IMO iSmart

DeviceNet Communication Manual – 2nd Edition

SMT-Dnet

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Introduction

The SMT intelligent relay can be connected into a DeviceNet network by the DeviceNet expansion Communication Module.

The SMT DeviceNet Communication Module is a Group2 Only Slave device; thus allowing the SMT intelligent relay to be a slave station of DeviceNet.

The *i*Smart DeviceNet Communication Module is connected to a SMT intelligent relay base by means of the expansion port. It can be connected directly to a base or into anyone of the three possible I/O expansion modules.

The SMT intelligent relay can also connect with another communication expansion module in the range, such as Modbus Communication Module (SMT-MODBUS), DeviceNet Communication Module (SMT-DNET) and Profibus Communication Module (SMT-PNET). However only one expansion communication module can be connected at any one time, i.e. If SMT-DNET is connected the SMT-PNET cannot be connected.

The SMT DeviceNet Communication Module connects to a DeviceNet Network as shown in figure1.
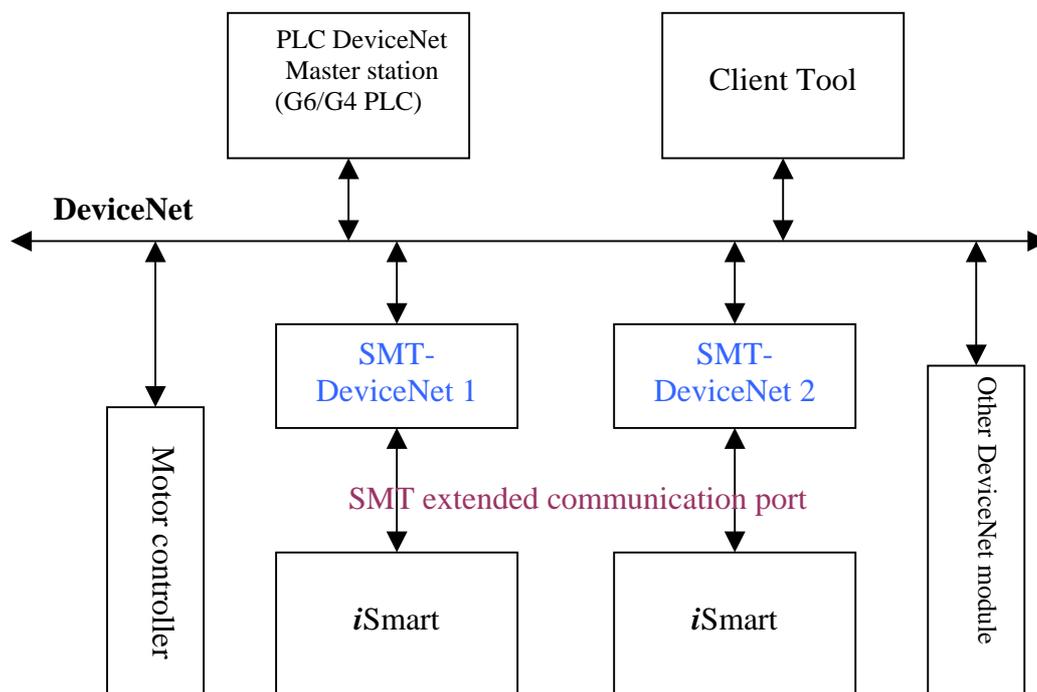

Figure1: DeviceNet Framework

Function Description

Network

- DeviceNet Communication Module is a slave station
- Baud rate and MAC Id set by a 8-bit DIP switch follow DeviceNet standards；
  - o Baud rate: 125K, 250K, 500K;
  - o Network MAC ID: 0～63;
- IO Assemble configuration can be conserved;
- Can't set baud rate and MAC ID by network;
- Can't resume or diagnose fault;

Protocol - DeviceNet

- Support predefine master slave connection
- Support predefine explicit message connection
- Support predefine poll IO message connection
- Support explicit and IO message fragment
- Support duplicate MAC Id check
- UCMM incapable device
- No bit-strobe IO message
- No change of state and cycle IO message
- No device communication faulted message
- No device heartbeat message
- No device shutdown message

SMT Extend Communication

Within the DeviceNet network the following parameters can be monitored of the *i*Smart:

- Read and write SMT coils states
- Read current value of SMT function blocks (Timer, Counter, RTC, Analogue, PWM)
- Read and write preset value of SMT function blocks (Timer, Counter, RTC, Analogue, PWM)
- Read and write the SMT Control bit, i.e. Run or Stop state of SMT
- Read SMT ID number

Interface

- Module status Indicators (Module LED)
- Network status Indicator (NET LED).
- Power is taken from the network.
- Interface connection with DeviceNet network.
- Interface connection with SMT.

