Iso Virtual
VTB Application for IsoNs

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PROMAX Motion & Control

Rev. 2.0.2

1 PREFACE

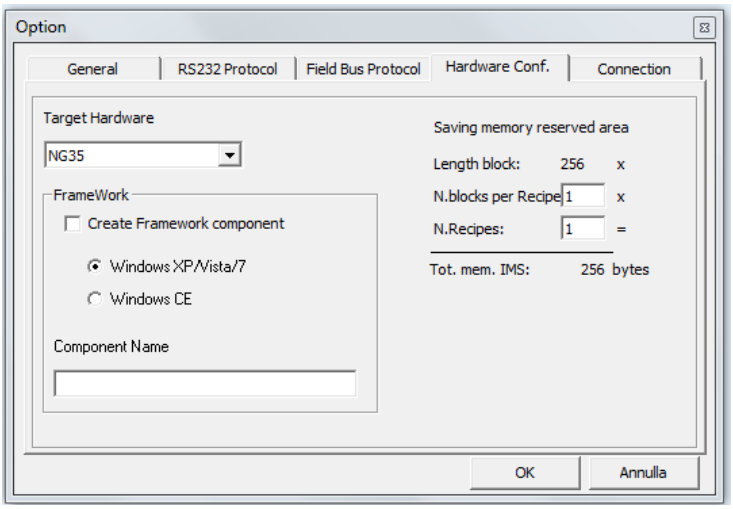
This manual describes the VTB application for IsoNs software.
The VTB application is the same for the IsoNs Windows Xp,7,8 and IsoNs Windwos CE

2 BASE COMPONENTS

To begin the application, is necessary to insert the following components in a new VTB Application:

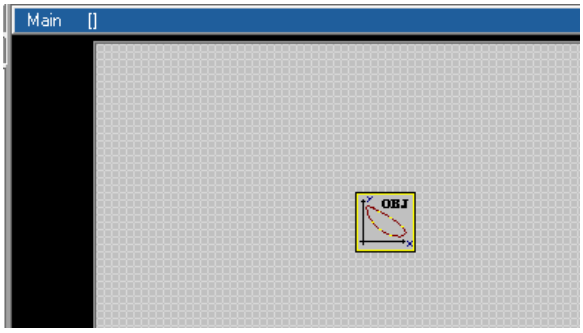
2.1 Select Hardware

Tools → Options → Hardware conf. (Ex NG35)

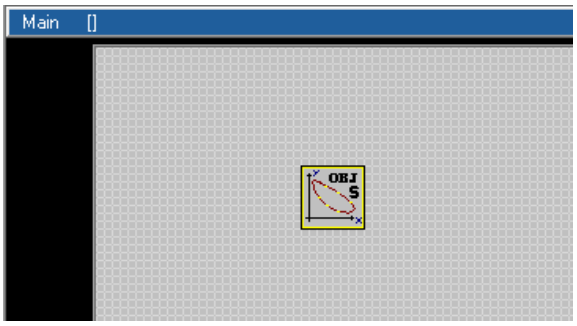


2.2 Insert Object *cobjinterpola*

Objects → Motor Control → cobjinterpola.vco



You can also insert the Obj interpola Rampe S
The difference is that in this object you can use the ISONS Parameter **JERK,** sinus acceleration ramps.



2.3 Properties setting of objinterpola

nome (name)	→	objinterpola1 (default)
N. Assi (Number of Axes)	→	Number of interpolated axes for this process
N.tratti (depth look ahead)	→	Look Ahead depth Default 16
Vper	→	Not change
Div. Vper	→	Not change
Abilita Arcto	→	Not change

Interpola1

Property | Events

Property	Value
Nome	Interpola1
Left	130
Top	75
N.assi	3
N.tratti	16
Vper	1024
Div. Vper	1024
Abilita arcto	1

Max DEPTH look ahead (this value must be multiple of 2 ex: 8 – 16 – 32 etc.)

NGQuark

2 Axes → 32
3 Axes → 16
4 Axes → 8

NGM EVO

2 Axes → 128
3 Axes → 128
4 Axes → 128

NG35

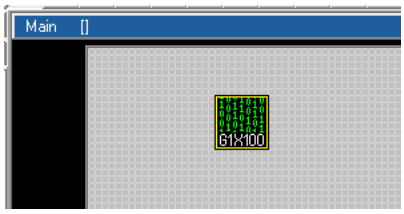
All → 2048

2.4 Insert Object Iso Virtual

Objects → IsoNs → - ISOVirtual - $Rev 2.3.0 (ISOVirtual - $Rev 1.1.9 is Obsolete)

The ISOVirtual light is used for **NGQ or NGQx** system only

This component uses little memory



2.5 Properties setting of IsoVirtual

nome (name)	→	ISOV1 (default)
Indice processo	→	Not change
Parametri Custom (Curtom Parameter)	→	See below

