CMZ SISTEMI ELETTRONICI

EncoderSSI - FCT640

Application note

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1. Italiano 1
1.1. Introduzione 1
1.2. Impostazione “Encoder Type” e “Total Steps of Absolute Encoder” 2
1.3. Reset della Quota Encoder 4
1.4. Cattura Quota 4
1.5. Variabili per il Reset dei fault 6
1.6. Configurazione via CANopen 6
1.7. Risoluzione dei problemi 10
2. English 12
2.1. Introduction 12
2.2. Setting of "Encoder Type” and “Total Steps of Absolute Encoder” 12
2.3. Encoder Position Reset 14
2.4. Position Capture 15
2.5. Variables for the fault Reset 16
2.6. Configuration via CANopen 17
2.7. Troubleshooting 21

1. Italiano

1.1. Introduzione

Questa application note ha lo scopo di guidare l'utente alla configurazione di un modulo TB20 SSI con un controllore FCT640, riportando un esempio di utilizzo. Si consiglia di conservare questo documento assieme al prodotto. Per informazioni più complete riguardo al modulo o al controllore, fare riferimento ai documenti disponibili nel sito http://www.cmz.it o rivolgersi a CMZ SISTEMI ELETTRONICI S.r.l..

L'esempio riportato nel presente documento consiste nel collegare un Encoder SSI dell'Eltra con codifica Gray a 13bit (8192 impulsi di onda primaria) al Modulo 640-320-7AA01 e provare le varie funzionalità previste dal modulo sul:

1. HBUS del FCT640
2. Coupler EtherCAT

3. Coupler CANopen

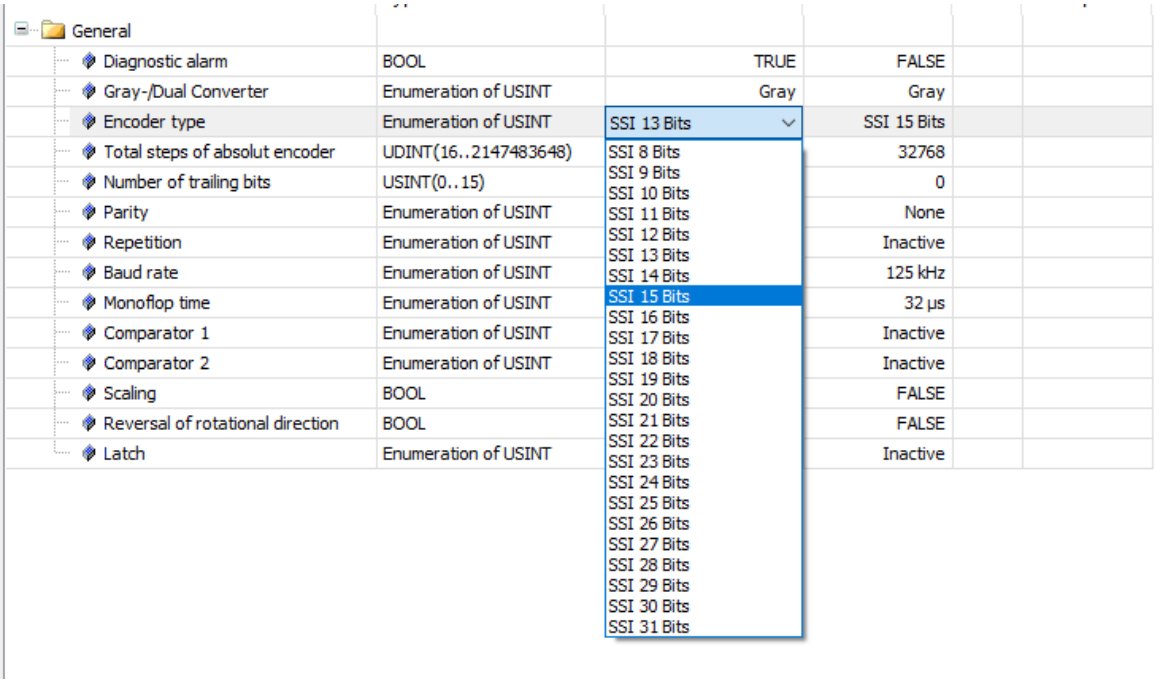
1.2. Impostazione “Encoder Type” e “Total Steps of Absolute Encoder”

L’impostazione del tipo di encoder sembra non funzionare in quanto l’unica configurazione ammissibile è "SSI 15 bit" (configurazione di Default).

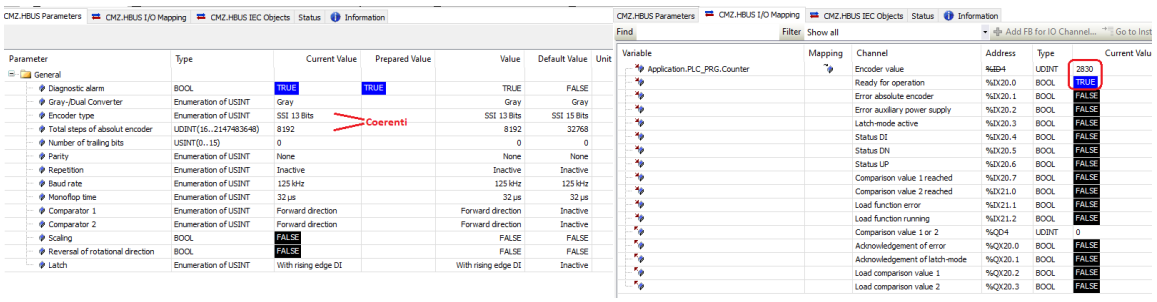
Se imposto il tipo di encoder a "SSI 13 bit", il led rosso del modulo lampeggia Rosso “parameter assignment error”.

Causa: la non coerenza tra impostazione Encoder “SSI 13 bits” e il parametro “Total steps of Absolute Encoder”

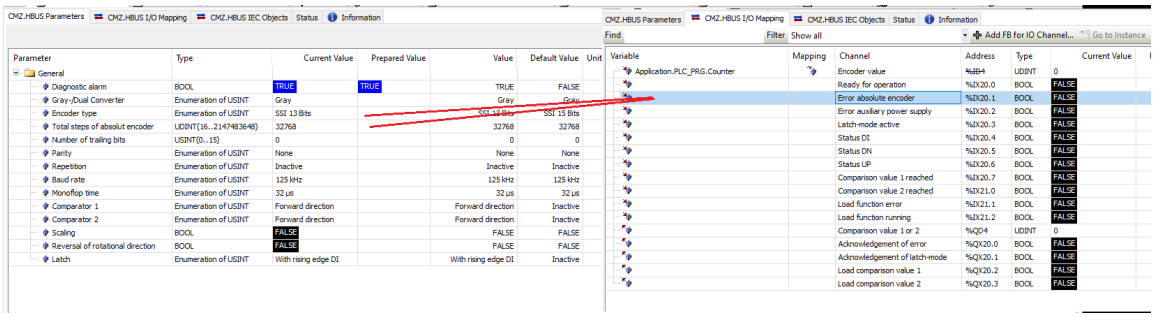
FCT640:



- Configurazione corretta:



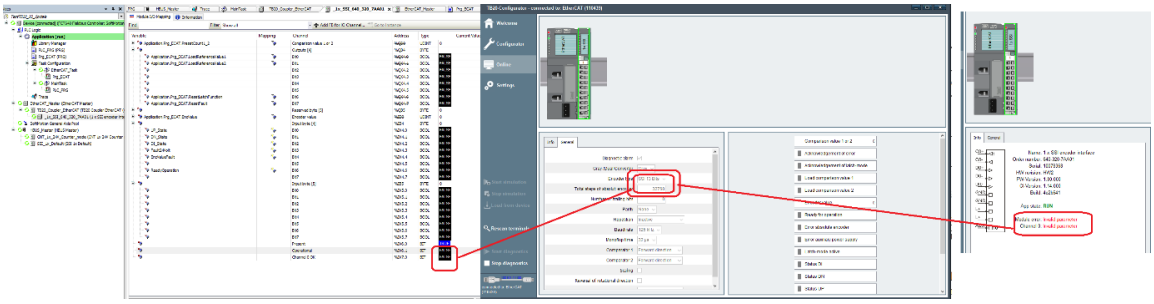
- Configurazione errata, il modulo non funziona, il led rosso è acceso e a livello IEC non viene riportata nessuna info:



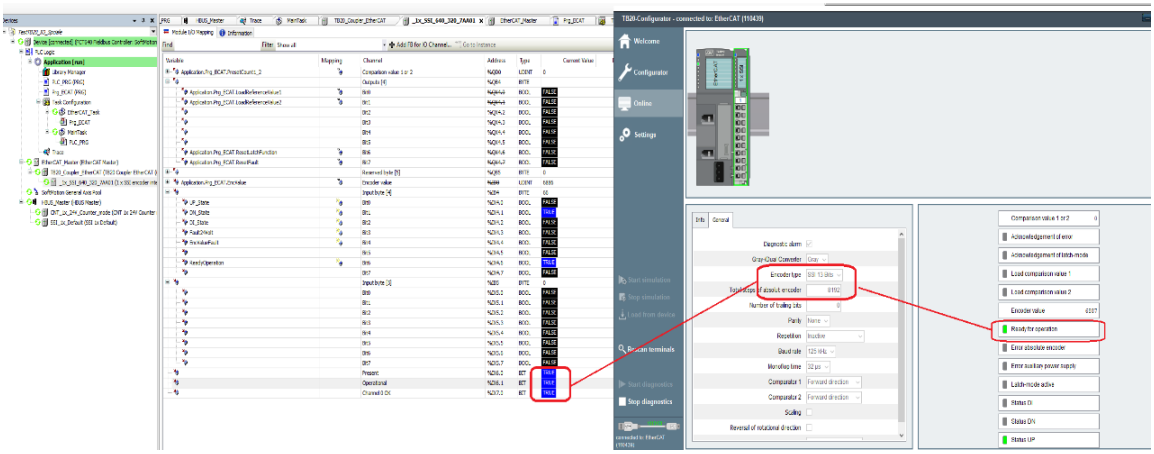
Coupler EtherCAT:

Per eseguire una corretta configurazione il valore di “Encoder Type” deve essere coerente con il “Total steps of absolute encoder”; in pratica il valore del parametro “total step absolute encoder” deve essere inferiore o uguale al massimo numero codificabile dall'Encoder Type.
Esempio: 13bit -> max codifica 8192 e non 32768.

- Configurazione corretta:



- Configurazione errata:

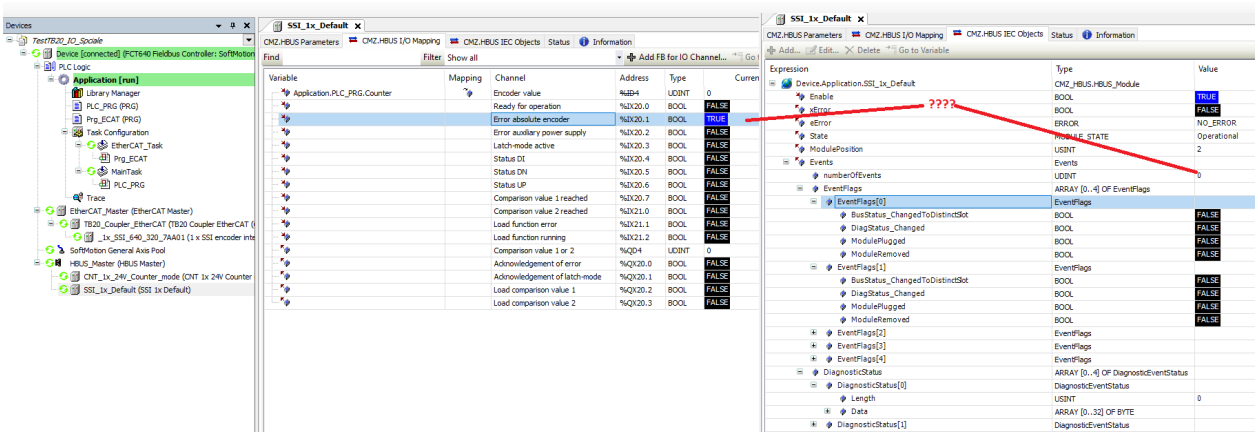


Coupler CANopen:
Vedere *Section 1.6, "Configurazione via CANopen"*

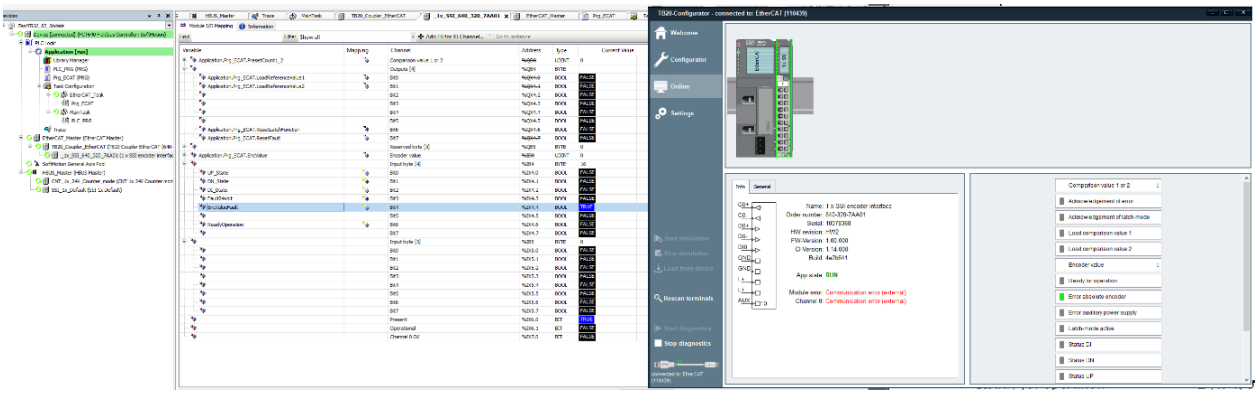
1.3. Reset della Quota Encoder

Tramite un ingresso si attiva la funzione di Reset Quota Encoder, dopo questa azione il modulo va in errore (il led Blu diventa Rosso Fisso) la quota encoder si resetta e rimane congelata finché non si resetta l'errore tramite il bit Acknowledgement of Error (vedere *Section 1.5, "Variabili per il Reset dei fault"*).

FCT640:



Coupler EtherCAT:



1.4. Cattura Quota

Dopo un fronte sull'ingresso di cattura quota:

FCT640:

L'avvenuta cattura si notifica tramite il bit "Latch-mode Active", inoltre il bit 31 del Encoder Value si setta a TRUE ("sporcando" la quota dell'Encoder).

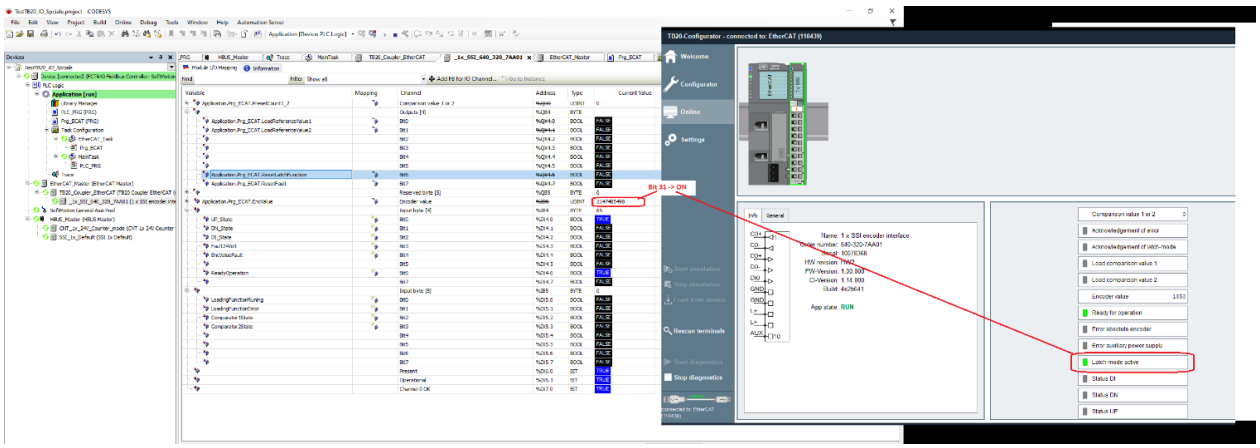
La quota Encoder rimane congelata finché non si setta il bit "Acknowledgement of latch-mode" (vedere *Section 1.5, "Variabili per il Reset dei fault"*).