Network Status LED Properties

Network LED	Status	To indicate	Remark
Off	Not powered	No power	
Off	Not online	The device has not completed the Duplicate MAC_ID test yet.	
Flashing green	Online, Not connected	The device isn't allocated to a master.	
Green on	Online, connected, link ok	The device is allocated to a Master.	
Flashing red	Connection Time–Out	I/O Connections are in the Timed–Out state.	
Red on	Critical Link Failure	Failed communication device. The device has detected an error that has rendered it incapable of communicating on the network (Duplicate MAC ID, or Bus–off).	
Flashing red and green	Communication Faulted and Received an Identify Comm. Fault Request - Long Protocol	A specific Communication Faulted device. The device has detected a Network access error and is in the Communication Faulted state.	Non supported.

Module Status LED Properties

Module LED	Status	To indicate	Remark
Off	No power	There is no power applied to the device.	
Flashing red and green	Device Self Testing	The Device is in Self Test.	
Flashing green	Device in Standby	Not connected with SMT	*User defined
Green on	Device Operational	The device is operating in a normal condition.	
Flashing Red	Minor Fault	Recoverable Fault may need replacing.	Communicated with SMT error.
Red on	Unrecoverable Fault	The device has an unrecoverable fault; may need replacing.	Such as hardware error.

Configuration

The SMT-Dnet modules have an EDS configuration file for the DeviceNet Network.

The *i*Smart DeviceNet MAC Id, communication baud rate and I/O Assemble can be configured for the network.

Device Profile

Device Name: SMT-DNET Module
Device Type Code: 0C Hex (Communications Adapter)

Object Modelling

Object Class List

Object Class	Must or Optional	Instance number
Identity	Must	1
Router	Must	1
DeviceNet	Must	1
Connection	Must	2（IO connection and Explicit connection）
Assembly	Optional	1（Possibly 1 or more）
Control	Optional	1
Interface	Optional	1
Application	Optional	1（Possibly 1 or more）

Object Behaviour

Object Class	Effect of Device Behaviour
Identity	Support reset operation, non-support heartbeat message
Router	No effect
DeviceNet	Configure net port instance such as node ID, baud rate）
Connection	Define and handle communication data in detail
Assembly	Define IO assemble data format and content
Control	Define PLC control and monitor parameters
Interface	Define communication module parameters
Application	Communication with SMT INTELLIGENT RELAY

Object Interface

Object Class	Interface
Identity	Router
Router	Identity, DeviceNet, Connection, Assemble, Application
DeviceNet	Router
Connection	Router, Assemble
Assembly	Router, Connection, Application
Control	Router, Assemble
Interface	Router
Application	Router, Assemble

I/O Assemble Data Define

The default IO Assemble is 6 (input assemble) and 36 (out assemble). Input assemble can be configured as 6,7or 110; Output assemble can be configured as 36,37 or 100. Configuration is effectual after the device is replacing.

Base inputs assemble 6, data length 8 bytes.

BYTE	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1
1	I8	I7	I6	I5	I4	I3	I2	I1
2	Reserved				IC	IB	IA	I9
3	M8	M7	M6	M5	M4	M3	M2	M1
4	Reserved	MF	ME	MD	MC	MB	MA	M9
5	Reserved							
6	Reserved							
7	Reserved				*3			

Base inputs assemble 7, data length 8 bytes.

BYTE	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1
1	I8	I7	I6	I5	I4	I3	I2	I1
2	Reserved				IC	IB	IA	I9
3	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1
4	Reserved				YC	YB	YA	Y9
5	X8	X7	X6	X5	X4	X3	X2	X1
6	Reserved				XC	XB	XA	X9
7	Reserved							

Extended inputs assemble 110, data length 8 bytes.

BYTE	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1
1	I8	I7	I6	I5	I4	I3	I2	I1
2	Reserved				IC	IB	IA	I9
3	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1
4	Reserved				YC	YB	YA	Y9
5	X8	X7	X6	X5	X4	X3	X2	X1
6	Reserved				XC	XB	XA	X9
7	Reserved							Running*2

Base outputs assemble 36, data length 4 bytes.

BYTE	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1
1	M8	M7	M6	M5	M4	M3	M2	M1
2	Reserved	MF	ME	MD	MC	MB	MA	M9
3	Reserved							

Base outputs assemble 37, data length 4 bytes.

BYTE	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1
1	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1
2	Reserved				YC	YB	YA	Y9
3	Reserved							

Extended outputs assemble 100, data length 4 bytes.

BYTE	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1
1	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1
2	Reserved				YC	YB	YA	Y9 *1
3	Reserved							Run *2

*1, States of coils (Q, I, M,Y, X) is the same of SMT, 1－ON, 0－OFF.
*2, Run command: 1－Run, 0－Stop.
Running states: 1－Running, 0－Stopping.
*3, reserved bit write 0.