ISOV1

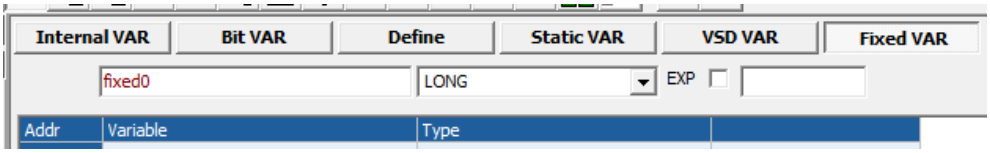
Property | Events

Property	Value
Nome	ISOV1
Left	95
Top	35
Indice processo	1
Parametri custom	0

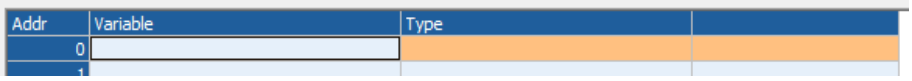
2.6 Insert a long fixed variable name fixed0

This variable is used to synchronized the IsoNs PC process

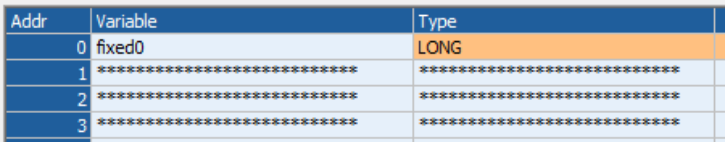
Objects → Fixed Var



Select the first address (click in the 0 position)



Press Add Button



3 Insert the Axes type

After insert the base components, is possible insert the axes

Choose the axes type

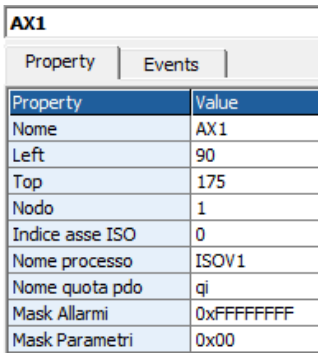
Objects → IsoNs → IsoCanOpen

Axes Type

IsoCanOpen

This contain all the CanOpen Driver

Typical set



Property	Value
Nome	AX1
Left	90
Top	175
Nodo	1
Indice asse ISO	0
Nome processo	ISOV1
Nome quota pdo	qi
Mask Allarmi	0xFFFFFFFF
Mask Parametri	0x00

Nome(Name) → Axis Name
Nodo (Node) → CanOpen Node
Indice Asse Iso (Index ISO Axis) → Indicates the ISONS Axis (0 -X , 1-Y , 2 – Z etc.)
Nome Processo (process Name) → Process Name with is associate ISOVIRTUAL OBJECT
Nome quota pdo (PDO CanOpen Name) → PDO CanOpen Name for interpolation mode

IsoPid.vco

This contain all the Analog driver +/- 10V with encoder loop Driver,closed loop for Stepper motor and CanOpen (with external encoder)

IsoPid- NG35 Filtro Digitale

Used for analog motor with +/-10 V and encoder for closed loop only for NG35 and NGIO expansion

Properties

Nome(Name)	→ Object IsoPid name
Indice Asse Iso (Index ISO Axis)	→ Indicates the ISO Axis (0 -X , 1-Y , 2 – Z etc.)
Nome Processo (process Name)	→ Process Name with is associate ISOVIRTUAL OBJECT
Indice Asse NGIO (Index NGIO Axis)	→ Indicates the channel of NGIO with is connect the driver 0 → Ch0 of First NGIO 1 → Ch1 of First NGIO 2 → Ch0 of Second NGIO 3 → Ch1 of second NGIO etc.
Kp,Ki,Kv,Err Saturazione,Divisore,Dir	→ PID Parameters set by IsoNs PC application
Enable Kp,Ki,Kd	→ Not change (True)
T0 Level	→ Level of encoder index 0 Low 1 High
Soglia ServoErr,Ritardo ServoErr	→ Parameters set by IsoNs PC application

NGPP- ***NG-PP + PID***

Used for closed loop in STEPPER MOTOR. Normally this object is used for high precision axes

Properties

Nome(Name)	→ Object IsoPid name
Indice Asse Iso (Index ISO Axis)	→ Indicates the ISO Axis (0 -X , 1-Y , 2 – Z etc.)
Nome Processo (process Name)	→ Process Name with is associate ISOVIRTUAL OBJECT
Indice Asse NGPP (Index NGPP Axis)	→ Indicates the channel of NGPP with is connect the driver 0 → Ch0 of First NGPP 1 → Ch1 of First NGPP 2 → Ch2 of First NGPP 3 → Ch3 of First NGPP 4 → Ch0 of Second NGPP 5 → Ch1 of Second NGPP Etc
Indice Asse NGIO (Index NGIO Axis)	→ Indicates the encoder channel input relative to axis 0 → Ch0 of First NGIO 1 → Ch1 of First NGIO 2 → Ch0 of Second NGIO 3 → Ch1 of second NGIO etc.
Kp,Ki,Kv,Err Saturazione,Divisore,Dir	→ PID Parameters set by IsoNs PC application
Enable Kp,Ki,Kd	→ not change (True)
T0 Level	→ Level of encoder index 0 Low 1 High
Soglia ServoErr,Ritardo ServoErr	→ Parameters set by IsoNs PC application
Max Freq,Scalav,Enable Out	→ Reserved

IsoDouble_Enc.vco

This contain all the Iso CanOpen with external encoder closed loop

CanOpen + PID

Used for external closed loop in CanOpen ESTUN DRIVES with interpolation mode. Normally this object is used for high precision axes

