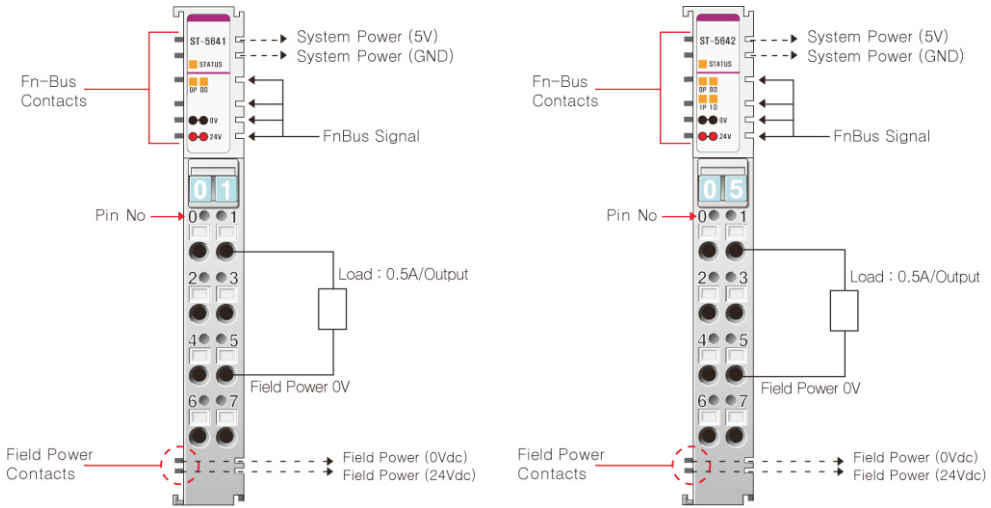


ST-5641, ST-5642

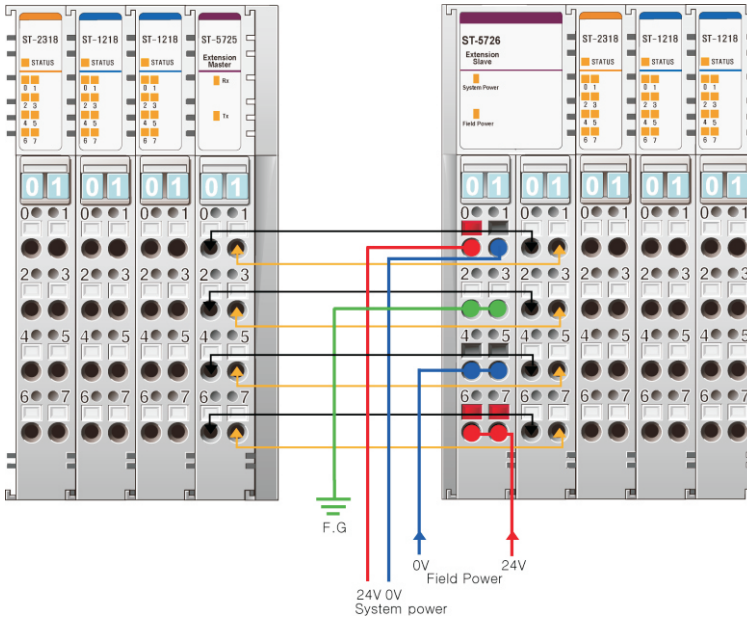
PULSE, 1 Channel Output, 0.5A/24Vdc, Source (ST-5641)
 2 Channels Output, 0.5A/24Vdc, Source (ST-5642)



Item	ST-5641	ST-5642
Output Specification		
Number of Channel	1 Channel, Source Type	2 Channel, Source Type
Number of Output	2 Output / Channel	2 Output / Channel
	2 Output (1 Pulse Output, 1 Pulse Direction Output)	4 Output (2 Pulse Output, 2 Pulse Direction Output)
Indicators	1 Green/Red Fn-Bus Status 1 Pulse Output LED, 1 Pulse Direction Output LED	1 Green/Red Fn-Bus Status 2 Pulse Output LED, 2 Pulse Direction Output LED
Output Current	0.5A/Output, 1A/All Output, short protection	0.5A/Output, 2A/All Output, short protection
Pulse Output Frequency	1 ~ 20,000Hz± 0.5%	
Pulse Output Duty	50%± 3.0% Fixed, Ton>5us, Toff>5us	
Pulse Output Quantity with One Command	Continuous Pulse Output Max. +1 ~ 32767 : Pulse Direction Output OFF Max. -1 ~ 32767 : Pulse Direction Output ON	
Pulse Output Counter	Signed 32bit-wide	
Diagnostic	Yes, Short Protection	
Common Type	2 Common	
General Specification		
Power Dissipation	Max. 150mA @5.0Vdc	
Isolation	I/O to Logic : Photocoupler Isolation I/O to Field Power : Non-Isolation	
Field Power	Supply Voltage : 24 Vdc nominal Voltage Range : 18 ~ 28.8Vdc Power Dissipation : Max. 60mA @ 24Vdc except Load	
Wiring	I/O Cable Max. 2.0m (AWG#14)	
Weight	70g	
Module Size	12mm x 99mm x 70mm	
Environment Condition	Refer to " Environment Specification"(page : 1-191)	
Pin No.	Description	Description
0	Pulse Output Channel#0	Pulse Output Channel#0
1	Pulse Direction Output Channel#0	Pulse Direction Output Channel#0
2	-	Pulse Output Channel#1
3	-	Pulse Direction Output Channel#1
4	Field Power 0V, Common	Field Power 0V, Common
5	Field Power 0V, Common	Field Power 0V, Common
6	Field Power 24V	Field Power 24V
7	Field Power 24V	Field Power 24V
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Special Module

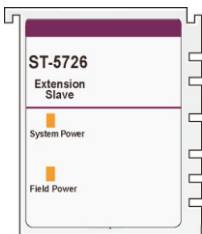
ST-5725, ST-5726 Wiring Example



Status LED



LED Status	State	Action
Rx LED	OFF	Rx Signal OFF-State Make sure of Rx Signal
	GREEN	Rx Signal ON-State Normal Operation
Tx LED	OFF	Tx Signal OFF-State Make sure of Tx Signal
	GREEN	Tx Signal ON-State Normal Operation



LED Status	State	Action
System Power LED	OFF	System Power OFF-State Make sure of System Power
	GREEN	System Power ON-State Normal Operation
Field Power LED	OFF	Field Power OFF-State Make sure of Field Power
	GREEN	Field Power ON-State Normal Operation

* Note : It does not have a Module Status LED (Fn-Bus Status)

Special Module - High Speed Counter

I/O Process Image Table

ST-5101, ST-5111

Input Image Data
- 6byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Current Counter Value (Low) when IDS = 0 Current Counter Value (Low) when IDS = 1							
1	Current Counter Value (Middle) when IDS = 0 Current Counter Value (Middle) when IDS = 1							
2	Current Counter Value (High) when IDS = 0 Current Counter Value (High) when IDS = 1							
3	Always 0							
4	Status Low (compared flags)							
	0	0	SUF	SOF	SEQL(=)	SEQ(=)	SLT(<)	SGT(>)
5	Status High (same as LED flags)							
	0	0	SOT	SGIN	SBIN	SAIN	SDN	SUP

- Current Counter Value

The Current Counter Value is really counting value of incoming pulse.
The Current Counter Value can only read to binary number (0 to 16,777,215)

- Status Low (compared flags)

The Status Low can only read.
SUF: Status Underflow (Latched)
SOF: Status Overflow (Latched)
SEQL(=): Status Current count value = Compare count value (Latched)
SEQ(=): Status Current count value = Compare count value (Unlatched)
SLT(<): Status Current count value < Compare count value (Unlatched)
SGT(>): Status Current count value > Compare count value (Unlatched)

- Status High (same as LED display)

The Status High can only read.
SUP: Status Counter Up
SDN: Status Counter Down
SAIN: Status A Terminal Input
SBIN: Status B Terminal Input
SGIN: Status G Terminal Input
SOT: Status Output Terminal (same as OT)

Output Image Data
- 2byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
0	Status Output Terminal (OT) Control								
	Status Output Terminal Selection				Status Output Terminal Pulse Width				
	"0000" : Force Off				"0000" : Bypass				
	"0001" : GT				"0001" : 1msec				
	"0010" : LT				"0010" : 5msec				
	"0011" : EQ				"0011" : 10msec				
	"0101" : Overflow				"0100" : 20msec				
	"0110" : Underflow				"0101" : 50msec				
	"1001" : Count Up				"0110" : 100msec				
	"1010" : Count Down				"0111" : 200msec				
	"1011" : A Terminal Input				"1000" : 500msec				
	"1100" : B Terminal Input				"1111" : Latched				
	"1101" : G Terminal Input				Others : Bypass				
	"1110" : PWM Output								
"1111" : Force On									
"Others" : Force Off									
1	Command or PWM Duty value (PWM Output Mode)								
	Command	7	6	5	4	3	2	1	0
		HRST	CR	CP	CST	PU	PO	PE	IDS
PWM duty	0 ~ 100dec (=0 ~ 100%)								

Special Module - High Speed Counter

ST-5112

Input Image Data
- 8byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Counter Value Ch#0 LL							
1	Counter Value Ch#0 LH							
2	Counter Value Ch#0 HL							
3	Counter Value Ch#0 HH							
4	Counter Value Ch#1 LL							
5	Counter Value Ch#1 LH							
6	Counter Value Ch#1 HL							
7	Counter Value Ch#1 HH							

- Counter Value Ch#0 ~ 1 is a 32bit-wide data.