Parameter Configure

Referenced in EDS file.

DeviceNet Information

Message Type

As the communication module is a group2 slave device it can only support message types as shown in table 5-1.

CAN Identity Field	Group2 Message Type	Remark
10xxxxxx111	Duplicate MAC ID check message	
10xxxxxx110	Predefine master/slave connection message	xxxxxx is device MAC ID
10xxxxxx101	Source poll IO request message	
10xxxxxx100	Source explicit request message	

Table 5-1: Communication module consumed message type

DeviceNet Service

As the communication module is a group2 slave device it can only support class service and instance service as shown in table 5-2.

Service name	Service code
Reset	0x05
Get Attribute Single	0x0E
Set Attribute Single	0x10
Allocate Master Slave Connection Set	0x4B
Release Master Slave Connection Set	0x4C

Table 5-2: Communication module service type

DeviceNet Object

Class code	Object class name	Instance number
01hex	Identity	1
02hex	Router	1
03hex	DeviceNet	1
04hex	Assemble	6
05hex	Connection	2
29hex	Control	1
64hex	Interface	1
65hex	SMT extend	1

Table 5-3 Communication module object class

DeviceNet Object Modelling
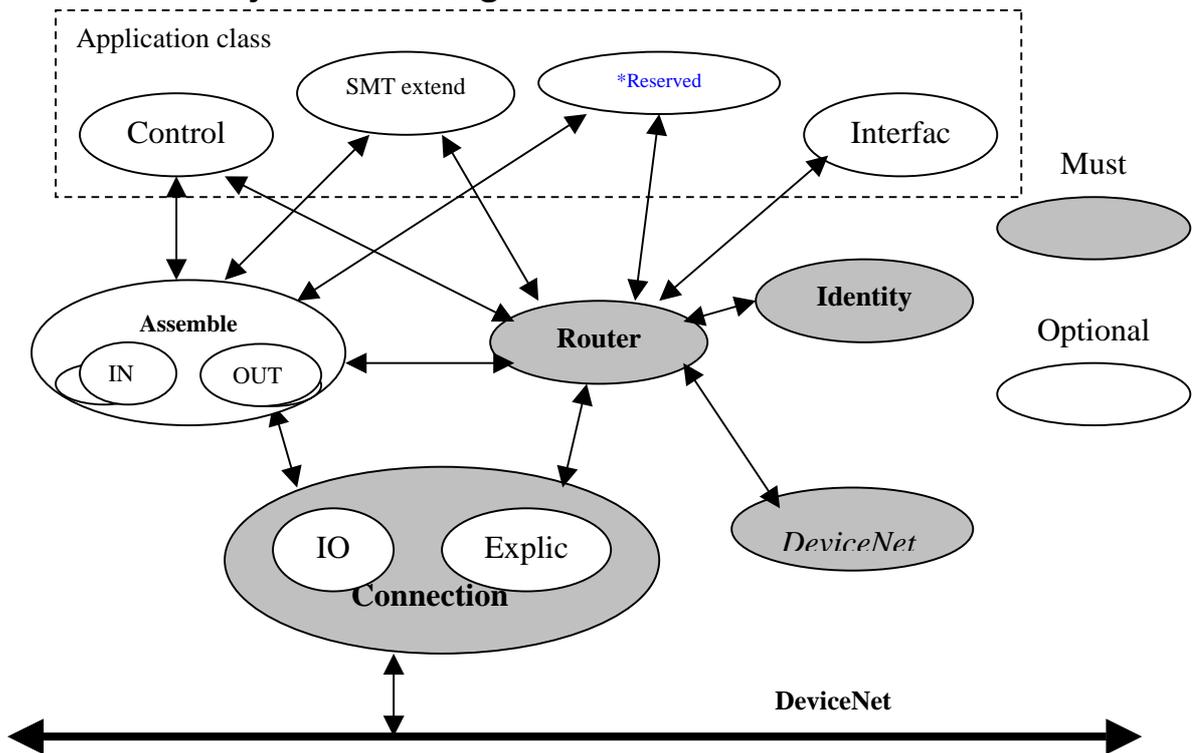
Figure 5-1: Communication module object modelling

Object Class Define

Identity Object

Class code: 01Hex

This object provides identification of and general information about the device.

