	0x80340000	Node ID error

Example) StatusCode: OpcUa_BadDeviceFailure(0x808B0000)



■ VARIABLE NODE ACCESS MONITORING

As an OPC UA client accesses a variable node, R30NOUA1 activates the monitoring timer and starts monitoring the client. While a variable node is being read or written, RUN LED turns green, ERR LED turns OFF, and RUN contact turns ON.

When there is no access to a variable node before the timeout period elapses, a timeout error occurs, RUN LED turns OFF, ERR LED turns ON, and RUN contact turns OFF.

The timer value can be set on R30CFG.

■ CONNECTION MONITORING

As connection is established, R30NOUA1 starts monitoring the connection status based on the connection timer (fixed to approx. 70 sec.).

In the case where the connection cannot be closed due to communication cable breakage, client server system down, etc., the connection being used is forcibly closed (communication resource being used is released) when the timeout period has elapsed.

■ TIME MANAGEMENT

R30NOUA1 is equipped with an RTC (Real Time Clock) and a timestamp is assigned to each access to OPC UA data based on the time acquired from the RTC.

R30NOUA1 communicates with the NTP server (ntp.nict.jp) regularly to perform time correction.

Time can also be adjusted on R30CFG.

■ TIME ZONE

The UTC time zone can be set on R30CFG.

■ APPLICABLE TYPES OF I/O MODULES

The table below shows applicable types of I/O modules (excluding R3 series I/O modules)

TYPE	2 POINTS	4 POINTS	8 POINTS	16 POINTS	DESCRIPTION
DI				✓	
DO				✓	
DIO				✓	
AI	✓	✓	✓	✓	
AO	✓	✓	✓	✓	
AIO		✓	✓	✓	Points are half for PA2 as data is allocated in 2-words units.

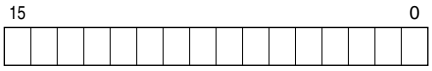
Note 1) DI, DO, DIO; data allocation in bit units.
Note 2) AI, AO, AIO; data allocation in word units.

I/O DATA DESCRIPTIONS

The data allocations for typical I/O modules are shown below.
Refer to the manual for each module for detailed data allocations.

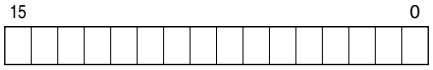
■ ANALOG DATA (16-bit data, models: R30SV2, R30SV4, R30YV4, R30YS4, R30US2, R30US4, etc.)

16-bit binary data.
Basically, 0 to 100% of the selected I/O range is converted into 0 to 10000 (binary).
Negative percentage is represented in 2's complements.



■ ANALOG DATA (16-bit data, models: R30RS4, R30TS4, R30US2, R30US4, etc.)

16-bit binary data.
With °C temperature unit, raw data is multiplied by 10. For example, 25.5°C is converted into 255.
With °F temperature unit, the integer section of raw data is directly converted into the data. For example, 135.4°F is converted into 135.
Minus temperature is converted into negative values, represented in 2's complements.

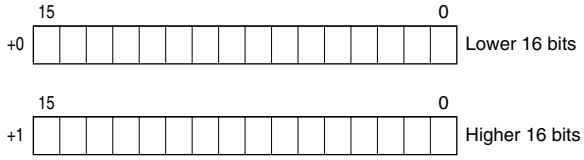


■ ANALOG DATA (16-bit data, models: R30CT4E etc.)

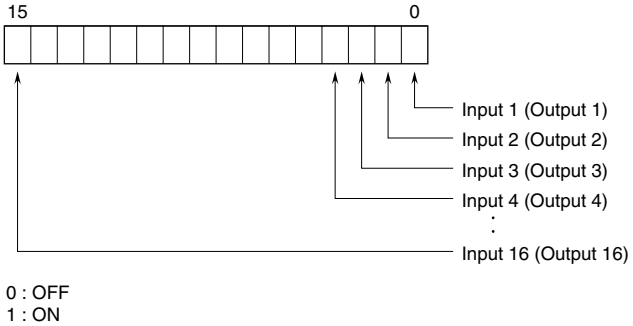
16-bit binary data.
Integer obtained by multiplying engineering unit value (A) by 100.
(For CLSE-R5, integer obtained by multiplying engineering unit value (A) by 1000.)

■ ANALOG DATA (32-bit data, models: R3-PA2)

32-bit binary data is used for accumulated counts, encoder positions, and active energy.
Lower 16 bits are allocated to the 16 lowest addresses from the lowest to higher ones, and higher 16 bits are allocated to the following addresses from the lowest to higher ones.



■ DISCRETE DATA (models: R30XN16A, R30YN16x, etc.)



0 : OFF
1 : ON