Output Image Data
- 2byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	CR0	CR0	DO1	DO0	Count Mode 0 (refer Count Mode Table)			
1	CR1	CR1	-	-	Count Mode 1 (refer Count Mode Table)			

- CR0, 1 : Counter Reset for Ch#0,1
 - CS0, 1 : Counter Stop (Inhibit Input) for Ch#0, 1
 - DO0, 1 : Digital Output for Output Ch#0, 1
 - CountMode 0, 1 Count Mode for : Ch#0, 1

ST-5114

Input Image Data
- 16byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Counter Value Ch#0 LL							
1	Counter Value Ch#0 LH							
2	Counter Value Ch#0 HL							
3	Counter Value Ch#0 HH							
4	Counter Value Ch#1 LL							
5	Counter Value Ch#1 LH							
6	Counter Value Ch#1 HL							
7	Counter Value Ch#1 HH							
8	Counter Value Ch#2 LL							
9	Counter Value Ch#2 LH							
10	Counter Value Ch#2 HL							
11	Counter Value Ch#2 HH							
12	Counter Value Ch#3 LL							
13	Counter Value Ch#3 LH							
14	Counter Value Ch#3 HL							
15	Counter Value Ch#3 HH							

- Counter Value Ch#0 ~ 3 is a 32bit-wide data.

Output Image Data
- 4byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	CR0	CS0	DO1	DO0	Count Mode 0 (refer Count Mode Table)			
1	CR1	CS1	-	-	Count Mode 1 (refer Count Mode Table)			
2	CR2	CS2	-	-	Count Mode 2 (refer Count Mode Table)			
3	CR3	CS3	-	-	Count Mode 3 (refer Count Mode Table)			

- CR0, 1, 2, 3 : Counter Reset for Ch#0,1, 2, 3
 - CS0, 1, 2, 3 : Counter Stop (Inhibit Input) for Ch#0, 1, 2, 3
 - DO0, 1 : Digital Output for Output Ch#0, 1
 - CountMode 0, 1, 2, 3 Count Mode for : Ch#0, 1, 2, 3

Special Module - High Speed Counter

Count Mode Table

ST-5112

Count Mode 0, 1

1/2 Input	Value	Count Mode	Description
1-Input Mode	B'0000 (0x0)	Up Clock	Counter Input Ch#0~1 act as Up Clock to Ch#0~1
	B'0001 (0x1)	Down Clock	Counter Input Ch#0~1 act as Down Clock to Ch#0~1
	B'0010 (0x2)	-	-
	B'0011 (0x3)	-	-
2-Input Mode	B'0100 (0x4)	Up Clock & Inhibit	If Count Mode 0=0x4, Count Mode 1 is not used. - Counter Input Ch#0 acts as Up Clock Input to Ch#0 - Counter Input Ch#1 acts as Inhibit Input to Ch#0
	B'0101 (0x5)	Up Clock & Reset	If Count Mode 0=0x5, Count Mode 1 is not used. - Counter Input Ch#0 acts as Up Clock Input to Ch#0 - Counter Input Ch#1 acts as Reset Input to Ch#0
	B'0110 (0x6)	Down Clock & Inhibit	If Count Mode 0=0x6, Count Mode 1 is not used. - Counter Input Ch#0 acts as Down Clock Input to Ch#0 - Counter Input Ch#1 acts as Inhibit Input to Ch#0
	B'0111 (0x7)	Down Clock & Reset	If Count Mode 0=0x7, Count Mode 1 is not used. - Counter Input Ch#0 acts as Down Clock Input to Ch#0 - Counter Input Ch#1 acts as Reset Input to Ch#0
	B'1000 (0x8)	Up Clock & Down Clock	If Count Mode 0=0x8, Count Mode 1 is not used. - Counter Input Ch#0 acts as Up Clock Input to Ch#0 - Counter Input Ch#1 acts as Down Clock Input to Ch#0
	B'1001 (0x9)	Clock & Direction	If Count Mode 0=0x9, Count Mode 1 is not used. - Counter Input Ch#0 acts as Clock Input to Ch#0 - Counter Input Ch#1 acts as Direction Input to Ch#0
	B'1010 (0xA)	Encoder 1x	If Count Mode 0=0xA, Count Mode 1 is not used. - Counter Input Ch#0 acts as A phase Input to Ch#0 - Counter Input Ch#1 acts as B phase Input to Ch#0
	B'1011 (0xB)	Encoder 2x	If Count Mode 0=0xB, Count Mode 1 is not used. - Counter Input Ch#0 acts as A phase Input to Ch#0 - Counter Input Ch#1 acts as B phase Input to Ch#0
	B'1100 (0xC)	Encoder 4x	If Count Mode 0=0xC, Count Mode 1 is not used. - Counter Input Ch#0 acts as A phase Input to Ch#0 - Counter Input Ch#1 acts as B phase Input to Ch#0
	B'1101 (0xD)	-	-
	B'1110 (0xE)	-	-
	B'1111 (0xF)	-	-

- If Count Mode 0 is 2-Input Mode, Count Mode 1 and Counter Input Ch#0 do not affect Counter Value Ch#1.
- Do not assign 2-Input Mode to Count Mode 1

Special Module - High Speed Counter

ST-5114

Count Mode 0, 1, 2, 3

1/2 Input	Value	Count Mode	Description
1-Input Mode	B'0000 (0x0)	Up Clock	Counter Input Ch#0~3 act as Up Clock to Ch#0~3
	B'0001 (0x1)	Down Clock	Counter Input Ch#0~3 act as Down Clock to Ch#0~3
	B'0010 (0x2)	-	-
	B'0011 (0x3)	-	-
2-Input Mode	B'0100 (0x4)	Up Clock & Inhibit	If Count Mode 0=0x4, Count Mode 1 is not used. - Counter Input Ch#0 acts as Up Clock Input to Ch#0 - Counter Input Ch#1 acts as Inhibit Input to Ch#0
	B'0101 (0x5)	Up Clock & Reset	If Count Mode 0=0x5, Count Mode 1 is not used. - Counter Input Ch#0 acts as Up Clock Input to Ch#0 - Counter Input Ch#1 acts as Reset Input to Ch#0
	B'0110 (0x6)	Down Clock & Inhibit	If Count Mode 0=0x6, Count Mode 1 is not used. - Counter Input Ch#0 acts as Down Clock Input to Ch#0 - Counter Input Ch#1 acts as Inhibit Input to Ch#0
	B'0111 (0x7)	Down Clock & Reset	If Count Mode 0=0x7, Count Mode 1 is not used. - Counter Input Ch#0 acts as Down Clock Input to Ch#0 - Counter Input Ch#1 acts as Reset Input to Ch#0
	B'1000 (0x8)	Up Clock & Down Clock	If Count Mode 0=0x8, Count Mode 1 is not used. - Counter Input Ch#0 acts as Up Clock Input to Ch#0 - Counter Input Ch#1 acts as Down Clock Input to Ch#0
	B'1001 (0x9)	Clock & Direction	If Count Mode 0=0x9, Count Mode 1 is not used. - Counter Input Ch#0 acts as Clock Input to Ch#0 - Counter Input Ch#1 acts as Direction Input to Ch#0
	B'1010 (0xA)	Encoder 1x	If Count Mode 0=0xA, Count Mode 1 is not used. - Counter Input Ch#0 acts as A phase Input to Ch#0 - Counter Input Ch#1 acts as B phase Input to Ch#0
	B'1011 (0xB)	Encoder 2x	If Count Mode 0=0xB, Count Mode 1 is not used. - Counter Input Ch#0 acts as A phase Input to Ch#0 - Counter Input Ch#1 acts as B phase Input to Ch#0
	B'1100 (0xC)	Encoder 4x	If Count Mode 0=0xC, Count Mode 1 is not used. - Counter Input Ch#0 acts as A phase Input to Ch#0 - Counter Input Ch#1 acts as B phase Input to Ch#0
	B'1101 (0xD)	-	-
	B'1110 (0xE)	-	-
	B'1111 (0xF)	-	-

- If Count Mode 0 is 2-Input Mode, Count Mode 1 and Counter Input Ch#0 do not affect Counter Value Ch#1.
- If Count Mode 2 is 2-Input Mode, Count Mode 3 and Counter Input Ch#3 do not affect Counter Value Ch#3.
- Do not assign 2-Input Mode to Count Mode 1, 3.