Class Attributes

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
1	Get	Revision	UINT	Revision of this class	1	2

Instance Attributes

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
1	Get	Vendor ID	UINT	Identification of each vendor by number.	1234	2
2	Get	Device Type	UINT	Indication of general type of product.	0x0C	2
3	Get	Product Code	UINT	Indication of a particular product of an individual vendor.	0x02	2
4	Get	Revision	STRUCT:	Revision of the item the identity object represents.		2
		Major	USINT	Major revision.	0x01	
		Minor	USINT	Minor revision.	0x01	
5	Get	Status	WORD	Summary status of device（3 operation）	0x00	2
6	Get	Serial number	UDINT	Serial number of number.	0x1234 5678	4
7	Get	Product Name	SHORT STRING	Length of product name.	15	16
				Human readable identification.	SMT-Dnet-module	
8	Get	State	USINT	Present state of the device as represented by the state transition diagram. 0 = Nonexistent 1 = Device Self testing 2 = Standby 3 = Operational 4 = Recoverable Fault 5 = Major Unrecoverable Fault	0x00	1
9	Get	Configure	UINT	Configuration of device.	0x00	2
A	Get/Set	Heartbeat interval	USINT	The nominal interval between heartbeat messages in seconds.	0x00	1

Class Service

Service code	Service name	Description of service	Remark
0x0E	Get Attribute Single	Returns the contents of the specified attribute.	

Instance Service

Service code	Service name	Description of service	Remark
0x0E	Get Attribute Single	Returns the contents of the specified attribute.	
0x10	Set Attribute Single	Modifies an attribute	
0x05	Reset	Invokes the Reset service for the device.	

Router Object

Class code: 02Hex

The Message Router Object provides a messaging connection point through which a Client may address a service to any object class or instance residing in the physical device.

Class Attributes

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
1	Get	Revision	UINT	Revision of this class	1	2

Instance Attributes
No.

Class Service

Service code	Service name	Description of service	Remark
0x0E	Get Attribute Single	Returns the contents of the specified attribute.	

Instance Service
No.

DeviceNet Object

Class code: 03Hex

The DeviceNet Object provides the configuration and status of a DeviceNet port. DeviceNet product must support one (and only one) DeviceNet object per physical connection to the DeviceNet communication link.

Class Attributes

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
1	Get	Revision	UINT	Revision of this class	2	2

Instance Attributes

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
1	Get	Mac ID	USINT	Node Address, Range 0~63	63	1
2	Get	Baud Rate	USINT	Baud Rate, Range 0~2	0	1
3	Get/Set	BOI	BOOL	Bus–Off Interrupt	1	1
4	Get/Set	Bus Off Counter	USINT	Number of times CAN went to the bus–off state, Range 0–255	0	1
5	Get	Allocation	STRUCT	Allocate Master/Slave Connection Set		2
		Choice	BYTE	Indicates which Connections from the Predefined Master/Slave Connection Set is to be allocated/configured for use by the Master.	0x00	
		My Master	USINT	MAC ID of Master	0xFF	
8	Get	Mac Switch Value	USINT	Actual value of Node Address switch, Range 0~63.		1
9	Get	Baud Switch Value	USINT	Actual value of Baud Rate switch, Range 0~2.		1

Class Service

Service code	Service name	Description of service	Remark
0x0E	Get Attribute Single	Returns the contents of the specified attribute.	

Instance Service

Service code	Service name	Description of service	Remark
0x0E	Get Attribute Single	Returns the contents of the specified attribute.	
0x10	Set Attribute Single	Modifies an attribute	

Object Class Specific Service

Service code	Service name	Description of service	Remark
0x4B	Allocate Master Slave Connection Set	Requests the use of the Predefined Master/Slave Connection Set.	
0x4C	Release Master Slave Connection Set	Indicates that the specified Connections within the Predefined Master/Slave Connection Set are no longer desired. These Connections are to be released (Deleted).	

Connection Object

Class code: 05Hex

The Connection Class allocates and manages the internal resources associated with both I/O and Explicit Messaging Connections.

Class Attributes

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
1	Get	Revision	UINT	Revision of this class	2	2

Instance1Attributes (Explicit message connection)

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
1	Get	State	USINT	State of the object: 00 Nonexistent, 03 Established, 05 Deferred Delete	00	1
2	Get	Instance Type	USINT	Indicates either I/O or Messaging Connection: 0 explicit connection, 1 IO connection	00	1
3	Get	Transport Class Trigger	BYTE	Defines behavior of the Connection	0x83	1
4	Get	Produced connection ID	UINT	Placed in CAN Identifier Field when the Connection transmits, ****** is MAC ID	10******011	2
5	Get	Consumed connection ID	UINT	CAN Identifier Field value that denotes message to be received, ****** is MAC ID	10******100	2
6	Get	Initial Comm. Characters	BYTE	Defines the Message Group across which productions and consumptions associated with this Connection occur.	0x21	1
7	Get	Produced connection Size	UINT	Maximum number of bytes transmitted across this connection.	40	2
8	Get	Consumed connection Size	UINT	Maximum number of bytes received across this connection.	40	2
9	Get/Set	Expected Packet Rate	UINT	Defines timing associated with this connection.	2500（ms)	2
C	Get/Set	Watchdog Timeout Action	USINT	Defines how to handle Inactivity/Watchdog timeouts: 1Auto delete, 3 Deferred delete	3	1
D	Get	Produced connection Path Length	USINT	Number of bytes in the produced connection path attribute.	0	2
E	Get	Produced connectio	SEG	Specifies the Application object	No	6

		n Path		whose data is to be produced by this connection object.		
F	Get	Consumed connectio n Path Length	USIN T	Number of bytes in the Consumed connection path attribute.	0	2
10	Get	Consumed connectio n Path	SEG	Specifies the Application Object that is to receive the data consumed by this connection Object.	No	6
11	Get	Productio n Inhibit Time	UINT	Defines minimum time between new data production.	0	2