Properties

Nome(Name)	→ Object IsoPid name
Nodo(Node)	→ Driver Canopen Node
Indice Asse Iso (Index ISO NS Axis)	→ Indicates the ISO NS Axis (0 -X , 1-Y , 2 – Z etc.)
Nome Processo (process Name)	→ Process Name with is associate ISOVIRTUAL OBJECT
Nome quota pdo (PDO CanOpen Name)	→ PDO CanOpen Name for interpolation mode
Indice Asse NGIO (Index NGIO Axis)	→ Indicates the encoder channel input relative to axis 0 → Ch0 of First NGIO 1 → Ch1 of First NGIO 2 → Ch0 of Second NGIO 3 → Ch1 of second NGIO etc.
Kp,Ki,Kv,Err Saturazione,Divisore,Dir	→ PID Parameters set by IsoNs PC application
Enable Kp,Ki,Kd	→ Not change (True)
T0 Level	→ Level of encoder index 0 Low 1 High
Soglia ServoErr,Ritardo ServoErr	→ Parameters set by IsoNs PC application
Home Delay	→ Delay in Millisecond for home commando (typically 1000)

IsoPP.vco

This contain all the Axes STEP DIR open loop

IsoPP NGM EVO Passo-Passo

Used for the NGM EVO board and STEP DIR axes

Properties

Nome(Name) → Object IsoPid name
Indice Asse Iso (Index ISONS Axis) → Indicates the ISONS Axis (0 -X , 1-Y , 2 – Z etc.)
Nome Processo (process Name) → Process Name with is associate ISOVIRTUAL OBJECT
NGM EVO Channel → Indicates the channel of NGM EVO with is connect the driver

- 0 → Ch0
- 1 → Ch1
- 2 → Ch2
- 3 → Ch3

IsoPP NG35 (NG-PP) Passo-Passo

Used for the NG35+NGPP board and STEP DIR axes

Properties

Nome(Name) → Object IsoPid name
Indice Asse Iso (Index ISONS Axis) → Indicates the ISONS Axis (0 -X , 1-Y , 2 – Z etc.)
Nome Processo (process Name) → Process Name with is associate ISOVIRTUAL OBJECT
NG-PP Channel → Indicates the channel of NGPP with is connect the driver

- 0 → Ch0 first NGPP
- 1 → Ch1 first NGPP
- 2 → Ch2 first NGPP
- 3 → Ch3 first NGPP
- 4 → Ch0 second NGPP
- 5 → Ch1 second NGPP etc.

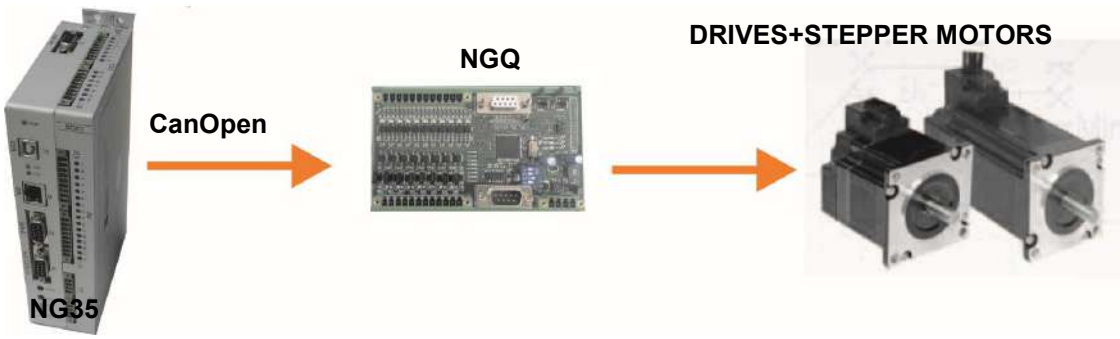
IsoPP_slave.vco

This contain all the Axes STEP DIR open loop slave mode.
In this mode, the master can control the slave axes step dir connect at a board via CanOpen
Ex:

NG35 Master
NGQ Slave CanOpen with step axes

IsoPP_slave (Do not Use NGM13)

Used for the NGQ board and STEP DIR axes in canopen



Properties

Nome(Name) → Object IsoPid name
Indice Asse Iso (Index ISONS Axis) → Indicates the ISONS Axis (0 -X , 1-Y , 2 – Z etc.)
Nome Processo (process Name) → Process Name with is associate ISOVIRTUAL OBJECT
NGM-13 Channel → Indicates the channel of NGQ with is connect the driver
0 → Ch0
1 → Ch1
2 → Ch2
3 → Ch3
Nodo(Node) → NGQ CanOpen node
Nome quota pdo (PDO CanOpen Name) → PDO CanOpen Name for interpolation mode

4 Insert the I/O

When the all axes are inserted, is possible insert the additional I/O module

Choose the I/O type

Objects → IsoNs → IsoCanOpen

Iso-IO.vco

This contain all the I/O module

Iso-IO – NG-IO - NGM-IO

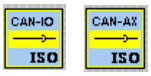
I/O on the NGIO -NGMIO (NG35 -NGM EVO expansion)