Special Module - Serial Interface

I/O Process Image Table

ST-5211, ST-5221, ST-5231

Input Image Data
- 6byte

Byte Offset		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
#0	STATUS Byte	TPA	IL2	IL1	ILO	RBO	RR	TA	IA
#1	Data Byte #0								
#2	Data Byte #1								
#3	Data Byte #2								
#4	Data Byte #3								
#5	Data Byte #4								

- IA : Initialization Acknowledge
- TA : Transmit Acknowledge
- RR : Receive Request
- RBO : RxD Buffer Overrun Error

There are two counters(Run counter and Index counter) which pointing at the position of RxD Buffer Run counter is increased +1 whenever RxD inputting, Index Counter is increased as much as Input Length that brought on Input Data.

- IL : Input Length
- TPA : Transmit Processing Acknowledge
(Related Configuration Parameter: TxD Buffering)

Output Image Data
- 6byte

Byte Offset		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
#0	Control Byte	TPR	OL2	OL1	OLO	-	RA	TR	IR
#1	Data Byte #0								
#2	Data Byte #1								
#3	Data Byte #2								
#4	Data Byte #3								
#5	Data Byte #4								

- IR : Initialization Request
- TR : Transmit Request
- RA : Receive Acknowledge
- OL : Output Length
- TPR : Transmit Processing Request
(Related Configuration Parameter: TxD Buffering)

ST-5212, ST-5232

Input Image Data
- 12byte

Byte Offset		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
#0	STATUS Byte(0ch)	TPA	IL2	IL1	ILO	RBO	RR	TA	IA
#1	Data Byte #0(0ch)								
#2	Data Byte #1(0ch)								
#3	Data Byte #2(0ch)								
#4	Data Byte #3(0ch)								
#5	Data Byte #4(0ch)								
#6	STATUS Byte(1ch)	TPA	IL2	IL1	ILO	RBO	RR	TA	IA
#7	Data Byte #0(1ch)								
#8	Data Byte #1(1ch)								
#9	Data Byte #2(1ch)								
#10	Data Byte #3(1ch)								
#11	Data Byte #4(1ch)								

- IA : Initialization Acknowledge
- TA : Transmit Acknowledge
- RR : Receive Request
- RBO : RxD Buffer Overrun Error

There are two counters(Run counter and Index counter) which pointing at the position of RxD Buffer Run counter is increased +1 whenever RxD inputting, Index Counter is increased as much as Input Length that brought on Input Data.

- IL : Input Length
- TPA : Transmit Processing Acknowledge
(Related Configuration Parameter: TxD Buffering)

Special Module - Serial Interface

Output Image Data
- 12byte

Byte Offset		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
#0	Control Byte(0ch)	TPR	OL2	OL1	OL0	-	RA	TR	IR
#1	Data Byte #0(0ch)								
#2	Data Byte #1(0ch)								
#3	Data Byte #2(0ch)								
#4	Data Byte #3(0ch)								
#5	Data Byte #4(0ch)								
#6	Control Byte(1ch)	TPR	OL2	OL1	OL0	-	RA	TR	IR
#7	Data Byte #0(1ch)								
#8	Data Byte #1(1ch)								
#9	Data Byte #2(1ch)								
#10	Data Byte #3(1ch)								
#11	Data Byte #4(1ch)								

- IR : Initialization Request
 - TR : Transmit Request
 - RA : Receive Acknowledge
 - OL : Output Length
 - TPR : Transmit Processing Request
- (Related Configuration Parameter: TxD Buffering)

ST-5252, ST-5272

Input Image Data
- 38byte

Byte Offset		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
#0	Response Byte	RPST	RRCH	RRRQ	RTCH	RTBM			
#1	Input Data Length or Timeout	1-CHT O	0-CHT O	Input Data Length : 0~32 character					
#2	STATUS Byte(0ch)	TBMS	REXD	RECT	RSCT	RBOF	RBFF	RPAT	RFRM
#3	STATUS Byte(1ch)	TBMS	REXD	RECT	RSCT	RBOF	RBFF	RPAT	RFRM
#4	Incoming DL(0ch)	0~255 character							
#5	Incoming DL(1ch)	0~255 character							
#6	Input Data 00								
#7	Input Data 01								
~	~								
#36	Input Data 30								
#37	Input Data 31								

- RTBM : Return Transmit data Buffering Machines State bits.
 0000: Ready State Done 0001 : TxD Sequence 1 Done
 0010 : TxD Sequence 2 Done 0011 : TxD Sequence 3 Done
 0100 : TxD Sequence 4 Done 0101 : TxD Sequence 5 Done
 0110 : TxD Sequence 6 Done 0111 : TxD Sequence 7 Done
 1000 : TxD Sequence 8 Done 1001 : TxD Sequence 9 Done
 Others : Unused
- RTCH : Return Transmit data Channel Bit.
 0:0-ch
 1:1-ch
- RRRQ : Return Received data Request bit.
- RRCH : Return Received data Channel bit.
 0:0-ch
 1:1-ch
- RPST : Return Preset bit.
- 0-CHTO and 1-CHTO : 0-Channel Timeout and 1-Channel Timeout.
- RFRM : FRAMING ERROR
- RPAT : PARITY ERROR
- RBFF : RxD Buffer Full (RxBuffer Size-256Byte)
- * In case Fixed Length Mode, RxBuffer Size = Fixed Length Value
- RBOF : RxD Buffer Overflow (RxBuffer Size > 256Byte)
- * In case Fixed Length Mode, Rxbuffer Size > Fixed Length Value
- RSCT : Found Start Character of RxD
- RECT : Found End Character of RxD
- REXD : Exist RxData in RxD Buffer
- TBMS : TxBuffering Machine State Error

I/O Process Image Table

ST-5351

Input Image Data
- 10byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Current SSI Data LL							
1	Current SSI Data LH							
2	Current SSI Data HL							
3	Current SSI Data HH							
4	Current SSI Data LL							
5	Current SSI Data LH							
6	Current SSI Data HL							
7	Current SSI Data HH							
8	RUN	WARN	LDF	-	DEC	INC	-	DIN
9	-	-	-	WFP	-	-	WSSIF	WSSID

- SSI Data word is a 32bit-wide data.
- RUN : SSI Clock Output Enabled Flag
- WARN: Warning. Any warning has occurred, WFP, WSSIF or WSSID.
- LDF: Latched Data Flag, if terminal's DIN goes OFF→ON, sets the flag and updates Latched SSI Data.
- DEC: SSI Data Decrement. It was set, it lasts until INC.
- INC: SSI Data Increment. It was set, it lasts until DEC.
- DIN: Digital Input Current Status.
- WFP: Warning of Field Power (SSI Power).
- WSSIF: Warning of SSI Frame. The last bit of frame data is not trailed with 0.
- WSSID: Warning of SSI Data. SSI Data is 0 during gap of frames. Generally when invalid wiring or cross wiring.