Instance2 Attributes (Poll IO message connection)

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
1	Get	State	USIN T	State of the object: 00Nonexistent, 01Configuring, 03Established, 04TimedOut	00	1
2	Get	Instance Type	USIN T	Indicates either I/O or Messaging Connection: 0 explicit connection, 1 IO connection	01	1
3	Get	Transport Class Trigger	BYTE	Defines behavior of the Connection	0x83	1
4	Get	Produced connectio n ID	UINT	Placed in CAN Identifier Field when the Connection transmits, ****** is MAC ID	01111** ****	2
5	Get	Consumed connectio n ID	UINT	CAN Identifier Field value that denotes message to be received, ****** is MAC ID	10***** *101	2
6	Get	Initial Comm. Characters	BYTE	Defines the Message Group across which productions and consumptions associated with this Connection occur.	0x01	1
7	Get/Set	Produced	UINT	Maximum number of	8	2

		connection Size		bytes transmitted across this connection.		
8	Get	Consumed connection Size	UINT	Maximum number of bytes received across this connection.	4	2
9	Get/Set	Expected Packet Rate	UINT	Defines timing associated with this connection.	0（ms）	2
C	Get	Watchdog Timeout Action	USINT	Defines how to handle Inactivity/Watchdog timeouts: 0 Transition to timed out. 2 Auto Reset.	0	1
D	Get	Produced connection Path Length	USINT	Number of bytes in the produced connection path attribute.	6	2
E	Get	Produced connection Path	SEG	Specifies the Application object whose data is to be produced by this connection object. Input assemble default is 6.	20,04,24, 06,30,03	6
F	Get	Consumed connection Path Length	USINT	Number of bytes in the Consumed connection path attribute.	6	2
10	Get	Consumed connection Path	SEG	Specifies the Application object that is to receive the data consumed by this connection object. Output assemble default is 36.	20,04,24, 24,30,03	6
11	Get	Production Inhibit Time	UINT	Defines minimum time between new data production.	0	2

Common Service

| Service code | Optional operation | | Service name |
	Class	Instance	
0x05	Yes *1	Yes *2	Reset
0x0E	Yes	Yes	Get attribute single
0x10	No	Yes	Set attribute single

*1To class: reset all connections to non-exist state.
*2 To instance: Used to reset the Inactivity/Watchdog Timer associated with a
Connection Object. When a Connection in the Timed Out or Deferred Delete state
receives a Reset request it also transitions back to the Established state.

Assemble Object

Class code: 04hex

Assembled controlling I/O states of SMT Intelligent Relay. Defined 6 instances and
data format referenced in I/O Assemble Data Define.

Class Attributes

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
1	Get	Revision	UINT	Revision of this class	1	2

Instance 6, 7, 110 Attributes (Input assemble, default is 6)

Attributes ID	Access Rule	Name	Data type	Description of Attributes
3	Get	Data	STRUCT of : WORD	SMT status data

Instance 36, 37, 100 Attributes (Output assemble, default is 36)

Attributes ID	Access Rule	Name	Data type	Description of Attributes
3	Get/Set	Data	STRUCT of : WORD	SMT control data

Class Service

Service code	Service name	Description of service	Remark
0x0E	Get Attribute Single	Returns the contents of the specified attribute.	

Instance Service

Service code	Service name	Description of service	Remark
0x0E	Get Attribute Single	Returns the contents of the specified attribute.	
0x10	Set Attribute Single	Modifies an attribute	

Control Supervisor Object

Class code: 29Hex

The class describes the behaviour of SMT control devices.

Instance Attributes

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
3	Get/Set	Run	BOOL	1 Run 0 Stop	0	1
7	Get	Running	BOOL	1 Running 0 Stopping	0	1
9	Get	Ready	BOOL	1 Ready 0 Not ready	0	1
A	Get	Faulted	BOOL	1 Faulted 0 No faulted	0	1
C *1	Get	FaultRst	BOOL	1 Faulted reset 0 No operation	0	1
D *1	Get	Fault Code	UINT	Fault Code indicates the fault that caused the last transition to the Faulted state.	0	2

Instance Service

Service code	Service name	Description of service	Remark
0x0E	Get Attribute Single	Returns the contents of the specified attribute.	
0x10	Set Attribute Single	Modifies an attribute	
0x05 *1	Reset	Reset PLC	

*1 Communication Module cannot sustain the instances; communication return value is default value.