Variable	Mapping	Channel	Address	Type	Current Value
Application.PLC_PRG.Counter		Encoder value	~~%ID2~~	UDINT	2147483648
		Ready for operation	%IX12.0	BOOL	TRUE
		Error absolute encoder	%IX12.1	BOOL	FALSE
		Error auxiliary power supply	%IX12.2	BOOL	FALSE
		Latch-mode active	%IX12.3	BOOL	TRUE
		Status DI	%IX12.4	BOOL	FALSE
		Status DN	%IX12.5	BOOL	TRUE
		Status UP	%IX12.6	BOOL	FALSE
		Comparison value 1 reached	%IX12.7	BOOL	FALSE
		Comparison value 2 reached	%IX13.0	BOOL	FALSE
		Load function error	%IX13.1	BOOL	FALSE
		Load function running	%IX13.2	BOOL	FALSE
		Comparison value 1 or 2	%QD2	UDINT	0
		Acknowledgement of error	%QX12.0	BOOL	FALSE
		Acknowledgement of latch-mode	%QX12.1	BOOL	FALSE
		Load comparison value 1	%QX12.2	BOOL	FALSE
		Load comparison value 2	%QX12.3	BOOL	FALSE

Coupler EtherCAT:

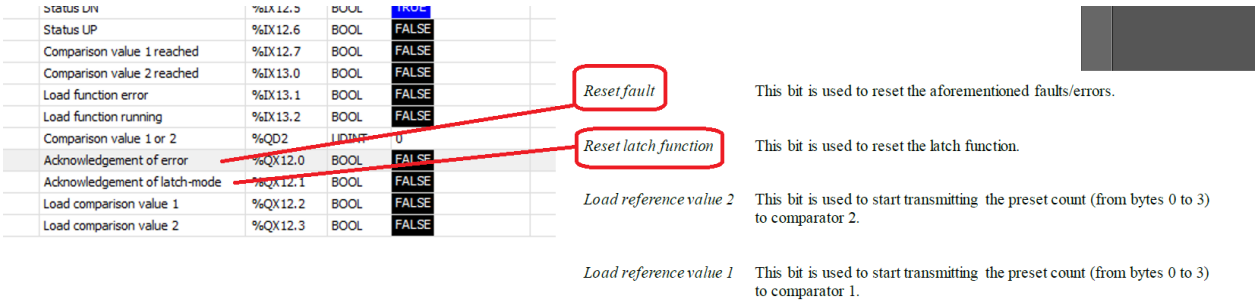
La quota Encoder rimane congelata finché non si setta il bit "Acknowledgement of latch-mode" (vedere *Section 1.5, "Variabili per il Reset dei fault"*).

Non è presente il bit "Latch-mode Active", ma solo il bit 31 della Encoder Value.



1.5. Variabili per il Reset dei fault

FCT640 e Coupler EtherCAT
La struttura delle variabili è già precompilata. È importante notare che le variabili di reset dei fault nelle strutture dati precompilate hanno nomi diversi rispetto ai nomi riportati nei manuali dei moduli.
Questi ultimi si chiamano "Reset fault" e "Reset latch function", mentre nella struttura precompilata nell'FCT640 e nel Coupler EtherCAT si chiamano rispettivamente "Acknowledgment of error" e "Acknowledgment of latch-mode".



Coupler CANopen
La struttura delle variabili è definita dall'utente, quindi anche il loro nome. Viene riportato un esempio in *Section 1.6, "Configurazione via CANopen"*.

1.6. Configurazione via CANopen

- Per la lettura dell'encoder ed il monitor dello stato della periferica da CODESYS, serve fare il mapping sul TPD come in figura:

Name	Object	Bit length
16#1800: Transmit PDO Communication Parameter 1	**16#181 ($NODEID+16#180)**	**64**
Digital Input Byte 1	16#6000:16#01	8
Digital Input Byte 2	16#6000:16#02	8
SSI_EncValue	16#2101:16#01	32
SSI_State1	16#2101:16#02	8
SSI_State2	16#2101:16#03	8

Mappare le variabili IEC, come in figura:

EncSSI		SSI_EncValue	%ID4	DWORD
		SSI_State1	%IB20	BYTE
UpState		Bit0	%IX20.0	BOOL
DnState		Bit1	%IX20.1	BOOL
DiState		Bit2	%IX20.2	BOOL
Fault24V		Bit3	%IX20.3	BOOL
EncoderFault		Bit4	%IX20.4	BOOL
		Bit5	%IX20.5	BOOL
ReadyXOp		Bit6	%IX20.6	BOOL
		Bit7	%IX20.7	BOOL
		SSI_State2	%IB21	BYTE
LoadRun		Bit0	%IX21.0	BOOL
LoadError		Bit1	%IX21.1	BOOL
Comp2State		Bit2	%IX21.2	BOOL
Comp1State		Bit3	%IX21.3	BOOL
		Bit4	%IX21.4	BOOL
		Bit5	%IX21.5	BOOL
		Bit6	%IX21.6	BOOL
		Bit7	%IX21.7	BOOL

Input space length: 6 bytes

	7	6	5	4	3	2	1	0	
Bytes 0–3	Bits 0–30 = Encoder value; bit 31 = Latch active								16#2101.1
Byte 4	Reserved	Ready for operation	Reserved	Encoder value fault	24-V encoder supply fault	DI state	DN state	UP state	16#2101.2
Byte 5	Reserved	Reserved	Reserved	Reserved	Comparator 1 state	Comparator 2 state	Loading function error	Loading function running	16#2101.3

Encoder value — Bytes 0 to 3 contain the current encoder value and a bit indicating whether the latch function is active. More specifically, bits 0 to 30 contain the current encoder value and bit 31 indicates that the encoder value is a stored value / that the latch function is active.

Ready for operation — Byte 4, bit 6 is used to signal that the TB20 SSI module is ready for operation, i.e., that communications between the module and the connected encoder are OK.

Absolute encoder fault — Byte 4, bit 4 is used to signal faults such as wire breaks and parity errors detected when communicating with the absolute encoder. The corresponding fault needs to be reset before the module can be used.

24-V encoder supply fault — Byte 4, bit 3 is used to signal faults in the 24-V encoder supply.

The corresponding fault needs to be reset before the module can be used.

DI state — Byte 4, bit 2 is used to signal the state of the latch function's digital input.

DN state — Byte 4, bit 1 is used to signal a negative direction of movement.

UP state — Byte 4, bit 0 is used to signal a positive direction of movement.

Comparator 1 state — Byte 5, bit 3 is used to signal the state of comparator 1 (please refer to 8.1.6).

Comparator 2 state — Byte 5, bit 2 is used to signal the state of comparator 2 (please refer to 8.1.6).

Loading function error — Byte 5, bit 1 is used to indicate that an error occurred when attempting to execute the loading function. To eliminate the error bits "load reference value 2" and "load reference value 1" (output byte 4, bits 0 and 1) are to be set to 0.

Loading function running — Byte 5, bit 0 is used to signal that the loading function is active.

- Per gestire la periferica, il Reset Fault, l'attivazione del trigger ed il Reset Latch della quota, serve mappare l'RPD come in figura:

Receive PDOs (Master => Slave)

Add PDO | Add Mapping | Edit | Delete | Move Up | Move Down

Name	Object	Bit length
16#1400: Receive PDO Communication Parameter 1	**16#201 ($NODEID+16#200)**	**64**
[illegible]	[illegible]	8
[illegible]	[illegible]	8
[illegible]	[illegible]	8
SSI_PresetCount	16#2201:16#01	32
SSI_CtrlByte	16#2201:16#02	8

Assegnare l'indirizzo alle variabili IEC come in figura:

SSI_SetQuota		SSI_PresetCount	%QD3	DWORD
		SSI_CtrlByte	%QB16	BYTE
LoadRefValue1		Bit0	%QX16.0	BOOL
LoadRefValue2		Bit1	%QX16.1	BOOL
		Bit2	%QX16.2	BOOL
		Bit3	%QX16.3	BOOL
		Bit4	%QX16.4	BOOL
		Bit5	%QX16.5	BOOL
ResetLatch		Bit6	%QX16.6	BOOL
ResetFault		Bit7	%QX16.7	BOOL

Output space length: 6 bytes

	7	6	5	4	3	2	1	0	
Bytes 0–3	Preset count for reference value 1 or 2								16#2201.1
Byte 4	Reset fault	Reset latch function	Reserved	Reserved	Reserved	Reserved	Load reference value 2	Load reference value 1	16#2201.2
Byte 5	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	

Preset count for reference value — Used to specify the count that will be used as a reference value by the comparator.

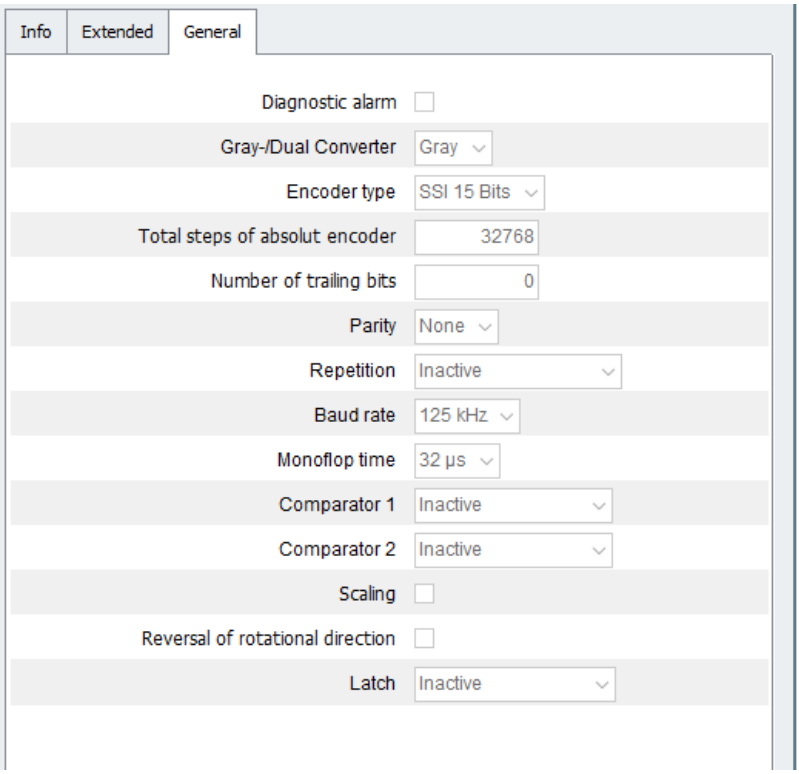
Reset fault — This bit is used to reset the aforementioned faults/errors.