Properties

Nome(Name) → Object IsoPid name
Nome Processo (process Name) → Process Name with is associate ISOVIRTUAL OBJECT
Indice ISO-IO (16 bit) (ISO-IO INDEX) → Number of block I/O from 0 to 15
0 → Group 1 - I/O from 0 to 15
1 → Group 2 - I/O from 16 to 31
3 → Group 3 – I/O from 32 to 47 etc.
Indice NG-IO (NG-IO Index) → Indicates the number NGIO oer NGMIO expansion
0 → First NGIO-NGMIO on local bus
1 → Second NGIO-NGMIO on local bus
2 → Third NGIO-NGMIO on local bus Etc.
Hardware enable → Do not change (true)

Iso-IO - CAN-IO – CAN-AX - NGM-13 SLAVE

I/O on the NGQ or NGQx slave CanOpen



Properties

Nome(Name) → Object IsoPid name
Nodo(Node) → NGQ - NGQx -NGM EVOs CanOpen node
Allarme cfg (CFG Alarm) → Number of alarm generated when the board is in error
default 41
If you have more boards NGQ,NGQx,NGM EVOs , increase this value (42,43 etc)
Nome Processo (process Name) → Process Name with is associate ISOVIRTUAL OBJECT
Indice ISO-IO (16 bit) (ISO-IO INDEX) → Number of block I/O from 0 to 15
0 → Group 1 - I/O from 0 to 15
1 → Group 2 - I/O from 16 to 31
3 → Group 3 – I/O from 32 to 47 etc.
Hardware enable → Do not change (true)
Variabile Inp (Variable digital inputs PDO) → Name for PDO digital inputs
Variabile Out (Variable digital outputs PDO) → Name for PDO digital outputs

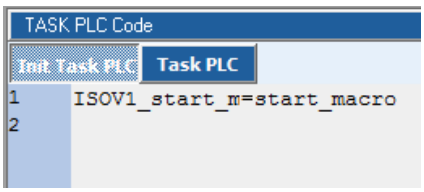
CAN-PPN,- EMC-IO Do not use obsolete

5 USE the M functions to internal the CNC

In this example the ISO VIRTUAL OBJECT NAME is ISOV1

1) Set the VTB pointer at function **ISOV1_start_m**

Insert the code in **INIT TASK PLC**



Start_macro is a function located in Main → Page Functions

This function is called automatically when the **M** function is invoked by PC

```
'-----------------------------------------------------------
'          start macro Function
'-----------------------------------------------------------
function start_macro() as void
        ISOV1_M_ack=1  ' set acknoleged for ISONS PC
        select ISOV1_M_cmd
                case 1
                        ' M Function 1
                case 2
                        ' M Function 2
                case 3
                        ' M Function 3
                case else
                        ISOV1_M_ack=0 ' M not found
        endselect
endfunction
```

5.1 Read the M parameters

IsoNs can write the M parameters from code:

IsoNs Code

```
$_PARM1=100
$_PARM2=130
M5
```

You can read in the VTB application this parameters in the following variables:

ISOV1_M_1 → $_PARM1 ISOV1_M_2 → $_PARM2
ISOV1_M_3 → $_PARM3 ISOV1_M_4 → $_PARM4
ISOV1_M_5 → $_PARM5 ISOV1_M_6 → $_PARM6
ISOV1_M_7 → $_PARM7 ISOV1_M_8 → $_PARM8
ISOV1_M_9 → $_PARM9 ISOV1_M_10 → $_PARM10

VTB Code

```
function start_macro() as void
        ISOV1_M_ack=1  ' set acknoleged for ISONS PC
        select ISOV1_M_cmd
                case 5
                        ' M Function 5
                        if ISOV1_M_1=100 && ISOV1_M_2=130
                                .....
                        endif
                        ISOV1_status_m_run=0 ' Free the IsoNs application
                case else
                        ISOV1_M_ack=0 ' M not found
        endselect
endfunction
```

5.2 Write the M parameters

The VTB application can be write the M parameters for IsoNs application:

IsoNs Code

```
M5
IF $_PARM1=100
        …
        …
END_IF
```

VTB Code

```
function start_macro() as void
        ISOV1_M_ack=1  ' set acknoleged for ISONS PC
        select ISOV1_M_cmd
                case 5
                        ' M Function 5
                        ISOV1_M_1=100
                        ISOV1_status_m_run=0 ' Free the IsoNs application
                case else
                        ISOV1_M_ack=0 ' M not found
        endselect
endfunction
```

5.3 M flags

In the VTB application, the M functions have the following flags:

ISOV1_M_ack	If set **True** (1) indicate to IsoNs PC application the M is performed If set **False** (0) the M is not found – Error
ISOV1_M_cmd	Contains the M number invoked by IsoNs PC application
ISOV1_status_m_run	The IsoNs Part Program PC applications, wait for this flag to value **False** (0) The value **True** (1) lock the part program When the time out is reached, an error is performed
ISOV1_status_m_stop	This flag is set **True** (1) from IsoNs when the **STOP REQUEST** is performed The VTB application must stop all internal M cycles in run and reset this flag

5.4 Example M3 M4 M5 start/stop Spindle

The IsoNs application can be write the spindle speed (S function) automatically in the VTB variable **ISOV1_generic(9)** (only if the IsoNs PC parameter **WR_SPD9**=1)
When in the Gcode is present the Function S **value**, automatically value is written in the **ISOV1_generic(9)** VTB array
The following sample refers to NG35 with NGIO for analog Spindle output