Interface Object

Class code: 64Hex

The class describes the parameters of Communication Module.

Instance Attributes

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
1	Get/Set	In Assemble Configure	USINT	Input assemble configure 6, 7, 110	6	1
2	Get/Set	Out Assemble Configure	USINT	Out assemble configure 36, 37, 100	36	1
3	Get	Nonvolatile Baud Rate	USINT	Communication baud rate.	0	1
4	Get	Nonvolatile Node Address	USINT	Node MAC ID.	63	1
5	Get	Soft Version	USINT	Soft version.	1.1	2

Instance Service

Service code	Service name	Description of service	Remark
0x0E	Get Attribute Single	Returns the contents of the specified attribute.	
0x10	Set Attribute Single	Modifies an attribute	

SMT Intelligent Relay Extend Object

Class code: 65Hex

Extended object of SMT intelligent relay. The class describes the parameters of SMT.

Instance Attributes

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
1	Get	SMT ID	USINT	SMT ID Number	1	1
2	Get/Set	R coils Status	UINT	SMT RTC Blocks current Status	0	2 *1
3	Get/Set	G coils Status	UINT	SMT Analog Blocks current Status	0	2
4	Get/Set	T coils Status	UINT	SMT Timer Blocks current Status	0	2
5	Get/Set	C coils Status	UINT	SMT Counter Blocks current Status	0	2
6	Get/Set	M coils Status	UINT	SMT M Coils current Status	0	2
7	Get	I coils Status	UINT	SMT I (input) points current Status	0	2
8	Get	X coils Status	UINT	SMT X (extend input) points current Status	0	2
9	Get/Set	Q coils Status	USINT	SMT Q (output) points current Status	0	1
0A	Get/Set	Y coils Status	UINT	SMT Y (extend output) points current Status	0	2
0B	Get/Set	N coils Status	UINT	SMT N Coils current Status	0	2
0C	Get/Set	RTC current V	UINT	RTC current value		7 *2
0D	Get	PWM current V	UINT	PWM current running		5 *3
0E		Reserved				
0F		Reserved				
10	Get	Timer1 current V	UINT	Timer1 current value		2 *4
11	Get	Timer2 current V	UINT	Timer2 current value		2
12	Get	Timer3 current V	UINT	Timer3 current value		2
13	Get	Timer4 current V	UINT	Timer4 current value		2
14	Get	Timer5	UINT	Timer5 current value		2

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
		current V				
15	Get	Timer6 current V	UINT	Timer6 current value		2
16	Get	Timer7 current V	UINT	Timer7 current value		2
17	Get	Timer8 current V	UINT	Timer8 current value		2
18	Get	Timer9 current V	UINT	Timer9 current value		2
19	Get	TimerA current V	UINT	TimerA current value		2
1A	Get	TimerB current V	UINT	TimerB current value		2
1B	Get	TimerC current V	UINT	TimerC current value		2
1C	Get	TimerD current V	UINT	TimerD current value		2
1D	Get	TimerE current V	UINT	TimerE current value		2
1E	Get	TimerF current V	UINT	TimerF current value		2
1F		Reserved				
20	Get	Counter1 current V	UINT	Counter1 current value		4　*5
21	Get	Counter2 current V	UINT	Counter2 current value		4
22	Get	Counter3 current V	UINT	Counter3 current value		4
23	Get	Counter4 current V	UINT	Counter4 current value		4
24	Get	Counter5 current V	UINT	Counter5 current value		4
25	Get	Counter6 current V	UINT	Counter6 current value		4
26	Get	Counter7 current V	UINT	Counter7 current value		4
27	Get	Counter8 current V	UINT	Counter8 current value		4
28	Get	Counter9 current V	UINT	Counter9 current value		4
29	Get	CounterA current V	UINT	CounterA current value		4
2A	Get	CounterB current V	UINT	CounterB current value		4
2B	Get	CounterC current V	UINT	CounterC current value		4