Reset latch function — This bit is used to reset the latch function.

Load reference value 2 — This bit is used to start transmitting the preset count (from bytes 0 to 3) to comparator 2.

Load reference value 1 — This bit is used to start transmitting the preset count (from bytes 0 to 3) to comparator 1.

- Per cambiare la configurazione del Modulo di acquisizione dell'Encoder_SSI si può procedere in due modi:



1. Tramite ToolBOX:

   a. Creare un progetto con tutti i moduli I/O presenti.

   b. Andare nella tab di configurazione del modulo SSI e cambiarla:

      i. Salvando il file EDS --> importarlo in CODESYS

      ii. Salvando nel Coupler CANopen la configurazione appena fatta

> **Note**
>
> Scegliere una delle due vie: salvataggio dei parametri nel nodo oppure importazione tramite file EDS.

2. Tramite SDO:
   alla fine della fase di inizializzazione del modulo è possibile, in CODESYS, scaricare nel nodo tramite SDO una lista di parametri. Grazie a questa procedura si può modificare l'impostazione della scheda SSI.

15	16#3001:16#01	Module Slot 1 Parameter 1	1	8
16	16#3001:16#02	Module Slot 1 Parameter 2	13	8
17	16#3001:16#03	Module Slot 1 Parameter 3	8192	32
18	16#3001:16#04	Module Slot 1 Parameter 4	0	8
19	16#3001:16#05	Module Slot 1 Parameter 5	1	8
20	16#3001:16#06	Module Slot 1 Parameter 6	17	8
21	16#3001:16#07	Module Slot 1 Parameter 7	129	8

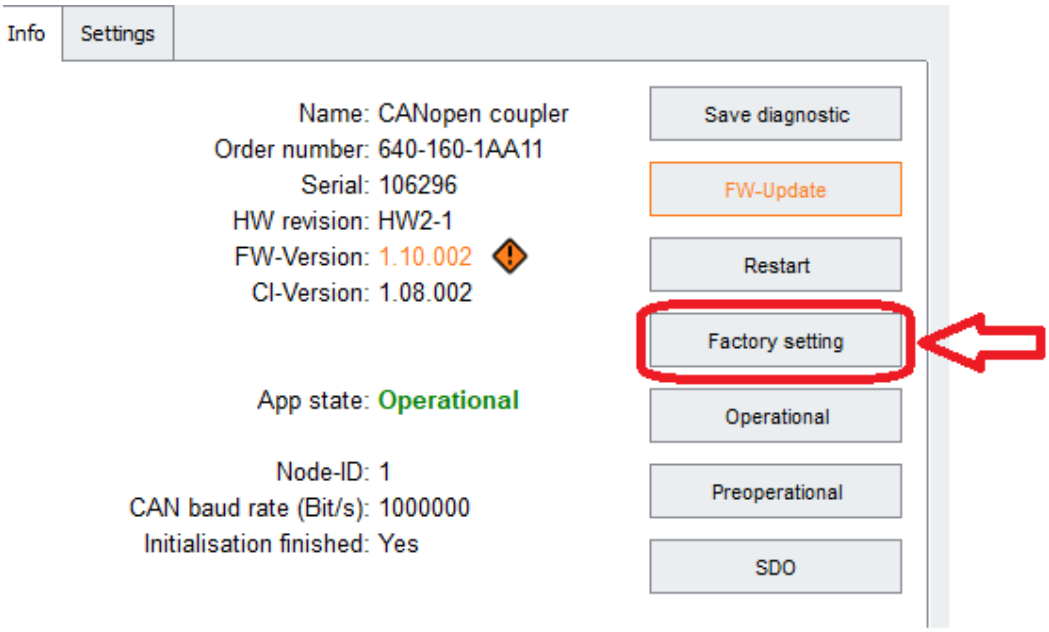
Per come comporre i vari parametri di configurazione, riferirsi alla seguente tabella:

Byte	7	6	5	4	3	2	1	0	
0	Operating mode								16#3001.1
1	Encoder value coding	Encoder value bit width							16#3001.2
2–5	Total number of encoder steps								16#3001.3
6	Multiple transmission		Parity		Number of appended bits				16#3001.4
7	Baud rate				Monostable multivibrator time period				16#3001.5
8	Comparator 2 mode				Comparator 1 mode				16#3001.6
9	Diagnosis alarm	Reserved	Reserved	Reserved	Normalization	Direction reversal	Latch		16#3001.7

Operating mode 1 = Operating mode 1
Encoder value coding 0 = Gray code; 1 = Natural binary code
Encoder value bit width 0 = No encoder
8 = 8 bits / 9 = 9 bits /…/15 = 15 bits/ … / 31 = 31 bits (with no parity bit)
Total number of encoder steps (16 – 2^31); (16,…, 32768,…, 2147483648)
Multiple transmission 0 = No multiple transmission
1–3 = Multiple transmission with 1–3 idle cycles
Parity bit 0 = None; 1 = Odd; 2 = Even
Number of appended bits 0 bits–15 bits
Baud rate/Clock frequency 0 = 125 kHz; 1 = 250 kHz; 2 = 500 kHz; 3 = 1 MHz;
4 = 1.5 MHz; 5 = 2 MHz
Monostable multivibrator time period 0 = 16 µs; 1 = 32 µs; 2 = 48 µs; 3 = 64 µs
Comparator 1/2 mode 0 = Disabled; 1 = Forward direction; 2 = Reverse direction; 3 = Both directions
Diagnosis alarm 0 = Disabled; 1 = Enabled
Normalization 0 = Disabled; 1 = Enabled
Direction reversal 0 = Disabled; 1 = Enabled
Latch 0 = Disabled; 1 = Rising edge at DI;
2 = Falling edge at DI; 3 = Both edges at DI

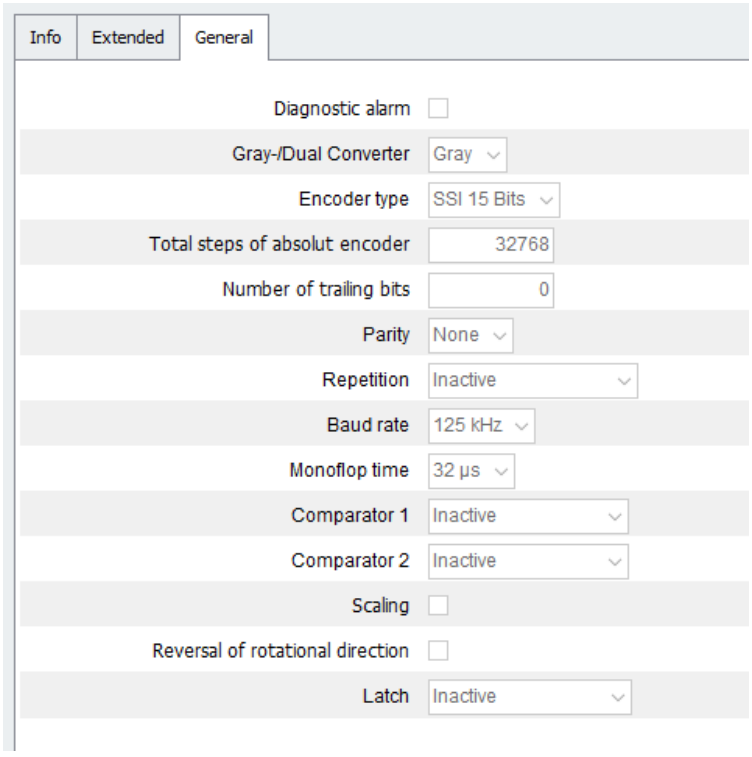
1.7. Risoluzione dei problemi

1. Non viene inviato il TPDO della quota:
   a. Verificare che il PDO mapping sia impostato a 255
   b. Ristabilire la configurazione di default del Nodo TB20 Coupler tramite ToolBox



2. Non funziona il latch della quota e/o non si attiva il comparatore di quota:

   a. Verificare/modificare le impostazioni di default del Modulo



3. L'encoder SSI dell'Eltra prevede un ingresso per resettare la quota. Quando si esegue il reset tramite questo ingresso dell'encoder, il modulo di acquisizione SSI va in errore (probabilmente a fronte di un "salto" di quota). Lo stato di errore del modulo si resetta tramite il bit7 della cella CAN 16#2201.2.