Note:
MAXDAC is a VTB define 2047 (Dac division)
MAXSPEEDSPINDLE is a VTB define the Rpm max of Spindle ex: 24000
CwOut is a bit of digital output for set the spindle in Cw mode
CCwOut is a bit of digital output for set the spindle in CCw mode
SpindleStart is a bit of digital output for Start Spindle
VelSpindle is a VTB long variable

IsoNs Code

```
S1200 // set to 1200 rpm
M3    // start spindle in CW mode
```

VTB Code

```
function Start_Macro() as char
        ISOV1_m_ACK=1
        select ISOV1_M_cmd
                case 3 ' start spindle in CW
                        Cw=true' set Cw mode
                        Ccw=false
                        ' calculate the Speed
                        VelSpindle=(ISOV1_generic(9)*MAXDAC)/MAXSPEEDSPINDLE
                        ng_dac(0,VelSpindle)      ' Update the Speed on Dac out
                        SpindleStart=true         ' Start spindle
                        ISOV1_status_m_run=0
                case 4 ' start spindle in CCW
                        Cw=false
                        Ccw=true ' set CCw mode
                        ' calculate the Speed
                        VelSpindle=(ISOV1_generic(9)*MAXDAC)/MAXSPEEDSPINDLE
                        ng_dac(0,VelSpindle)      ' Update the Speed on Dac out
                        SpindleStart=true         ' Start spindle
                        ISOV1_status_m_run=0
                case 5  ' Stop spindle
                        SpindleStart=false        ' Stop spindle
                        VelSpindle=0              ' set Speed to 0
                        ng_dac(0,VelSpindle)      ' Update the Speed on Dac out
                        ISOV1_status_m_run=0
                case else
                        ISOV1_m_ACK=0
        endselect
endfunction
```

6 Standard I/O

The following describes all virtual I/O exchange between VTB and application PC (the process is named ISOV1)

I/O	VTB VARIABLE	DESCRIPTION
External RUN request	**ISOV1_ext_run**	This variable is set True (1) the PLC cycle request the **RUN** to IsoNs application. Ex: when external **RUN** button is pressed **if input_ext_run = 1 && ISOV1_status_run=0** **' test external input run and not in run** **' request of run IsoNs PC application** **ISOV1_ext_run=1** **' the PC read this flag and RUN the part program** **endif**
External STOP request	**ISOV1_ext_stop**	This variable is set True (1) the PLC cycle request the **STOP** to IsoNs application. Ex: when external **STOP** button is pressed **if input_ext_stop = 1 && ISOV1_status_run=1** **' test external input stop and in run** **' request of stop IsoNs PC application** **ISOV1_ext_stop=1** **' the PC read this flag and STOP the part program** **endif**
External PAUSE request	**ISOV1_ext_pausa**	This variable is set True (1) the PLC cycle request the **PAUSE** to IsoNs application. Ex: when external **PAUSE** button is pressed **if input_ext_pausa = 1 && ISOV1_status_pausa=0** **' test external input pause and in not in pause** **' request of pause IsoNs PC application** **ISOV1_ext_pausa=1** **' the PC read this flag and PAUSE the part program** **endif**
Negative limit switch for X axis	**ISOV1_ext_fcm_x**	Copy in this bit the digital input where is connected the **Negative** limit switch for X axis. **ISOV1_ext_fcm_x=InputLimtXneg** Automatically the VTB application stops the PartProgram
Positive limit switch for X axis	**ISOV1_ext_fcp_x**	Copy in this bit the digital input where is connected the **Positive** limit switch for X axis. **ISOV1_ext_fcp_x=InputLimtXpos** Automatically the VTB application stops the PartProgram
Negative limit switch for Y axis	**ISOV1_ext_fcm_y**	Copy in this bit the digital input where is connected the **Negative** limit switch for Y axis. **ISOV1_ext_fcm_y=InputLimtYneg** Automatically the VTB application stops the PartProgram

Positive limit switch for Y axis	**ISOV1_ext_fcp_y**	Copy in this bit the digital input where is connected the **Positive** limit switch for Y axis. **ISOV1_ext_fcp_y=InputLimtYpos** Automatically the VTB application stops the PartProgram
Negative limit switch for Z axis	**ISOV1_ext_fcm_z**	Copy in this bit the digital input where is connected the **Negative** limit switch for Z axis. **ISOV1_ext_fcm_z=InputLimtzneg** Automatically the VTB application stops the PartProgram
Positive limit switch for Z axis	**ISOV1_ext_fcp_z**	Copy in this bit the digital input where is connected the **Positive** limit switch for Z axis. **ISOV1_ext_fcp_z=InputLimtZpos** Automatically the VTB application stops the PartProgram
Negative limit switch for A axis	**ISOV1_ext_fcm_a**	Copy in this bit the digital input where is connected the **Negative** limit switch for A axis. **ISOV1_ext_fcm_a=InputLimtAneg** Automatically the VTB application stops the PartProgram
Positive limit switch for A axis	**ISOV1_ext_fcp_a**	Copy in this bit the digital input where is connected the **Positive** limit switch for A axis. **ISOV1_ext_fcp_a=InputLimtApos** Automatically the VTB application stops the PartProgram
Negative limit switch for B axis	**ISOV1_ext_fcm_b**	Copy in this bit the digital input where is connected the **Negative** limit switch for B axis. **ISOV1_ext_fcm_b=InputLimtBneg** Automatically the VTB application stops the PartProgram
Positive limit switch for B axis	**ISOV1_ext_fcp_b**	Copy in this bit the digital input where is connected the **Positive** limit switch for B axis. **ISOV1_ext_fcp_b=InputLimtBpos** Automatically the VTB application stops the PartProgram
Negative limit switch for C axis	**ISOV1_ext_fcm_c**	Copy in this bit the digital input where is connected the **Negative** limit switch for C axis. **ISOV1_ext_fcm_c=InputLimtCneg** Automatically the VTB application stops the PartProgram