Output Image Data
- 2byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	RUN	GRAY	LDFCLR	SSI Data Length (0~30)				
1	SSI Data Delay Time Selection				SSI Data Rate Selection			

- RUN: SSI Clock Output Command. 1:Run, 0:Stop
- GRAY: Conversion Binary to Gray code. 1:Gray, 0:Binary
It has effect on Current SSI Data and Latched SSI Data.
- LDFCLR: LDF (Latched Data Flag) Clear, it acts on both edge. (0→1, 1→0)
- SSI Data Length: Sensor Resolution Bit + Sensor Number of turn Bit.
Example) Sensor Resolution (Step/Revolution) =8192 →13bit, Sensor Number of turn=4092→12bit
SSI Data Length must be 25(13bit + 12bit)

SSI Data Rate Selection

Value	Description
0 (B'0000)	125 Kbps (default)
1 (B'0001)	62.5 Kbps
2 (B'0010)	100 Kbps
3 (B'0011)	125 Kbps
4 (B'0100)	250 Kbps
5 (B'0101)	500 Kbps
6 (B'0110)	1 Mbps
7 (B'0111)	2 Mbps

SSI Data Delay Time Selection

Value	62.5K	100K	125K	250K	500K	1M	2M
0 (B'0000)	300 usec (default)						
1 (B'0001)	400 usec	300 usec	200 usec	100 usec	70 usec	35 usec	20 usec
2 (B'0010)	400 usec	300 usec	200 usec	100 usec	70 usec	35 usec	
3 (B'0011)	400 usec	300 usec	200 usec	100 usec	70 usec		
4 (B'0100)	400 usec	300 usec	200 usec	100 usec			
5 (B'0101)	400 usec	300 usec	200 usec				
6 (B'0110)	400 usec	300 usec					
7 (B'0111)	400 usec						
8 (B'1000)	500 usec						
9 (B'1001)	750 usec						
10 (B'1010)	1 msec						
11 (B'1011)	2 msec						
12 (B'1100)	3 msec						
13 (B'1101)	4 msec						
14 (B'1110)	5 msec						
15 (B'1111)	10 msec						

SSI Module Status LED

LED Status	Cause	Action
All LED turns off	- No power	- Check main power Cable
	- System power is not supplied.	- Contact Sales team and send module for repair.
STATUS LED flashes red	- Excess of expansion slot	- Use expansion slot up to 32.
	- Excess of I/O size	- Compose that I/O total size is not excess.
	- Wrong I/O composition	- Check composition I/O Module
	- Occurrence of EEPROM checksum error	

Special Module - PWM Output

I/O Process Image Table

ST-5422, ST-5442

Input Image Data
- 2byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved							
1	Reserved							

Output Image Data
- 6byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Frequency Ch#0, 1 Low Byte							
1	Frequency Ch#0, 1 High Byte							
2	Duty Ch#0 Low Byte							
3	Duty Ch#0 High Byte							
4	Duty Ch#1 Low Byte							
5	Duty Ch#1 High Byte							

- Ch#0,1 is using the same frequency.
- Range of each Duty is 0(0.0%) ~ 1000(100.0%). If Duty value is 250, then Duty rate is 25.0%

ST-5444

Input Image Data
- 4byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							

Output Image Data
- 12byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Frequency Ch#0, 1 Low Byte							
1	Frequency Ch#0, 1 High Byte							
2	Duty Ch#0 Low Byte							
3	Duty Ch#0 High Byte							
4	Duty Ch#1 Low Byte							
5	Duty Ch#1 High Byte							
6	Frequency Ch#2, 3 Low Byte							
7	Frequency Ch#2, 3 High Byte							
8	Duty Ch#2 Low Byte							
9	Duty Ch#2 High Byte							
10	Duty Ch#3 Low Byte							
11	Duty Ch#3 High Byte							

- Ch#0,1 is using the same frequency.
- Ch#2,3 are using the same frequency.
- Range of each Duty is 0(0.0%) ~ 1000(100.0%). If Duty value is 250, then Duty rate is 25.0%

Special Module - Pulse Output

I/O Process Image Table

ST-5641, ST-5651

Input Image Data
- 4byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Real Pulse Output Counter Ch#0 LL							
1	Real Pulse Output Counter Ch#0 LH							
2	Real Pulse Output Counter Ch#0 HL							
3	Real Pulse Output Counter Ch#0 HH							

- ST-5651 : A Pulse Output Counter is a signed 32bit-wide data.

Output Image Data
- 6byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Pulse Frequency Ch#0 Low Byte							
1	Pulse Frequency Ch#0 High Byte							
2	Pulse Output Qty Ch#0 Low Byte							
3	Pulse Output Qty Ch#0 High Byte							
4	RUN0	ECPO	-	CLRCNT0	-	-	Frequency Multiple 0	
5	-	-	-	-	-	-	-	-

- Pulse Output Qty is a signed 16bit-wide data.
- The duty of each channel frequency is fixed by 50%.
- If Pulse Output Qty ≥ 0 , Direction Output turns OFF. If Pulse Output Qty < 0 , Direction Output Turns ON.
- Byte 8 is a control for Channel #0; Byte 9 is a control for Channel #1.
- RUN 0,1 : Pulse Output Run
- ECP 0,1 (Enable Continuous Pulse) : If this bit is '1' and Pulse Output Qty is not 0, pulse output always runs.
- CLRCNT 0,1 : Clear Real Pulse Output Counter

Frequency Multiple 0 Selection

Value	Description
0 (B'00)	x1 Frequency Multiple
1 (B'01)	x10 Frequency Multiple
2 (B'10)	x100 Frequency Multiple
3 (B'11)	x1000 Frequency Multiple

- If Pulse Frequency = 123 and Frequency Multiple = 2, real pulse output is 12.3KHz(123*100)

Special Module - Pulse Output

ST-5642

Input Image Data
- 8byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Real Pulse Output Counter Ch#0 LL							
1	Real Pulse Output Counter Ch#0 LH							
2	Real Pulse Output Counter Ch#0 HL							
3	Real Pulse Output Counter Ch#0 HH							
4	Real Pulse Output Counter Ch#1 LL							
5	Real Pulse Output Counter Ch#1 LH							
6	Real Pulse Output Counter Ch#1 HL							
7	Real Pulse Output Counter Ch#1 HH							

- A Pulse Output Counter is a signed 32bit-wide data.

Output Image Data
- 10byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Pulse Frequency Ch#0 Low Byte							
1	Pulse Frequency Ch#0 High Byte							
2	Pulse Output Qty Ch#0 Low Byte							
3	Pulse Output Qty Ch#0 High Byte							
	Pulse Frequency Ch#1 Low Byte							
	Pulse Frequency Ch#1 High Byte							
	Pulse Output Qty Ch#1 Low Byte							
	Pulse Output Qty Ch#1 High Byte							
8	RUN0	ECP0	-	CLRCNT0	-	-	Frequency Multiple 0	
9	RUN1	ECP1	-	CLRCNT1	-	-	Frequency Multiple 1	

- Pulse Output Qty is a signed 16bit-wide data.
- The duty of each channel frequency is fixed by 50%.
- If Pulse Output Qty ≥ 0 , Direction Output turns OFF. If Pulse Output Qty < 0 , Direction Output Turns ON.
- Byte 8 is a control for Channel #0. Byte 9 is a control for Channel #1
- RUN 0,1 : Pulse Output Run
- ECP 0,1 (Enable Continuous Pulse) : If this bit is '1' and Pulse Output Qty is not 0, pulse output always runs.
- CLRCNT 0,1 : Clear Real Pulse Output Counter

Frequency Multiple 0 Selection

Value	Description
0 (B'00)	x1 Frequency Multiple
1 (B'01)	x10 Frequency Multiple
2 (B'10)	x100 Frequency Multiple
3 (B'11)	x1000 Frequency Multiple

- If Pulse Frequency = 123 and Frequency Multiple = 2, real pulse output is 12.3KHz(123*100)

Pulse Module Status LED

LED Status	Cause	Action
All LED turns off	- No power	- Check main power Cable
	- System power is not supplied.	- Contact Sales team and send module for repair.
STATUS LED flashes red	- Excess of expansion slot	- Use expansion slot up to 32.
	- Excess of I/O size	- Compose that I/O total size is not excess.
	- Wrong I/O composition	- Check composition I/O Module
	- Occurrence of EEPROM checksum error	

Special Module

Configuration Parameter

ST-5101, ST-5111

Valid Parameter length: 2 bytes
Parameter Data:

Offset	Decimal Bit	Description	Default Value
0	00-03	Counter Mode 0000 : Counter Disabled 0001 : 1 Pulse Mode 0010 : 2 Pulse Mode 0011 : Encoder x 1 0100 : Encoder x 2 0101 : Encoder x 4 0110 : Period/Rate Mode 0111 : reserved 1000 : PWM Output Mode 1001 : reserved Others : Counter Disable	0
	04-07	Gate Function 0000 : Gate Function Disabled 0001 : Store/Continue 0010 : Store/Wait/Resume 0011 : Store-Reset/Wait/Start 0100 : Store-Reset/Start Others : Gate Function Disabled	0
1	00-03	Input Filter 0000 : Bypass (about 1.5MHz) 0001 : 1usec (500KHz±30%) 0010 : 5usec (100KHz±30%) 0011 : 10usec (50KHz±30%) 0100 : 50usec (10KHz±30%) 0101 : 100usec (5KHz±30%) 0110 : 500usec (1KHz±30%) 0111 : 1msec (500KHz±30%) 1000 : 5msec (100KHz±30%) 1001 : 10msec (50KHz±30%) Others : Bypass (about 1.5MHz)	0
	04-07	Gate Sampling Time 0000 : (10/1) MHz (0.1usec) 0001 : (10/2) MHz (0.2usec) 0010 : (10/4) MHz (0.4usec) 0011 : (10/8) MHz (0.8usec) 0100 : (10/16)MHz (1.6usec) 0101 : (10/32)MHz (3.2usec) 0110 : (10/64)MHz (6.4usec) 0111 : (10/128)MHz (12.8usec) Others : (10/1)MHz (0.1usec)	0
2	00-07	Not used	0
3	00-07	Not used	0
4	00-07	Not used	0
5	00-07	Not used	0
6	00-07	Not used	0
7	00-07	Not used	0

* All values are stored in Adapter's EEPROM.