2. English

2.1. Introduction

The purpose of this application note is to help the user to configure a TB20 SSI module with a FCT640 controller, showing an application example. It is recommended to save this product with the product. For more complete information about the module or the controller, please refer to the documents that are available in the http://www.cmz.it website or contact CMZ SISTEMI ELETTRONICI S.r.l..

The example that is reported in this document consist of the connection of an Encoder SSI of Eltra with 13bit Gray code (8192 pulses in primary wave) to the 640-320-7AA01 Module and try the various functionalities, that are provided by the module, on:

1. HBUS of FCT640
2. Coupler EtherCAT
3. Coupler CANopen

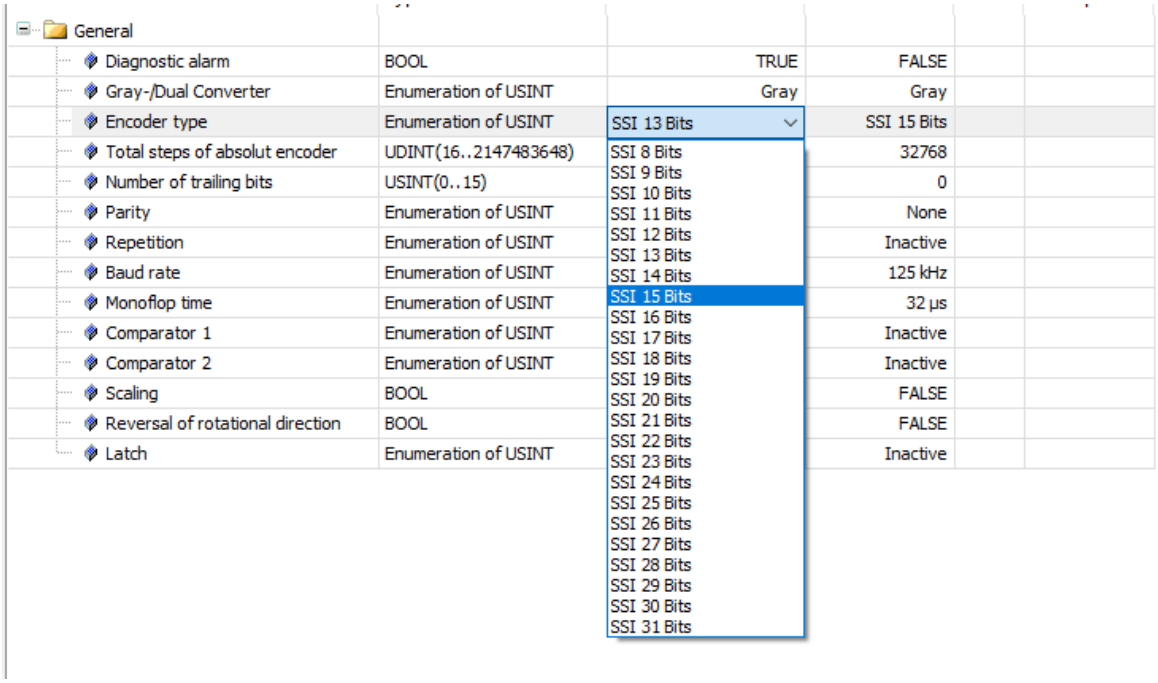
2.2. Setting of "Encoder Type" and “Total Steps of Absolute Encoder”

The setting of the encoder type seems not to work because the only admissible configuration is SSI 15 bit (Default configuration).

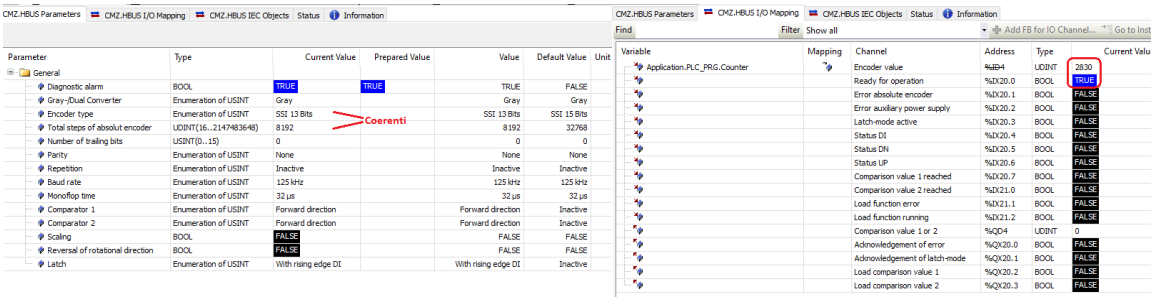
If the SSI 13 bit is set, the red led of the module blinks Red "parameter assignment error”.

Cause: the not coherence between the Encoder “SSI 13 bits” setting and the “Total steps of Absolute Encoder” parameter

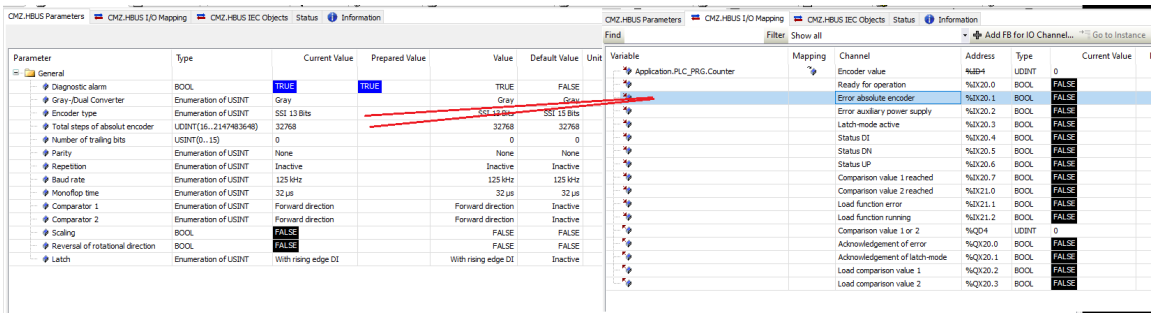
FCT640:



- Correct configuration:

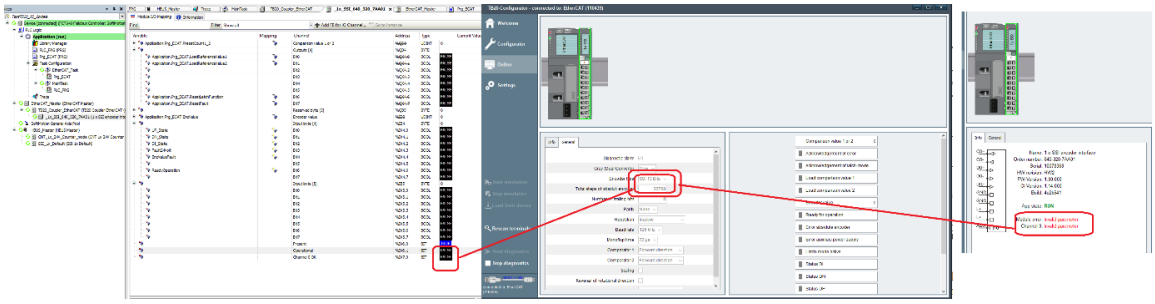


- Wrong configuration, the module doesn't work, the red led is on and at IEC level no info is reported:

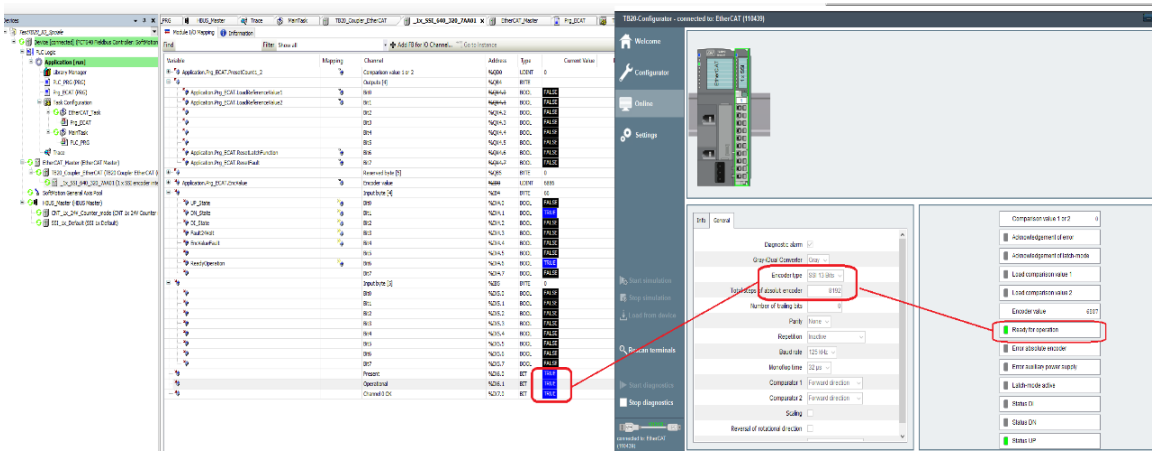


Coupler EtherCAT:
To follow a correct configuration the “Encoder Type” value must be coherent with the "Total steps of absolute encoder”; in other words, the value of the “total step absolute encoder” parameter must be lower or equal to the maximum number that can be encoded by the Encoder Type. Example: 13bit -> max encoding 8192 and not 32768.