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
2C	Get	CounterD current V	UINT	CounterD current value		4
2D	Get	CounterE current V	UINT	CounterE current value		4
2E	Get	CounterF current V	UINT	CounterF current value		4
2F		Reserved				
30	Get/Set	Timer1 preset V	UINT	Timer1 preset value		2 *4
31	Get/Set	Timer2 preset V	UINT	Timer2 preset value		2
32	Get/Set	Timer3 preset V	UINT	Timer3 preset value		2
33	Get/Set	Timer4 preset V	UINT	Timer4 preset value		2
34	Get/Set	Timer5 preset V	UINT	Timer5 preset value		2
35	Get/Set	Timer6 preset V	UINT	Timer6 preset value		2
36	Get/Set	Timer7 preset V	UINT	Timer7 preset value		2
37	Get/Set	Timer8 preset V	UINT	Timer8 preset value		2
38	Get/Set	Timer9 preset V	UINT	Timer9 preset value		2
39	Get/Set	TimerA preset V	UINT	TimerA preset value		2
3A	Get/Set	TimerB preset V	UINT	TimerB preset value		2
3B	Get/Set	TimerC preset V	UINT	TimerC preset value		2
3C	Get/Set	TimerD preset V	UINT	TimerD preset value		2
3D	Get/Set	TimerE preset V	UINT	TimerE preset value		2
3E	Get/Set	TimerF preset V	UINT	TimerF preset value		2
3F		Reserved				
40	Get/Set	Counter1 preset V	UINT	Counter1 preset value		4/8 *6
41	Get/Set	Counter2 preset V	UINT	Counter2 preset value		4/8
42	Get/Set	Counter3 preset V	UINT	Counter3 preset value		4/8
43	Get/Set	Counter4 preset V	UINT	Counter4 preset value		4/8

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
44	Get/Set	Counter5 preset V	UINT	Counter5 preset value		4/8
45	Get/Set	Counter6 preset V	UINT	Counter6 preset value		4/8
46	Get/Set	Counter7 preset V	UINT	Counter7 preset value		4/8
47	Get/Set	Counter8 preset V	UINT	Counter8 preset value		4/8
48	Get/Set	Counter9 preset V	UINT	Counter9 preset value		4/8
49	Get/Set	CounterA preset V	UINT	CounterA preset value		4/8
4A	Get/Set	CounterB preset V	UINT	CounterB preset value		4/8
4B	Get/Set	CounterC preset V	UINT	CounterC preset value		4/8
4C	Get/Set	CounterD preset V	UINT	CounterD preset value		4/8
4D	Get/Set	CounterE preset V	UINT	CounterE preset value		4/8
4E	Get/Set	CounterF preset V	UINT	CounterF preset value		4/8
4F		Reserved				
50	Get/Set	RTC1 preset V	UINT	RTC1 preset value		6 *7
51	Get/Set	RTC2 preset V	UINT	RTC2 preset value		6
52	Get/Set	RTC3 preset V	UINT	RTC3 preset value		6
53	Get/Set	RTC4 preset V	UINT	RTC4 preset value		6
54	Get/Set	RTC5 preset V	UINT	RTC5 preset value		6
55	Get/Set	RTC6 preset V	UINT	RTC6 preset value		6
56	Get/Set	RTC7 preset V	UINT	RTC7 preset value		6
57	Get/Set	RTC8 preset V	UINT	RTC8 preset value		6
58	Get/Set	RTC9 preset V	UINT	RTC9 preset value		6
59	Get/Set	RTCA preset V	UINT	RTCA preset value		6
5A	Get/Set	RTCB preset V	UINT	RTCB preset value		6

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
5B	Get/Set	RTCC preset V	UINT	RTCC preset value		6
5C	Get/Set	RTCD preset V	UINT	RTCD preset value		6
5D	Get/Set	RTCE preset V	UINT	RTCE preset value		6
5E	Get/Set	RTCF preset V	UINT	RTCF preset value		6
5F		Reserved				
60	Get/Set	Analog1 preset V	UINT	Analog1 preset value		2 *8
61	Get/Set	Analog2 preset V	UINT	Analog2 preset value		2
62	Get/Set	Analog3 preset V	UINT	Analog3 preset value		2
63	Get/Set	Analog4 preset V	UINT	Analog4 preset value		2
64	Get/Set	Analog5 preset V	UINT	Analog5 preset value		2
65	Get/Set	Analog6 preset V	UINT	Analog6 preset value		2
66	Get/Set	Analog7 preset V	UINT	Analog7 preset value		2
67	Get/Set	Analog8 preset V	UINT	Analog8 preset value		2
68	Get/Set	Analog9 preset V	UINT	Analog9 preset value		2
69	Get/Set	AnalogA preset V	UINT	AnalogA preset value		2
6A	Get/Set	AnalogB preset V	UINT	AnalogB preset value		2
6B	Get/Set	AnalogC preset V	UINT	AnalogC preset value		2
6C	Get/Set	AnalogD preset V	UINT	AnalogD preset value		2
6D	Get/Set	AnalogE preset V	UINT	AnalogE preset value		2
6E	Get/Set	AnalogF preset V	UINT	AnalogF preset value		2
6F		Reserved				
70	Get/Set	PWM1 preset V	UINT	PWM1 preset value		4 *9
71	Get/Set	PWM2 preset V	UINT	PWM2 preset value		4
72	Get/Set	PWM3 preset V	UINT	PWM3 preset value		4