ST-5112, ST-5114

Valid Parameter length: 4 bytes
Parameter Data:

Offset	Decimal Bit	Description	Default Value
0	00-07	Reserved	0
1	00-07	Reserved	0
2	00-07	Reserved	0
3	00-07	Reserved	0
4	00-07	Not used	0
5	00-07	Not used	0
6	00-07	Not used	0
7	00-07	Not used	0

Special Module

ST-5211

Valid Parameter length: 4 bytes

Parameter Data:

Offset	Decimal Bit	Description	Default Value
0	00-03	Baud Rate 0000 : 300 bps 0101 : 19200 bps 0001 : 1200 bps 0110 : 38400 bps 0010 : 2400 bps 0111 : 57600 bps 0011 : 4800 bps 1000 : 115200 bps 0100 : 9600 bps Others: Unused	0100
	04-05	Data Bit 00 : 7 Data bit 01 : 8 Data bit Others : Unused	01
	06-07	Parity Bit 00 : 7 Data bit 10 : Even Parity 01 : Odd Parity Others : Unused	00
1	00	Stop Bit 0 : 1 bit 1 : 2 bit	0
	01	TxD Process 0 : Disable 1 : Enable	0
	02-03	CTS/RTS Flow Control 00 : RTS/CTS Disable 10 : CTS Enable 01 : RTS Enable 11 : RTS/CTS Enable	00
	04-07	Reserved	0
2	00-07	Reserved	0
3	00-07	Reserved	0
4	00-07	Not used	0
5	00-07	Not used	0
6	00-07	Not used	0
7	00-07	Not used	0

* All values are stored in Adapter's EEPROM.

ST-5212

Valid Parameter length: 4 bytes

Parameter Data:

Offset	Decimal Bit	Description	Default Value
0	00-03	Baud Rate 0000 : 300 bps 0001 : 1200 bps 0010 : 2400 bps 0011 : 4800 bps 0100 : 9600 bps 0101 : 19200 bps 0110 : 38400 bps 0111 : 57600 bps 1000 : 115200 bps Others: Unused	0100
	04-05	Data Bit 00 : 7 Data bit 01 : 8 Data bit Others : Unused	01
	06-07	Parity Bit 00 : No Parity 01 : Odd Parity 10 : Even Parity Others : Unused	00
1	00	Stop Bit 0 : 1 bit 1 : 2 bit	0
	01	TxD Process 0 : Disable 1 : Enable	0
	02-07	Reserved	
2	00-03	Baud Rate 0000 : 300 bps 0001 : 1200 bps 0010 : 2400 bps 0011 : 4800 bps 0100 : 9600 bps 0101 : 19200 bps 0110 : 38400 bps 0111 : 57600 bps 1000 : 115200 bps Others: Unused	0100
	04-05	Data Bit 00 : 7 Data bit 01 : 8 Data bit Others : Unused	01
	06-07	Parity Bit 00 : No Parity 01 : Odd Parity 10 : Even Parity Others : Unused	00
3	00	Stop Bit 0 : 1 bit 1 : 2bit	0
	01	TxD Process 0 : Disable 1 : Enable	0
	02-07	Reserved	0
4	00-07	Not used	0
5	00-07	Not used	0
6	00-07	Not used	0
7	00-07	Not used	0

ST-5221, ST-5231

* All values are stored in Adapter's EEPROM.

Valid Parameter length: 4 bytes

Parameter Data:

Offset	Decimal Bit	Description	Default Value
0	00-03	Baud Rate	0100
	04-05	Data Bit	01
	06-07	Parity	00
1	00	Stop Bit	0
	01	TxD Process	0
	02-03	CTS/RTS Flow Control	00
	04-07	Reserved	0
2	00-07	Reserved	0
3	00-07	Reserved	0
4	00-07	Not used	0
5	00-07	Not used	0
6	00-07	Not used	0
7	00-07	Not used	0

* All values are stored in Adapter's EEPROM.

* ST-5221 : Same as ST-5211

* ST-5231 : Same as ST-5212

Special Module

ST-5232

Valid Parameter length: 4 bytes
Parameter Data:

Offset	Decimal Bit	Description	Default Value
0	00-03	Baud Rate	0100
	04-05	Data Bit	01
	06-07	Parity	00
1	00	Stop Bit	0
	01	TxD Process	0
	02-07	Reserved	0
2	00-03	Baud Rate	0100
	04-05	Data Bit	01
	06-07	Parity Bit	00
3	00	Stop Bit	0
	01	TxD Process	0
	02-07	Reserved	0
4	00-07	Not used	0
5	00-07	Not used	0
6	00-07	Not used	0
7	00-07	Not used	0

* All values are stored in Adapter's EEPROM.
* Same as ST-5212

ST-5351, ST-5422, ST-5442, ST-5444, ST-5641, ST-5642, ST-5651

Valid Parameter length: 2 bytes
Parameter Data:

Offset	Decimal Bit	Description	Default Value
0	00-07	Reserved	0
1	00-07	Reserved	0
2	00-07	Not used	0
3	00-07	Not used	0
4	00-07	Not used	0
5	00-07	Not used	0
6	00-07	Not used	0
7	00-07	Not used	0

* All values are stored in Adapter's EEPROM.

Special Module

ST-5252, ST-5272

Valid Parameter length: 23 bytes

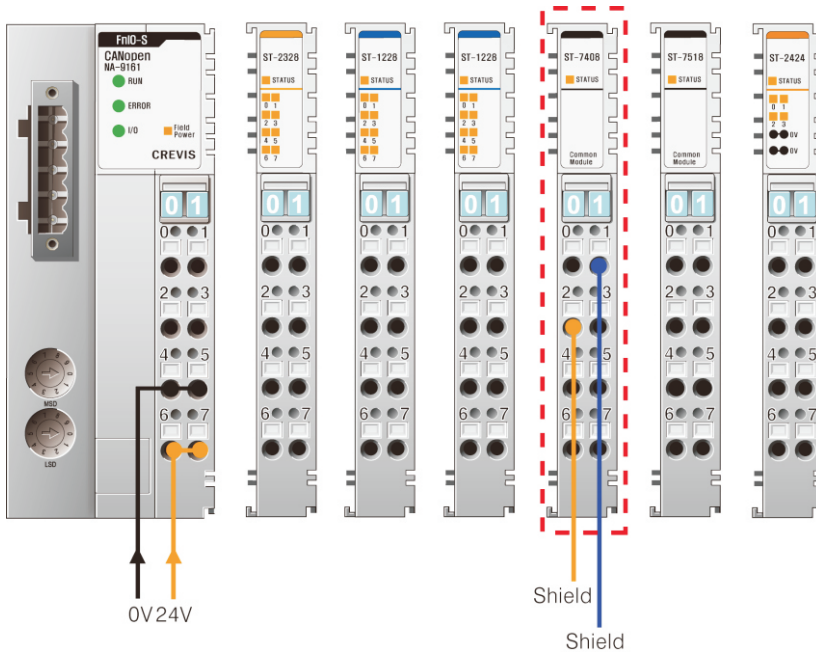
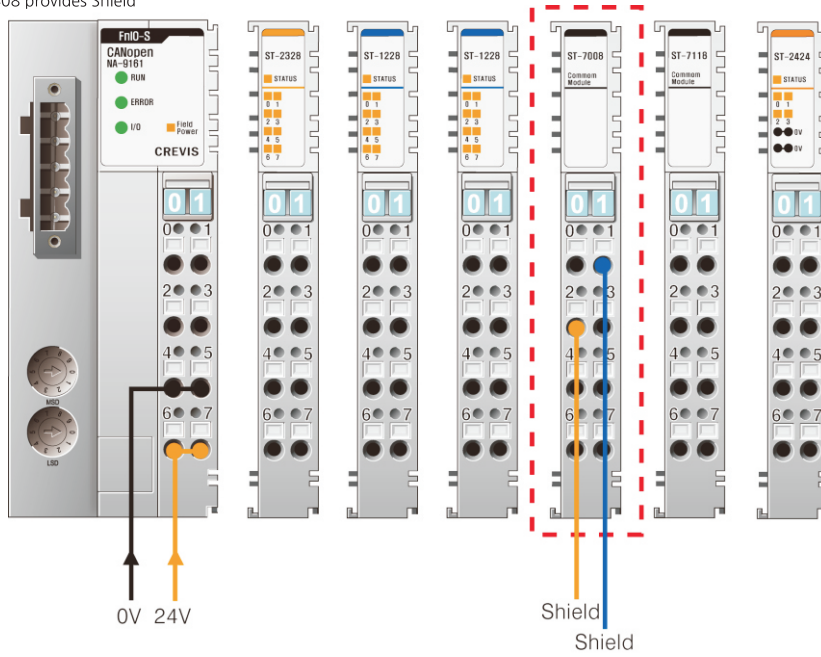
Parameter Data:

Offset	Decimal Bit							
00	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	0-ch Stop Bit 0 : 1 bit 1 : 2 bit (*default : 0)	0-ch Parity Bit 00 : No Parity (*default) 01 : Odd Parity 10 : Even Parity Others : Unused		0-ch Data Bit 00 : 7 Data Bit 01 : 8 DataBit (*default) Others : Unused		0-ch Baud Rate 000 : 1200 bps 001 : 2400 bps 010 : 4800 bps 011 : 9600 bps (*default) 100 : 19200 bps 101 : 38400 bps 110 : 57600 bps 111 : 115200 bps		
01	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	1-ch Stop Bit 0 : 1 bit 1 : 2 bit (*default : 0)	1-ch Parity Bit 00 : No Parity (*default) 01 : Odd Parity 10 : Even Parity Others : Unused		1-ch Data Bit 00 : 7 Data Bit 01 : 8 Data Bit (*default) Others : Unused		1-ch Baud Rate 000 : 1200 bps 001 : 2400 bps 010 : 4800 bps 011 : 9600 bps (*default) 100 : 19200 bps 101 : 38400 bps 110 : 57600 bps 111 : 115200 bps		
02	0-Channel (Set Parameter about Start and end Character)							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	TxD End Character 00 : Disable (*default) 01 : TxD 1-E/C 10 : TxD 2-E/C 11 : Reserved (Disable)		TxD Start Character 00 : Disable (*default) 01 : TxD 1-S/C 10 : TxD 2-S/C 11 : Reserved (Disable)		RxD End Character 00 : Disable (*default) 01 : RxD 1-E/C 10 : RxD 2-E/C 11 : Reserved (Disable)		RxD Start Character 00 : Disable (*default) 01 : RxD 1-S/C 10 : RxD 2-S/C 11 : Reserved (Disable)	
03	1-Channel (Set Parameter about Start and end Character)							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	TxD End Character 00 : Disable (*default) 01 : TxD 1-E/C 10 : TxD 2-E/C 11 : Reserved (Disable)		TxD Start Character 00 : Disable (*default) 01 : TxD 1-S/C 10 : TxD 2-S/C 11 : Reserved (Disable)		RxD End Character 00 : Disable (*default) 01 : RxD 1-E/C 10 : RxD 2-E/C 11 : Reserved (Disable)		RxD Start Character 00 : Disable (*default) 01 : RxD 1-S/C 10 : RxD 2-S/C 11 : Reserved (Disable)	
04	0-ch RxD 1-S/C (*default : 0x00)							
05	0-ch RxD 2-S/C (*default : 0x00)							
06	0-ch RxD 1-E/C (*default : 0x00)							
07	0-ch RxD 2-E/C (*default : 0x00)							
08	0-ch TxD 1-S/C (*default : 0x00)							
09	0-ch TxD 2-S/C (*default : 0x00)							
10	0-ch TxD 1-E/C (*default : 0x00)							
11	0-ch TxD 2-E/C (*default : 0x00)							
12	1-ch RxD 1-S/C (*default : 0x00)							
13	1-ch RxD 2-S/C (*default : 0x00)							
14	1-ch RxD 1-E/C (*default : 0x00)							
15	1-ch RxD 2-E/C (*default : 0x00)							
16	1-ch TxD 1-S/C (*default : 0x00)							
17	1-ch TxD 2-S/C (*default : 0x00)							
18	1-ch TxD 1-E/C (*default : 0x00)							
19	1-ch TxD 2-E/C (*default : 0x00)							
20	0-Channel Fixed Length Function 0x00 : F/L Mode Disable (*default) 0x01 ~ 0xFF : F/L Mode Enable and Fixed Length Value							
21	1-Channel Fixed Length Function 0x00 : F/L Mode Disable (*default) 0x01 ~ 0xFF : F/L Mode Enable and Fixed Length Value							
22	0-Ch Timeout Value Setting 0(dec) : Timeout Disable 1(dec) : 100ms 50(dec) : 5,000ms(5sec) *default 100(dec) : 10,000ms(10sec) 200(dec) : 20,000ms(20sec) 255(dec) : 25,500ms(25.5sec)							
23	1-Ch Timeout Value Setting 0(dec) : Timeout Disable 1(dec) : 100ms 50(dec) : 5,000ms(5sec) *default 100(dec) : 10,000ms(10sec) 200(dec) : 20,000ms(20sec) 255(dec) : 25,500ms(25.5sec)							

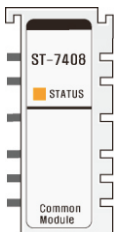
Power Module

Example :

The ST-7008, ST-7408 provides Shield



Status LED



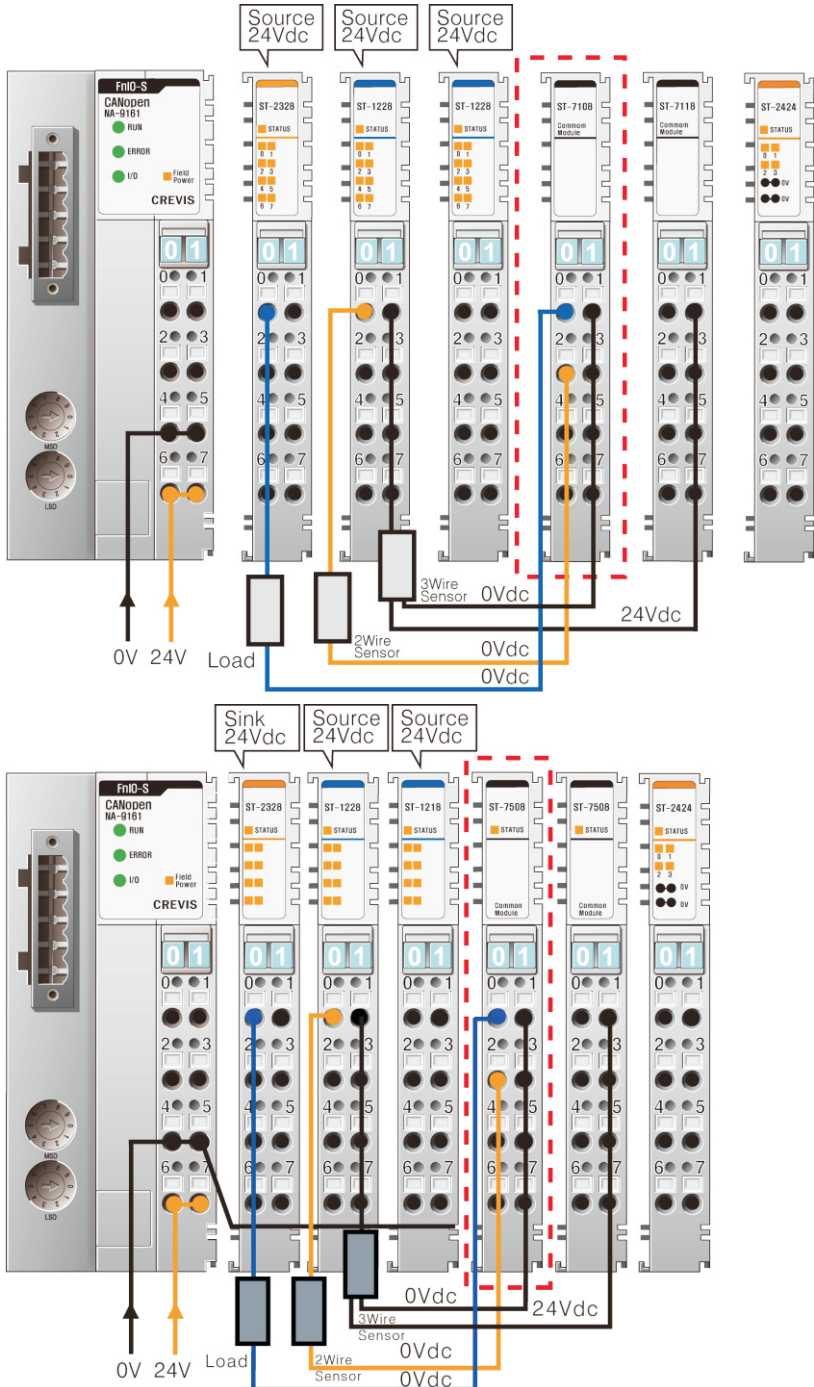
Status	STATUS LED is	Indicates
Not Power	OFF	Device has no expansion Module or May Not is Power.
No Initialized		The Parameter is not initialized yet
Fn-Bus Connection	Green	Fn-Bus Normal Operation
Fn-Bus Ready	Flashing Green	Fn-Bus Ready
Fn-Bus Fault	Flashing Red	Fn-Bus failed Communication
Device Fault	Red	Device Fault

Power Module

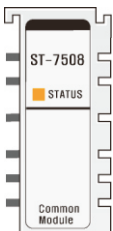
Example :

The ST-7108, ST-7508 provides 0V.