- Correct configuration:



- Wrong configuration:

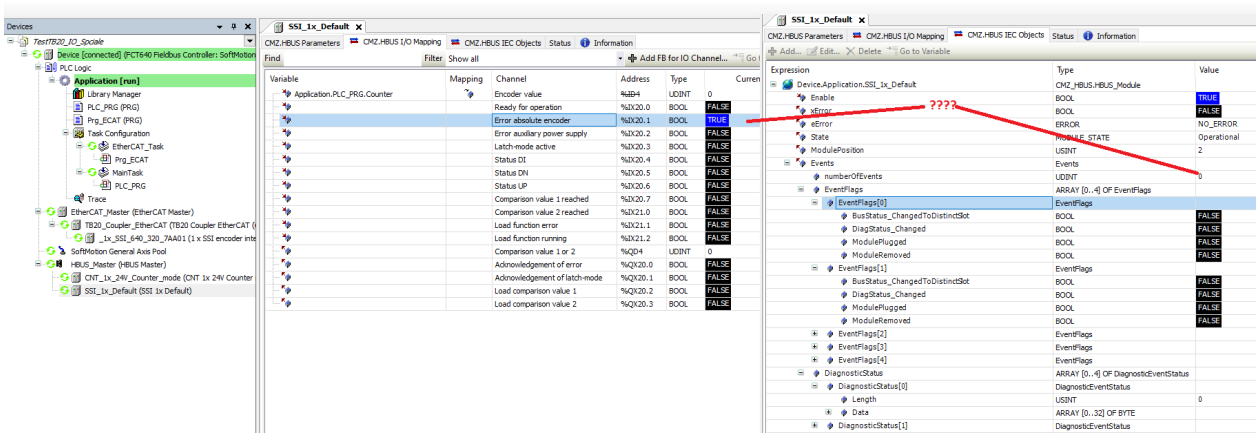


Coupler CANopen:
See *Section 2.6, “Configuration via CANopen”*

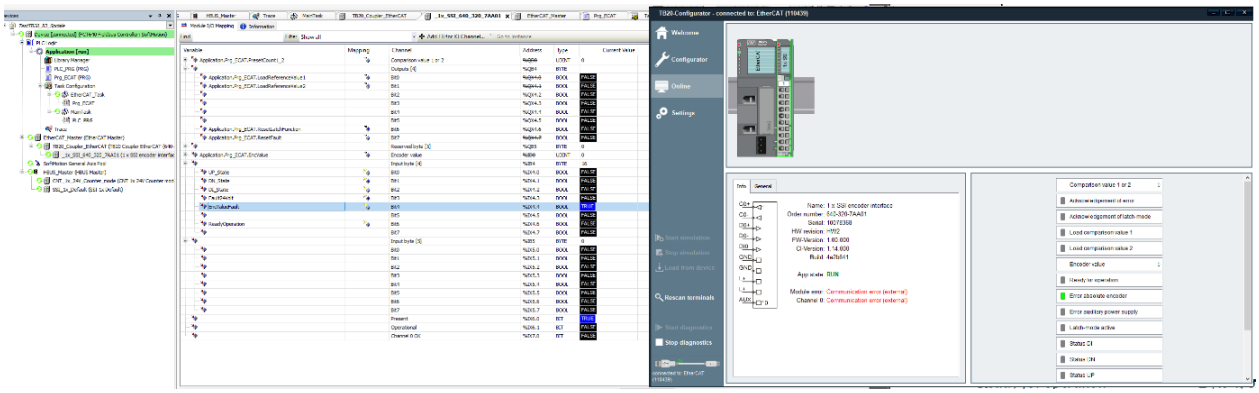
2.3. Encoder Position Reset

Through an input it can be activated the Encoder Position Reset function, after this action the module returns an error (the Blue led becomes Red ON fixed), the encoder position resets and remains "frozen" until the error is reset through the bit Acknowledgement of Error (see *Section 2.5, “Variables for the fault Reset”*).

FCT640:



Coupler EtherCAT:



2.4. Position Capture

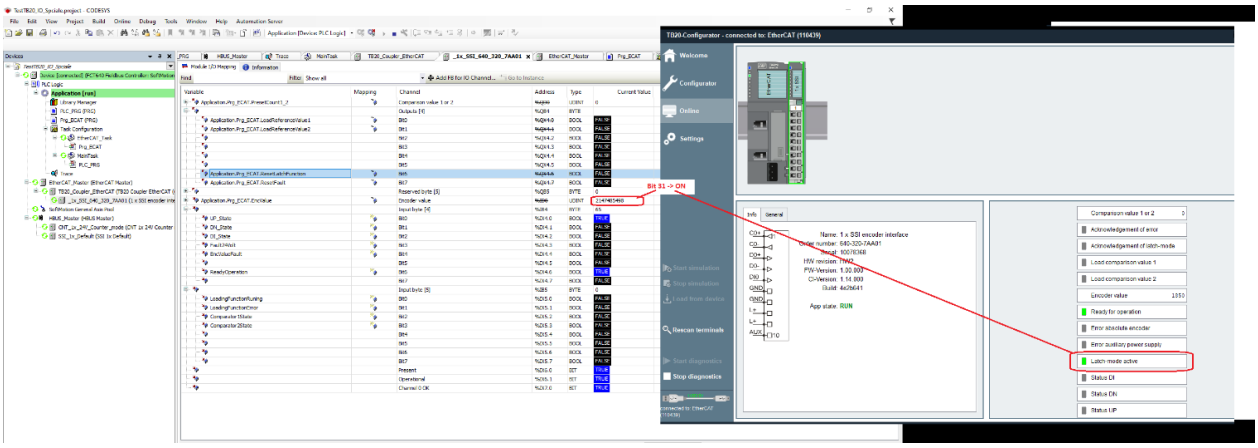
After a signal edge on the position capture input:

FCT640:

The capture happening is reported by the bit "Latch-mode Active" bit, furthermode the bit 31 of the Encoder Value is set to TRUE (“dirtying” the Encoder position).
The Encoder position remains "frozen" until the bit "Acknowledgement of latch-mode bit" is set (see *Section 2.5, “Variables for the fault Reset”*).

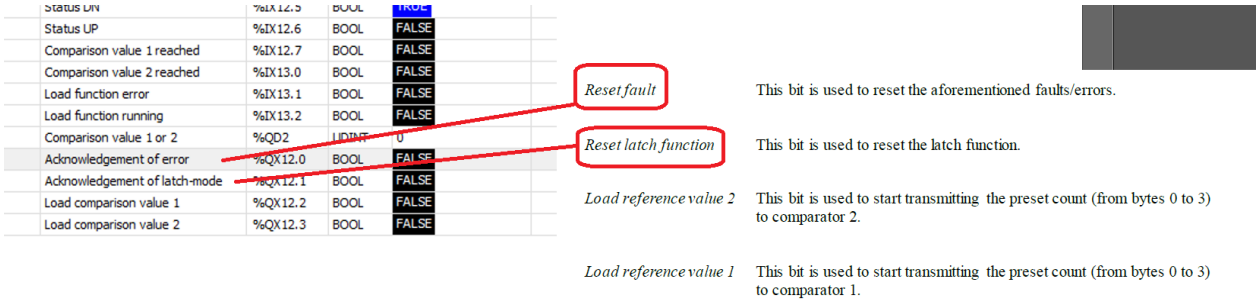
Variable	Mapping	Channel	Address	Type	Current Value
Application.PLC_PRG.Counter		Encoder value	%ID2	UDINT	2147483648
		Ready for operation	%IX12.0	BOOL	TRUE
		Error absolute encoder	%IX12.1	BOOL	FALSE
		Error auxiliary power supply	%IX12.2	BOOL	FALSE
		Latch-mode active	%IX12.3	BOOL	TRUE
		Status DI	%IX12.4	BOOL	FALSE
		Status DN	%IX12.5	BOOL	TRUE
		Status UP	%IX12.6	BOOL	FALSE
		Comparison value 1 reached	%IX12.7	BOOL	FALSE
		Comparison value 2 reached	%IX13.0	BOOL	FALSE
		Load function error	%IX13.1	BOOL	FALSE
		Load function running	%IX13.2	BOOL	FALSE
		Comparison value 1 or 2	%QD2	UDINT	0
		Acknowledgement of error	%QX12.0	BOOL	FALSE
		Acknowledgement of latch-mode	%QX12.1	BOOL	FALSE
		Load comparison value 1	%QX12.2	BOOL	FALSE
		Load comparison value 2	%QX12.3	BOOL	FALSE

Coupler EtherCAT:
The Encoder position remains "frozen" until the bit "Acknowledgement of latch-mode bit" is set (see *Section 2.5, "Variables for the fault Reset"*).
It is not present the "Latch-mode Active" bit, but only the bit 31 of the Encoder Value.