\Positive limit switch for C axis	**ISOV1_ext_fcp_c**	Copy in this bit the digital input where is connected the **Positive** limit switch for C axis. **ISOV1_ext_fcp_c=InputLimtCpos** Automatically the VTB application stops the PartProgram
Negative limit switch for U axis	**ISOV1_ext_fcm_u**	Copy in this bit the digital input where is connected the **Negative** limit switch for U axis. **ISOV1_ext_fcm_u=InputLimtUneg** Automatically the VTB application stops the PartProgram
Positive limit switch for U axis	**ISOV1_ext_fcp_u**	Copy in this bit the digital input where is connected the **Positive** limit switch for U axis. **ISOV1_ext_fcp_u=InputLimtUpos** Automatically the VTB application stops the PartProgram
Negative limit switch for V axis	**ISOV1_ext_fcm_v**	Copy in this bit the digital input where is connected the **Negative** limit switch for V axis. **ISOV1_ext_fcm_v=InputLimtVneg** Automatically the VTB application stops the PartProgram
Positive limit switch for V axis	**ISOV1_ext_fcp_v**	Copy in this bit the digital input where is connected the **Positive** limit switch for V axis. **ISOV1_ext_fcp_v=InputLimtVpos** Automatically the VTB application stops the PartProgram
Negative limit switch for W axis	**ISOV1_ext_fcm_w**	Copy in this bit the digital input where is connected the **Negative** limit switch for W axis. **ISOV1_ext_fcm_w=InputLimtwneg** Automatically the VTB application stops the PartProgram
Positive limit switch for W axis	**ISOV1_ext_fcp_w**	Copy in this bit the digital input where is connected the **Positive** limit switch for W axis. **ISOV1_ext_fcp_w=InputLimtWpos** Automatically the VTB application stops the PartProgram
Acq Sensor	**ISOV1_ext_acq**	Copy in this bit the digital input where is connected the sensor fro acqusitions **G102 function** **ISOV1_ext_acq=InputAcq** Automatically the VTB application stops the Axes when the input is set

Stop Axes	**ISOV1_stop_assi**	When this bit is set, the Gcode application is stopped This bit is alternative to **ISOV1_ext_stop** for example can be used for forcing stop axes by external events **if InputForceStop = 1 && ISOV1_status_run=1** **' Force a Stop axes** **ISOV1_stop_assi=1** **' the PC part program is stopped** endif
Stop Axes with emergency	**ISOV1_stop_emcy**	When this bit is set, the Gcode application is stopped and ALARM EMERGENCY is invoked All drives are dissbled **if InputForceEmcy = 1 && ISOV1_status_run=1** **' Force a Stop axes with EMCY** **ISOV1_stop_EMCY=1** **' the PC part program is stopped with error invoked** endif
Emergency Input	**ISOV1_ext_emcy**	Copy in this bit the digital input where is connected the **Emergency** general output (typical N.C.) **ISOV1_ext_emcy=!InputGeneralEmcy** Automatically the VTB application stops the PartProgram and a Alarm is invoked
Manual JOG X -	**ISOV1_ext_jogm_x**	Copy in this bit the digital input where is connected the **External Jog X - Button** **ISOV1_ext_jogm_x=JogExtXm** The Axis is moved in **NEGATIVE** direction at **VJOG** set by IsoNs application
Manual JOG X +	**ISOV1_ext_jogp_x**	Copy in this bit the digital input where is connected the **External Jog X + Button** **ISOV1_ext_jogp_x=JogExtXp** The Axis is moved in **POSITIVE** direction at **VJOG** set by IsoNs application
Manual JOG Y -	**ISOV1_ext_jogm_y**	Copy in this bit the digital input where is connected the **External Jog Y - Button** **ISOV1_ext_jogm_y=JogExtYm** The Axis is moved in **NEGATIVE** direction at **VJOG** set by IsoNs application
Manual JOG Y +	**ISOV1_ext_jogp_y**	Copy in this bit the digital input where is connected the **External Jog Y + Button** **ISOV1_ext_jogp_y=JogExtYp** The Axis is moved in **POSITIVE** direction at **VJOG** set by IsoNs application
Manual JOG Z -	**ISOV1_ext_jogm_z**	Copy in this bit the digital input where is connected the **External Jog Z - Button** **ISOV1_ext_jogm_z=JogExtZm** The Axis is moved in **NEGATIVE** direction at **VJOG** set by IsoNs application