If you have a setup where an external device near the FnIO module needs a ground(0V), you can simply use the ST-7508 as a common module.



Status LED

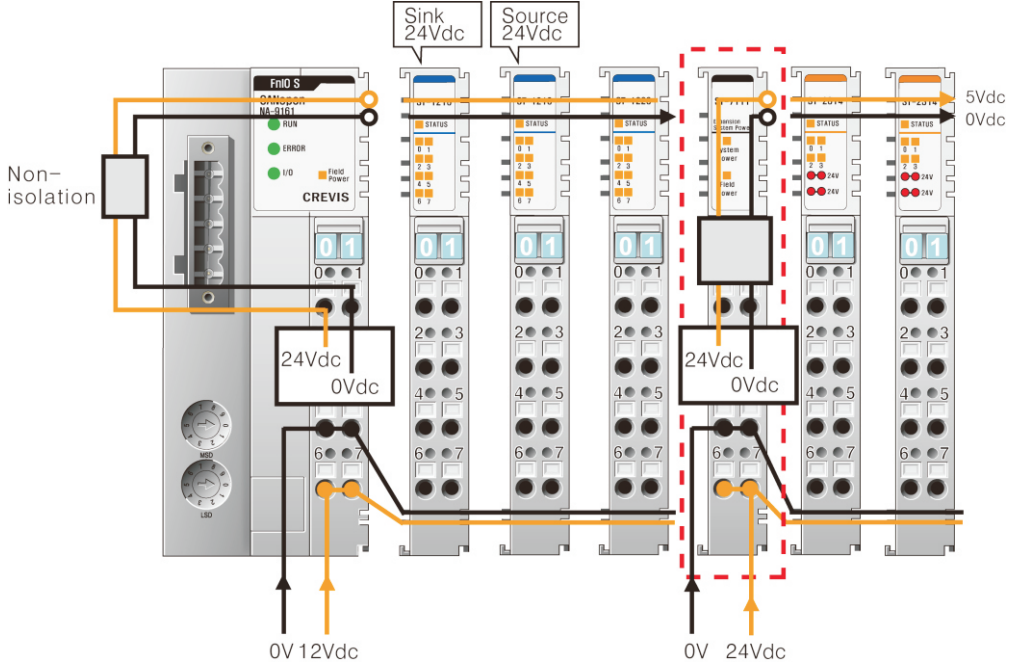


Status	STATUS LED is	Indicates
Not Power	OFF	Device has no expansion Module or May Not is Power.
No Initialized		The Parameter is not initialized yet
Fn-Bus Connection	Green	Fn-Bus Normal Operation
Fn-Bus Ready	Flashing Green	Fn-Bus Ready
Fn-Bus Fault	Flashing Red	Fn-Bus failed Communication
Device Fault	Red	Device Fault

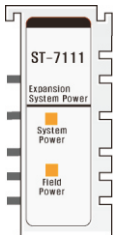
Power Module

Example :

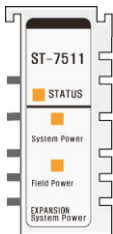
When you are using a FnIO setup that requires more than 1.5A for system power (+5) or 10A of field power, you will need to add a ST-7111, ST-7511 expansion power module to ensure that enough power will be available to all the ST Modules.



Status LED



Power	LED Status	Indicates
OFF	OFF	Inactive (Normal)
ON	Green	Active (Normal)

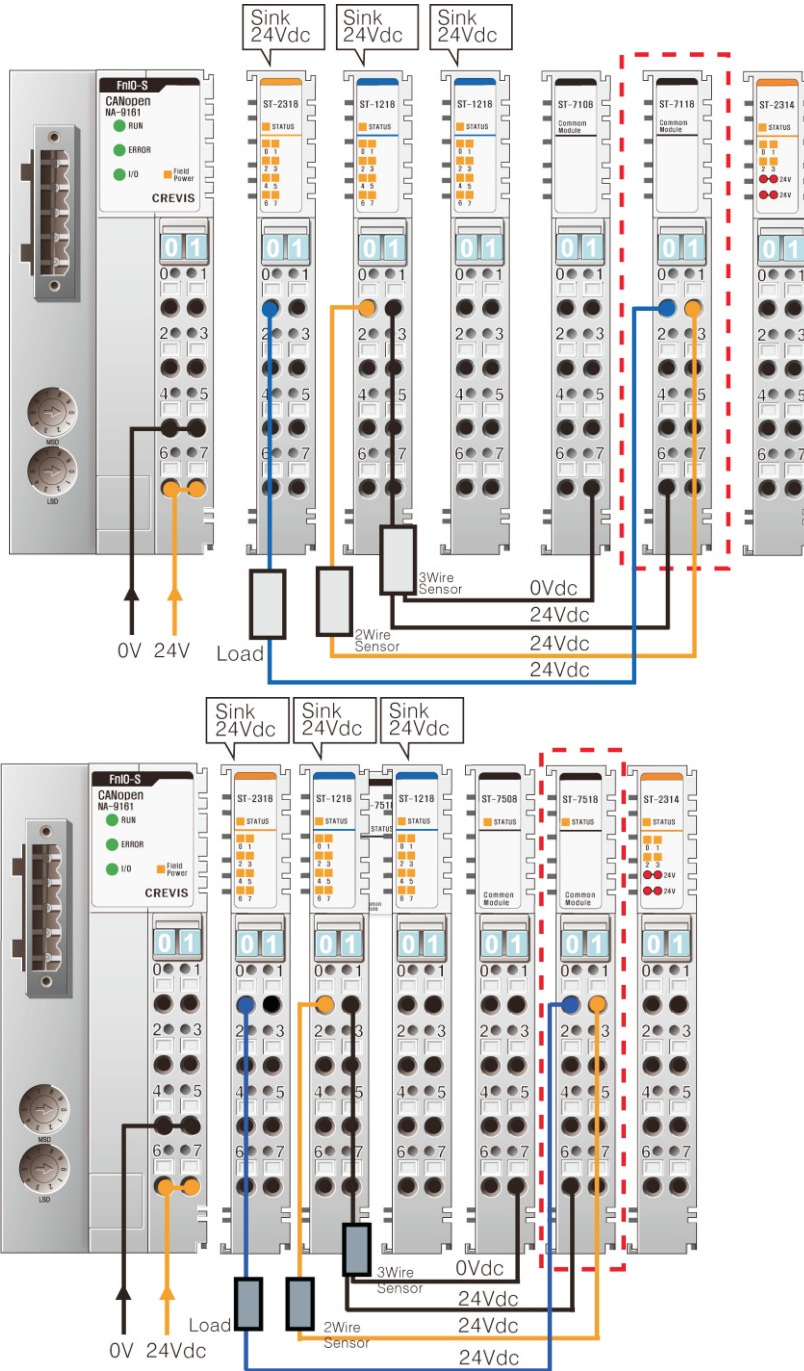


Status	STATUS LED is	Indicates
Not Power	OFF	Device has no expansion Module or May Not is Power.
No Initialized		The Parameter is not initialized yet
Fn-Bus Connection	Green	Fn-Bus Normal Operation
Fn-Bus Ready	Flashing Green	Fn-Bus Ready
Fn-Bus Fault	Flashing Red	Fn-Bus failed Communication
Device Fault	Red	Device Fault

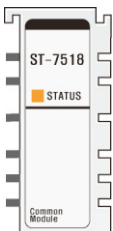
Power Module

Example :

The ST-7118, ST-7518 provides 24Vdc of power. If you have a setup where an external device near the FnIO module needs 24Vdc of power, you can simply use the ST-7118, ST-7518 as a common module.