Attributes ID	Access Rule	Name	Data type	Description of Attributes and Semantics	Default value	Byte number
73	Get/Set	PWM4 preset V	UINT	PWM4 preset value		4
74	Get/Set	PWM5 preset V	UINT	PWM5 preset value		4
75	Get/Set	PWM6 preset V	UINT	PWM6 preset value		4
76	Get/Set	PWM7 preset V	UINT	PWM7 preset value		4
77	Get/Set	PWM8 preset V	UINT	PWM8 preset value		4
78	Get	A1	UINT	A1 current value		2　　*4
79	Get	A2	UINT	A2 current value		2
7A	Get	A3	UINT	A3 current value		2
7B	Get	A4	UINT	A4 current value		2
7C	Get	A5	UINT	A5 current value		2
7D	Get	A6	UINT	A6 current value		2
7E	Get	A7	UINT	A7 current value		2
7F	Get	A8	UINT	A8 current value		2

Instance Service

Service code	Service name	Description of service	Remark
0x0E	Get Attribute Single	Returns the contents of the specified attribute.	
0x10	Set Attribute Single	Modifies an attribute	

Breakdown of the Parameter Words

*1   Coils states format as follows table: reserve bit is 0；

Coil	Bytes	First byte (bit8-bit1)								Second byte (bit8-bit1)							
R	2	R8	R7	R6	R5	R4	R3	R2	R1	-	RF	RE	RD	RC	RB	RA	R9
G	2	G8	G7	G6	G5	G4	G3	G2	G1	-	GF	GE	GD	GC	GB	GA	G9
T	2	T8	T7	T6	T5	T4	T3	T2	T1	-	TF	TE	TD	TC	TB	TA	T9
C	2	C8	C7	C6	C5	C4	C3	C2	C1	-	CF	CE	CD	CC	CB	CA	C9
M	2	M8	M7	M6	M5	M4	M3	M2	M1	-	MF	ME	MD	MC	MB	MA	M9
I	2	I8	I7	I6	I5	I4	I3	I2	I1	-	-	-	-	IC	IB	IA	I9
X	2	X8	X7	X6	X5	X4	X3	X2	X1	-	-	-	-	XC	XB	XA	X9
Q	1	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1								
Y	2	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1	-	-	-	-	YC	YB	YA	Y9
N	2	N8	N7	N6	N5	N4	N3	N2	N1	-	NF	NE	ND	NC	NB	NA	N9

*2   RTC current value only can be read, length is 7 bytes, as follows table；
*3   PWM current value only can be read, length is 5 bytes, as follows；

Parameter	Bytes	DeviceNet format							
		1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
RTC current value	7	Year	Month	Day	Week	Hour	Minute	Second	-
PWM current value	5	Current Running number	Current PW low byte	Current PW high byte	Current PT low byte	Current PT high byte	-	-	-

*4   Timer block current value and preset value length is 2 bytes, as follows table；
       Analog inputs A1~A8 current value 2 bytes, as follows；

Parameter	Bytes	DeviceNet format	
		1st byte	2nd byte
Timer preset value	2	Timer preset value Low byte	Timer preset value High byte
Timer current value	2	Timer current value Low byte	Timer current value High byte
Analogue Input value	2	A1~8 low byte	A1~8 high byte

*5   Counter block current value length is 4 bytes, as follows；

Parameter	Bytes	DeviceNet format			
		1st byte	2nd byte	3rd byte	4th byte
Counter current value	3	Counter current value Low byte	Counter current value Middle byte	Counter current value High byte	00

*6   Counter block preset value：when working mode 1～mode 7,data length is 4 bytes, low byte is first: when working mode 8,data length is 8bytes, as follows table；

Counter mode	Bytes	DeviceNet format							
		1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Mode1~ Mode7	3	Counter preset value low byte	Counter preset value middle byte	Counter preset value high byte	00	-	-	-	-
Mode8	8	Period time low byte	Period time high byte	Counter on value low byte	Counter on value middle byte	Counter on value high byte	Counter off value low byte	Counter off value middle value	Counter off value high byte

*7   RTC block preset value：data format is different with different working mode, as follows

RTC mode	Bytes	DeviceNet format					
		1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte
Mode1	6	On week	Off week	On hour	On minute	Off hour	Off minute
Mode2	6	On week	Off week	On hour	On minute	Off hour	Off minute
Mode3	6	On year	Off year	On month	On day	Off month	Off day

*8   Analogue block preset value is compare reference data length is 2 bytes; low byte is first, high byte is the second.

*9   PWM block preset value is 8 groups, each one group is 4 bytes, first is PW low byte, the second is PW high byte, the third is PT low byte and the last one is PT high byte.

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