2.5. Variables for the fault Reset

FCT640 and Coupler EtherCAT
The variables structure is pre-compiled. It is important to notice that the fault reset variables in the pre-compiled data structures have different names compared to the names reported in the modules manuals.
The latter are called "Reset fault" and "Reset latch function", while in the pre-compiled structure in the FCT640 and in the Coupler EtherCAT that are called respectively "Acknowledgment of error" and "Acknowledgment of latch-mode".



Status UP	%IX12.6	BOOL	FALSE
Comparison value 1 reached	%IX12.7	BOOL	FALSE
Comparison value 2 reached	%IX13.0	BOOL	FALSE
Load function error	%IX13.1	BOOL	FALSE
Load function running	%IX13.2	BOOL	FALSE
Comparison value 1 or 2	%QD2	UDINT	0
Acknowledgement of error	%QX12.0	BOOL	FALSE
Acknowledgement of latch-mode	%QX12.1	BOOL	FALSE
Load comparison value 1	%QX12.2	BOOL	FALSE
Load comparison value 2	%QX12.3	BOOL	FALSE

Coupler CANopen

The structure of the variables is defined by the user, so even their name. An example is reported in *Section 2.6, "Configuration via CANopen"*.

2.6. Configuration via CANopen

- For the encoder reading and the monitor of the peripheral status from CODESYS, the mapping on TPD must be done as shown in the following picture:

Name	Object	Bit length
16#1800: Transmit PDO Communication Parameter 1	**16#181 ($NODEID+16#180)**	**64**
Digital Input Byte 1	16#6000:16#01	8
Digital Input Byte 2	16#6000:16#02	8
SSI_EncValue	16#2101:16#01	32
SSI_State1	16#2101:16#02	8
SSI_State2	16#2101:16#03	8

IEC variables mapping, as shown in the following picture:

EncSSI		SSI_EncValue	%ID4	DWORD
		SSI_State1	%IB20	BYTE
UpState		Bit0	%IX20.0	BOOL
DnState		Bit1	%IX20.1	BOOL
DiState		Bit2	%IX20.2	BOOL
Fault24V		Bit3	%IX20.3	BOOL
EncoderFault		Bit4	%IX20.4	BOOL
		Bit5	%IX20.5	BOOL
ReadyXOp		Bit6	%IX20.6	BOOL
		Bit7	%IX20.7	BOOL
		SSI_State2	%IB21	BYTE
LoadRun		Bit0	%IX21.0	BOOL
LoadError		Bit1	%IX21.1	BOOL
Comp2State		Bit2	%IX21.2	BOOL
Comp1State		Bit3	%IX21.3	BOOL
		Bit4	%IX21.4	BOOL
		Bit5	%IX21.5	BOOL
		Bit6	%IX21.6	BOOL
		Bit7	%IX21.7	BOOL

Input space length: 6 bytes

	7	6	5	4	3	2	1	0	
Bytes 0–3	Bits 0–30 = Encoder value; bit 31 = Latch active								16#2101.1
Byte 4	Reserved	Ready for operation	Reserved	Encoder value fault	24-V encoder supply fault	DI state	DN state	UP state	16#2101.2
Byte 5	Reserved	Reserved	Reserved	Reserved	Comparator 1 state	Comparator 2 state	Loading function error	Loading function running	16#2101.3

Encoder value — Bytes 0 to 3 contain the current encoder value and a bit indicating whether the latch function is active. More specifically, bits 0 to 30 contain the current encoder value and bit 31 indicates that the encoder value is a stored value / that the latch function is active.

Ready for operation — Byte 4, bit 6 is used to signal that the TB20 SSI module is ready for operation, i.e., that communications between the module and the connected encoder are OK.

Absolute encoder fault — Byte 4, bit 4 is used to signal faults such as wire breaks and parity errors detected when communicating with the absolute encoder. The corresponding fault needs to be reset before the module can be used.

24-V encoder supply fault — Byte 4, bit 3 is used to signal faults in the 24-V encoder supply.

The corresponding fault needs to be reset before the module can be used.

DI state — Byte 4, bit 2 is used to signal the state of the latch function's digital input.

DN state — Byte 4, bit 1 is used to signal a negative direction of movement.

UP state — Byte 4, bit 0 is used to signal a positive direction of movement.

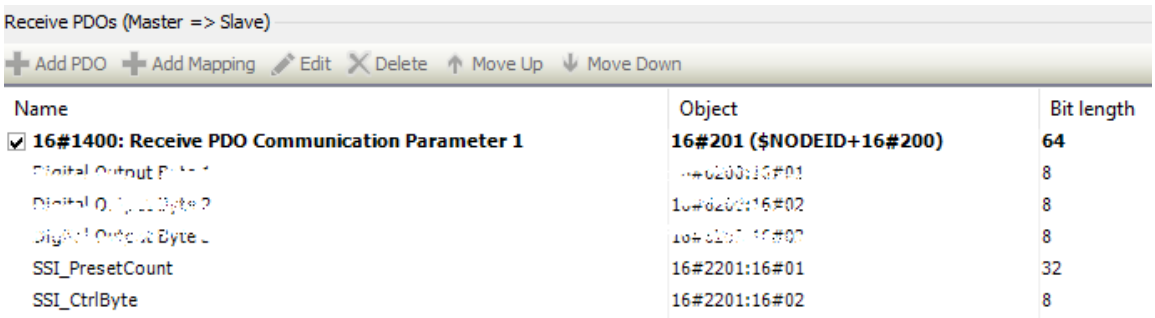
Comparator 1 state — Byte 5, bit 3 is used to signal the state of comparator 1 (please refer to 8.1.6).

Comparator 2 state — Byte 5, bit 2 is used to signal the state of comparator 2 (please refer to 8.1.6).

Loading function error — Byte 5, bit 1 is used to indicate that an error occurred when attempting to execute the loading function. To eliminate the error bits "load reference value 2" and "load reference value 1" (output byte 4, bits 0 and 1) are to be set to 0.

Loading function running — Byte 5, bit 0 is used to signal that the loading function is active.

- To manage the peripheral, the Fault Reset, the trigger activation and the Reset Latch of the position, it is necessary to map the RPD as shown in the following picture:



Assign the address to the IEC variables as shown in the following picture:

SSI_SetQuota		SSI_PresetCount	%QD3	DWORD
		SSI_CtrlByte	%QB16	BYTE
LoadRefValue1		Bit0	%QX16.0	BOOL
LoadRefValue2		Bit1	%QX16.1	BOOL
		Bit2	%QX16.2	BOOL
		Bit3	%QX16.3	BOOL
		Bit4	%QX16.4	BOOL
		Bit5	%QX16.5	BOOL
ResetLatch		Bit6	%QX16.6	BOOL
ResetFault		Bit7	%QX16.7	BOOL

Output space length: 6 bytes

	7	6	5	4	3	2	1	0	
Bytes 0–3	Preset count for reference value 1 or 2								16#2201.1
Byte 4	Reset fault	Reset latch function	Reserved	Reserved	Reserved	Reserved	Load reference value 2	Load reference value 1	16#2201.2
Byte 5	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	

Preset count for reference value Used to specify the count that will be used as a reference value by the comparator.

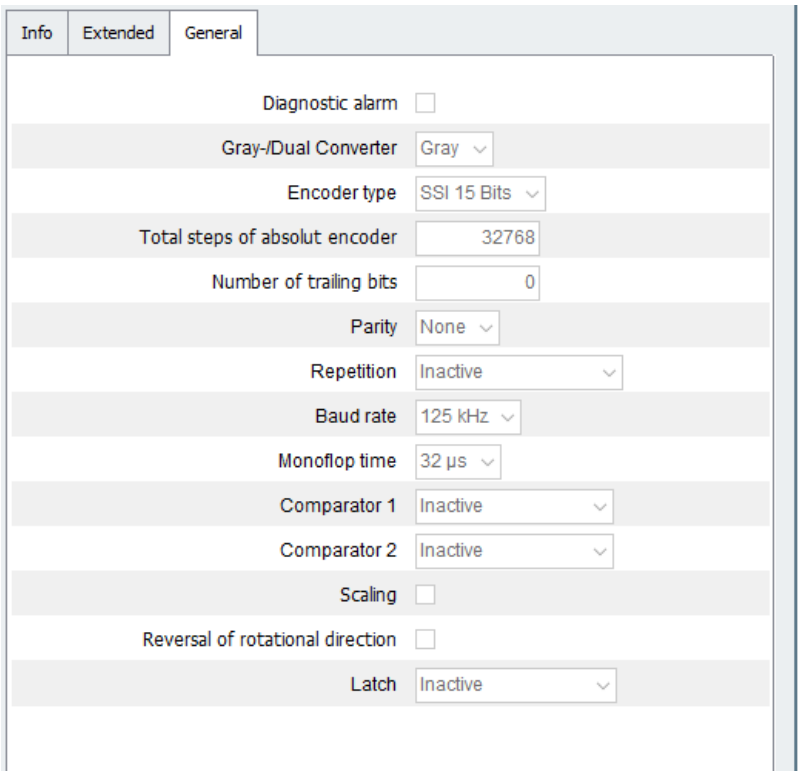
Reset fault This bit is used to reset the aforementioned faults/errors.