Status LED

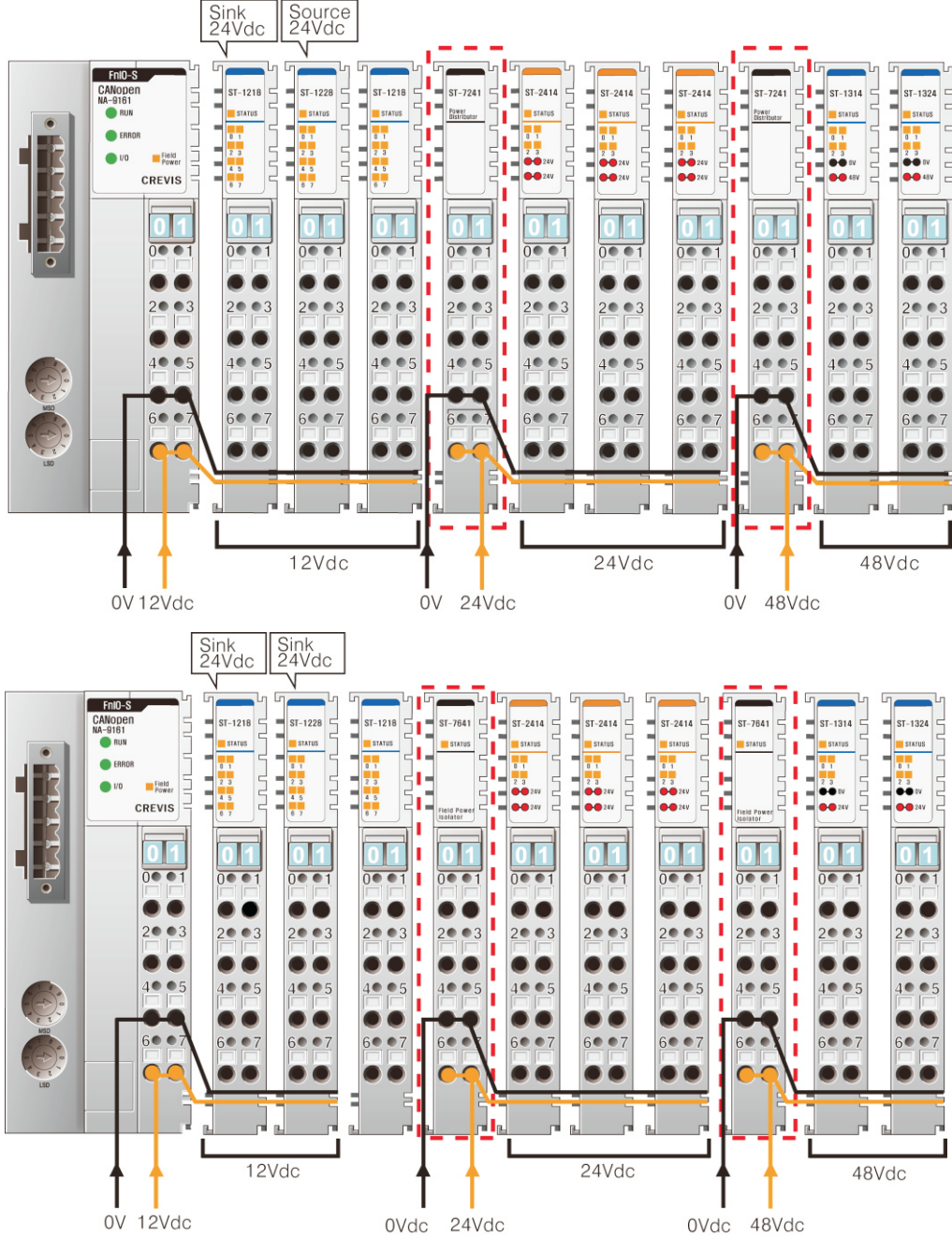


Status	STATUS LED is	Indicates
Not Power	OFF	Device has no expansion Module or May Not is Power.
No Initialized		The Parameter is not initialized yet
Fn-Bus Connection	Green	Fn-Bus Normal Operation
Fn-Bus Ready	Flashing Green	Fn-Bus Ready
Fn-Bus Fault	Flashing Red	Fn-Bus failed Communication
Device Fault	Red	Device Fault

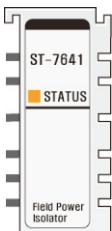
Power Module

Example :

When you have an FnIO setup and need to use with different Field Power Voltage, you can use the ST-7241, ST-7641 to change the distributed Voltage from 5Vdc/12Vdc/24Vdc/48Vdc, or from 110Vac/220Vac as below:



Status LED

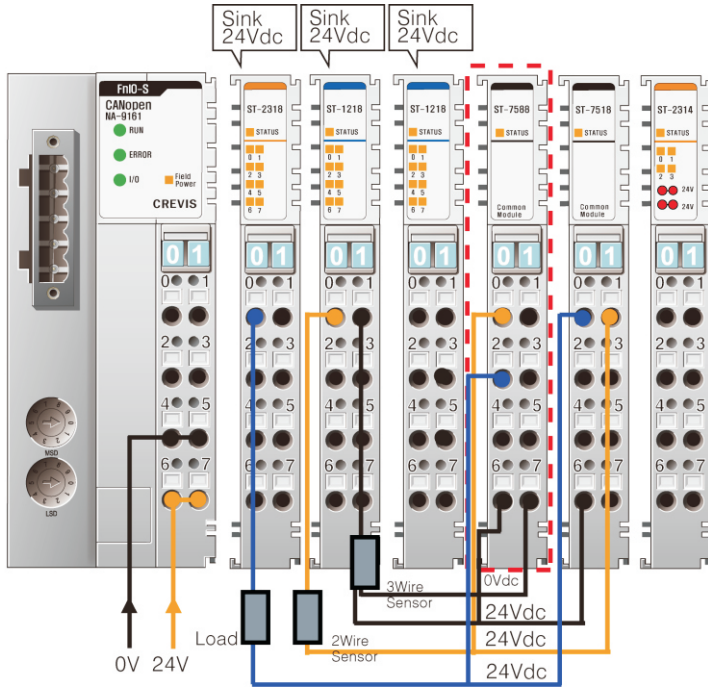


Status	STATUS LED is	Indicates
Not Power	OFF	Device has no expansion Module or May Not is Power.
No Initialized		The Parameter is not initialized yet
Fn-Bus Connection	Green	Fn-Bus Normal Operation
Fn-Bus Ready	Flashing Green	Fn-Bus Ready
Fn-Bus Fault	Flashing Red	Fn-Bus failed Communication
Device Fault	Red	Device Fault

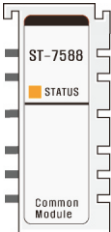
Power Module

Example :

If you have a setup where an external device near the FnIO module needs 24Vdc of power, you can simply use the ST-7588 as a common module.



Status LED



Status	STATUS LED is	Indicates
Not Power	OFF	Device has no expansion Module or May Not is Power.
No Initialized		The Parameter is not initialized yet
Fn-Bus Connection	Green	Fn-Bus Normal Operation
Fn-Bus Ready	Flashing Green	Fn-Bus Ready
Fn-Bus Fault	Flashing Red	Fn-Bus failed Communication
Device Fault	Red	Device Fault

S-Series Environment Specification

Environment Specification	
Environment Specification	
Operating Temperature	-20°C to 55°C (Discrete I/O) 0 to 55°C (Analog I/O)
Non-Operating Temperature	-40°C to 85°C
Surrounding Air Temperature	-20°C to 85°C
Field Supp. Volt	Class2, 24VDC
Relative Humidity	5% to 90% Non-condensing
Operating Altitude	2,000m
Mounting	DIN rail
General Specification	
Wiring I/O Cable	I/O Cable Max. 2.0mm (AWG#14)
Shock Operating	10g
Shock Non-Operating	30g
Vibration/Shock Resistance	Displacement : 0.012 Inch p-p from 10-57Hz Acceleration : 2G's from 57-500Hz Sweep Rate : 1 octave Per Minute Axes to test : x, y, z Frequency Sweeps Per Axis : 10
EMC resistance burst/ESD	Confirms to EN-61000-6-2
EMI	Confirms to EN-61000-6-4
Installation Pos./Protect. Class	Variable / IP20
Product Certifications	UL/cUL, CE
Network Conformance	NA-9111 : ODVA Conformance Test Completion NA-9122 : PTO Conformance Test Completion NA-9131 : CLPA Conformance Test Completion
Isolation	DC Module (Included Analog Module) : Terminal Block to F.G 500Vac/1min AC Module : Terminal Block to F.G 1500Vac/1min Relay Module : Terminal Block to F.G 2500Vac/1min



Note