Manual JOG Z +	**ISOV1_ext_jogp_z**	Copy in this bit the digital input where is connected the **External Jog Z + Button** **ISOV1_ext_jogp_z=JogExtZp** The Axis is moved in **POSITIVE** direction at **VJOG** set by IsoNs application
Manual JOG A -	**ISOV1_ext_jogm_a**	Copy in this bit the digital input where is connected the **External Jog A - Button** **ISOV1_ext_jogm_a=JogExtAm** The Axis is moved in **NEGATIVE** direction at **VJOG** set by IsoNs application
Manual JOG A +	**ISOV1_ext_jogp_a**	Copy in this bit the digital input where is connected the **External Jog A + Button** **ISOV1_ext_jogp_a=JogExtAp** The Axis is moved in **POSITIVE** direction at **VJOG** set by IsoNs application
Manual JOG B -	**ISOV1_ext_jogm_b**	Copy in this bit the digital input where is connected the **External Jog B - Button** **ISOV1_ext_jogm_b=JogExtBm** The Axis is moved in **NEGATIVE** direction at **VJOG** set by IsoNs application
Manual JOG B +	**ISOV1_ext_jogp_b**	Copy in this bit the digital input where is connected the **External Jog B + Button** **ISOV1_ext_jogp_b=JogExtBp** The Axis is moved in **POSITIVE** direction at **VJOG** set by IsoNs application
Manual JOG C -	**ISOV1_ext_jogm_c**	Copy in this bit the digital input where is connected the **External Jog C - Button** **ISOV1_ext_jogm_c=JogExtCm** The Axis is moved in **NEGATIVE** direction at **VJOG** set by IsoNs application
Manual JOG C +	**ISOV1_ext_jogp_c**	Copy in this bit the digital input where is connected the **External Jog C + Button** **ISOV1_ext_jogp_c=JogExtCp** The Axis is moved in **POSITIVE** direction at **VJOG** set by IsoNs application
Manual JOG U -	**ISOV1_ext_jogm_u**	Copy in this bit the digital input where is connected the **External Jog U - Button** **ISOV1_ext_jogm_u=JogExtUm** The Axis is moved in **NEGATIVE** direction at **VJOG** set by IsoNs application
Manual JOG U +	**ISOV1_ext_jogp_u**	Copy in this bit the digital input where is connected the **External Jog U + Button** **ISOV1_ext_jogp_u=JogExtUp** The Axis is moved in **POSITIVE** direction at **VJOG** set by IsoNs application

Manual JOG V -	**ISOV1_ext_jogm_v**	Copy in this bit the digital input where is connected the **External Jog V - Button** **ISOV1_ext_jogm_v=JogExtVm** The Axis is moved in **NEGATIVE** direction at **VJOG** set by IsoNs application
Manual JOG V +	**ISOV1_ext_jogp_v**	Copy in this bit the digital input where is connected the **External Jog V + Button** **ISOV1_ext_jogp_v=JogExtVp** The Axis is moved in **POSITIVE** direction at **VJOG** set by IsoNs application
Manual JOG W -	**ISOV1_ext_jogm_w**	Copy in this bit the digital input where is connected the **External Jog W - Button** **ISOV1_ext_jogm_w=JogExtWm** The Axis is moved in **NEGATIVE** direction at **VJOG** set by IsoNs application
Manual JOG W +	**ISOV1_ext_jogp_w**	Copy in this bit the digital input where is connected the **External Jog W + Button** **ISOV1_ext_jogp_w=JogExtWp** The Axis is moved in **POSITIVE** direction at **VJOG** set by IsoNs application
Manual JOG - Generic Axis	**ISOV1_ext_jogm**	This bit is used to move in manual mode negative direction a generic axis. The axis is set in the VTB variable **ISOV1_asse_man.** Copy the input jog button **ISOV1_ext_jogm=JogExtM** **ISOV1_asse_man=0 → X axis is set** **ISOV1_asse_man=1 → Y axis is set** **ISOV1_asse_man=2 → Z axis is set** **ISOV1_asse_man=3 → A axis is set** **ISOV1_asse_man=4 → B axis is set** **ISOV1_asse_man=5 → C axis is set** **ISOV1_asse_man=6 → U axis is set** **ISOV1_asse_man=7 → V axis is set** **ISOV1_asse_man=8 → W axis is set**
Manual JOG + Generic Axis	**ISOV1_ext_jogp**	This bit is used to move in manual mode positive direction a generic axis. The axis is set in the VTB variable **ISOV1_asse_man** (see above)**.** Copy the input jog button **ISOV1_ext_jogp=JogExtP**
Homing X Switch	**ISOV1_ext_fcz_x**	Copy in this bit the digital input where is connected the **Homing X Switch** **ISOV1_ext_fcz_x=InputHoming_X** This bit is used when the command axis home is performed

Homing Y Switch	**ISOV1_ext_fcz_y**	Copy in this bit the digital input where is connected the **Homing Y Switch** **ISOV1_ext_fcz_y=InputHoming_Y** This bit is used when the command axis home is performed
Homing Z Switch	**ISOV1_ext_fcz_z**	Copy in this bit the digital input where is connected the **Homing Z Switch** **ISOV1_ext_fcz_z=InputHoming_Z** This bit is used when the command axis home is performed
Homing A Switch	**ISOV1_ext_fcz_a**	Copy in this bit the digital input where is connected the **Homing A Switch** **ISOV1_ext_fcz_a=InputHoming_A** This bit is used when the command axis home is performed
Homing B Switch	**ISOV1_ext_fcz_b**	Copy in this bit the digital input where is connected the **Homing B Switch** **ISOV1_ext_fcz_b=InputHoming_B** This bit is used when the command axis home is performed
Homing C Switch	**ISOV1_ext_fcz_c**	Copy in this bit the digital input where is connected the **Homing C Switch** **ISOV1_ext_fcz_c=InputHoming_C** This bit is used when the command axis home is performed
Homing U Switch	**ISOV1_ext_fcz_u**	Copy in this bit the digital input where is connected the **Homing U Switch** **ISOV1_ext_fcz_u=InputHoming_U** This bit is used when the command axis home is performed
Homing V Switch	**ISOV1_ext_fcz_v**	Copy in this bit the digital input where is connected the **Homing V Switch** **ISOV1_ext_fcz_v=InputHoming_V** This bit is used when the command axis home is performed
Homing W Switch	**ISOV1_ext_fcz_W**	Copy in this bit the digital input where is connected the **Homing W Switch** **ISOV1_ext_fcz_w=InputHoming_W** This bit is used when the command axis home is performed