Reset latch function This bit is used to reset the latch function.

Load reference value 2 This bit is used to start transmitting the preset count (from bytes 0 to 3) to comparator 2.

Load reference value 1 This bit is used to start transmitting the preset count (from bytes 0 to 3) to comparator 1.

- To change the configuration of the Encoder_SSI acquisition module it is possible to proceed in two different ways:



1. Through ToolBOX:

   a. Create a project with all the I/O modules that are present.

   b. Enter the configuration tab of the SSI module and customize it:

      i. Saving the file EDS --> import it in CODESYS

      ii. Saving in the CANopen coupler the configuration just done

> **Note**
>
> Choose one of the two ways: parameter saving in the node or import through EDS file.

2. Through SDO:
   at the end of the module initialization phase it is possible, in CODESYS, to download a list of parameters in the node through SDO. Thanks to this procedure it is possible to modify the SSI board setting.

15	16#3001:16#01	Module Slot 1 Parameter 1	1	8
16	16#3001:16#02	Module Slot 1 Parameter 2	13	8
17	16#3001:16#03	Module Slot 1 Parameter 3	8192	32
18	16#3001:16#04	Module Slot 1 Parameter 4	0	8
19	16#3001:16#05	Module Slot 1 Parameter 5	1	8
20	16#3001:16#06	Module Slot 1 Parameter 6	17	8
21	16#3001:16#07	Module Slot 1 Parameter 7	129	8

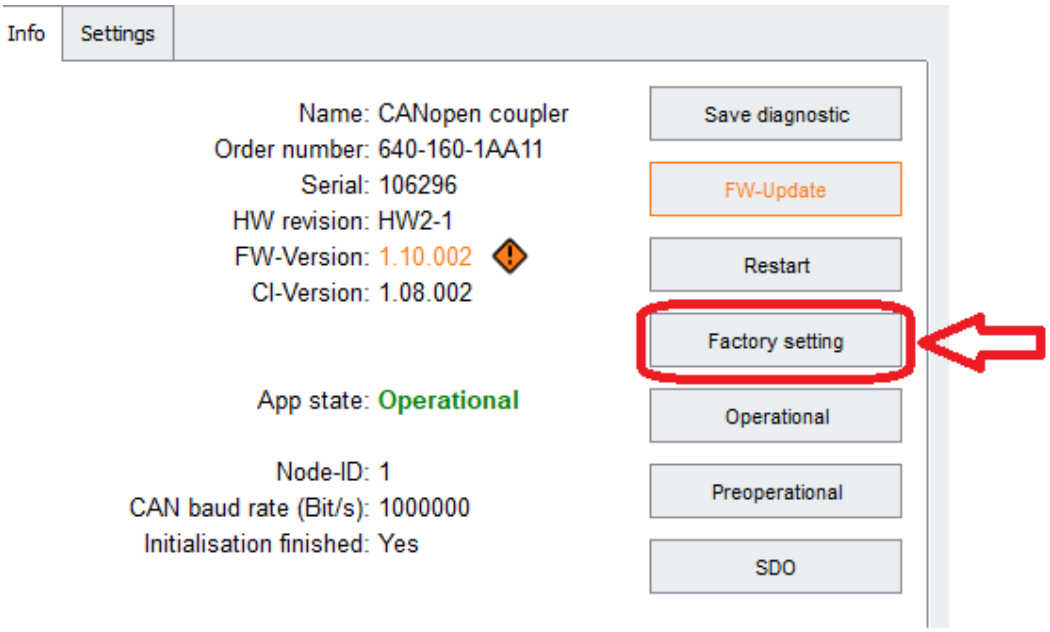
To understand how to set the various configuration parameters, refer to the following table:

Byte	7	6	5	4	3	2	1	0	
0	Operating mode								16#3001.1
1	Encoder value coding	Encoder value bit width							16#3001.2
2-5	Total number of encoder steps								16#3001.3
6	Multiple transmission		Parity		Number of appended bits				16#3001.4
7	Baud rate				Monostable multivibrator time period				16#3001.5
8	Comparator 2 mode				Comparator 1 mode				16#3001.6
9	Diagnosis alarm	Reserved	Reserved	Reserved	Normalization	Direction reversal	Latch		16#3001.7

Operating mode 1 = Operating mode 1
Encoder value coding 0 = Gray code; 1 = Natural binary code
Encoder value bit width 0 = No encoder
8 = 8 bits / 9 = 9 bits /…/15 = 15 bits/ … / 31 = 31 bits (with no parity bit)
Total number of encoder steps (16 – 2^31); (16,…, 32768,…, 2147483648)
Multiple transmission 0 = No multiple transmission
1–3 = Multiple transmission with 1–3 idle cycles
Parity bit 0 = None; 1 = Odd; 2 = Even
Number of appended bits 0 bits–15 bits
Baud rate/Clock frequency 0 = 125 kHz; 1 = 250 kHz; 2 = 500 kHz; 3 = 1 MHz;
4 = 1.5 MHz; 5 = 2 MHz
Monostable multivibrator time period 0 = 16 µs; 1 = 32 µs; 2 = 48 µs; 3 = 64 µs
Comparator 1/2 mode 0 = Disabled; 1 = Forward direction; 2 = Reverse direction; 3 = Both directions
Diagnosis alarm 0 = Disabled; 1 = Enabled
Normalization 0 = Disabled; 1 = Enabled
Direction reversal 0 = Disabled; 1 = Enabled
Latch 0 = Disabled; 1 = Rising edge at DI;
2 = Falling edge at DI; 3 = Both edges at DI

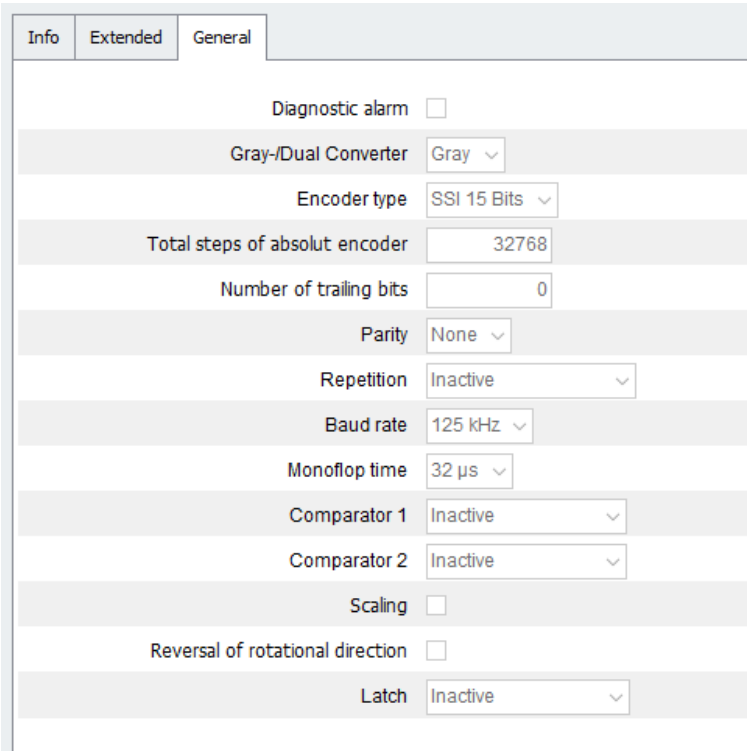
2.7. Troubleshooting

1. The position TPDO has not been sent:
   a. Check that the PDO mapping is set to 255
   b. Restore the default configuration of the TB20 Coupler Node through ToolBox



2. The latch of the position doesn't work and/or the position comparator doesn't activates:

   a. Check/modify the Module default settings



3. The encoder SSI of Eltra provides an input to reset the position. When the reset is made through this encoder input, the SSI acquiring module returns an error (probably due to a position "gap"). The error status of the module can be reset through the bit 7 of the CAN cell 16#2201.2.