7 Status Word

The VTB application uses a Status Word for communicate to PC application the status.
Normally this status is set by internal VTB functions, but the application can read the status.
This Status Word is Bit mapped

VTB Bit Name	DESCRIPTION
ISOV1_status_run	Setted to **True** (1) when the IsoNs application run the GCODE
ISOV1_status_move	Setted to **True** (1) when the axes are in movements
ISOV1_status_pausa	Setted to **True** (1) when the IsoNs application is in PAUSE MODE
ISOV1_status_error	Setted to **True** (1) when the Alarm is present (EMCY drives, Emergency button etc.)
ISOV1_status_rzero	Setted to **True** (1) when one axis is during search homing Home command by IsoNs application
ISOV1_status_rsens	Setted to **True** (1) when the acquisition command is performed set to **False** (0) when the acquisition is finished G102 function by IsoNs application
ISOV1_status_para_upd	Setted to **True** (1) when the PC application updates the VTB internal parameters. This flag is not reset automatically, but when read, you can reset. In the some case is necessary when the PC updates the VTB parameters, perform the operations with the new parameters.
ISOV1_status_m_run	Setted to **True** (1) when the M cycle is in execution. Reset by M functions management, ***See chapter 5 - "USE the M functions to internal the CNC "***
ISOV1_status_m_stop	This flag is Setted **True** (1) from IsoNs when the **STOP REQUEST** is performed The VTB application must stop all internal M cycles in run and reset this flag
ISOV1_status_home_x	This flag is Setted **True** (1) when the relative axis has performed the homing procedure
ISOV1_status_home_y	
ISOV1_status_home_z	
ISOV1_status_home_a	
ISOV1_status_home_b	
ISOV1_status_home_c	
ISOV1_status_home_u	
ISOV1_status_home_v	
ISOV1_status_home_W	
ISOV1_status_enable_x	This flag is Setted **True** (1) when the relative axis is enabled or **False** if is Disabled
ISOV1_status_enable_y	
ISOV1_status_enable_z	
ISOV1_status_enable_a	
ISOV1_status_enable_b	
ISOV1_status_enable_c	
ISOV1_status_enable_u	
ISOV1_status_enable_v	
ISOV1_status_enable_w	

8 PLC I/O management

The VTB application can use the PLC I/O in very simple mode.
First, is necessary, load in the application the relative I/O object (***See chapter 4 - "Insert the I/O")***
The VTB application use e definition Bit to management the I/O.
The max number of I/O is:

256 Digital Inputs
256 Digital outputs

The I/O are a blocks of 16 bit
If is used the NGQ-NGQx module with 11 digital Inputs, you can not use the Inputs 11 to 15 (or relative to block 27 to 31 etc.) because these are not present in the board NGQ-NGQx
You can not use the outputs 8 to 15 (or relative to block 24 to 31 etc)

If is used the NGIO-NGMIO module with 14 digital Outputs, you can not use the Outputs 14,15 (or relative to block 30,31 etc) because these are not present in the board NGIO-NGMIO

You can use always the outputs 14,15 for internal flag

8.1 Defined bit digital Inputs

ISOV1.inp0 → Digital Inputs 1
ISOV1.inp1 → Digital Inputs 2
ISOV1.inp2 → Digital Inputs 3
.
ISOV1.inp255 → Digital Inputs 255

8.2 Defined bit digital Outputs

ISOV1.out0 → Digital Outputs 1
ISOV1.out1 → Digital Outputs 2
ISOV1.out2 → Digital Outputs 3
.
ISOV1.out255 → Digital Outputs 255

Ex:

```
if ISOV1.inp0 = 1 && ISOV1.inp1=0
        ISOV1.out0=true 'set out 0
endif
```

9 FEED External Override

By VTB application is possible management a potentiometer for Axes feed control.
The potentiometer must be connected at analog input.
The Variable is :
ISOV1_vper

The value range is 0 to 1024, you can copy the analog input directly in this variable

Ex:
The analog input is Number 1
Insert this code in main cycle or task plc cycle

```
ISOV1_vper=ng_adc(0)
```

If is used the NGM EVO,NGQ,NGQx analog inputs (12 bit – range from 0 to 4095)
divide by 4 the **ISOV1_vper**

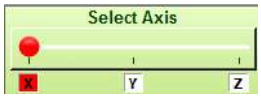
```
ISOV1_vper=ng_adc(0)
ISOV1_vper=ISOV1_vper/4
```

10 Electronic HandWheel

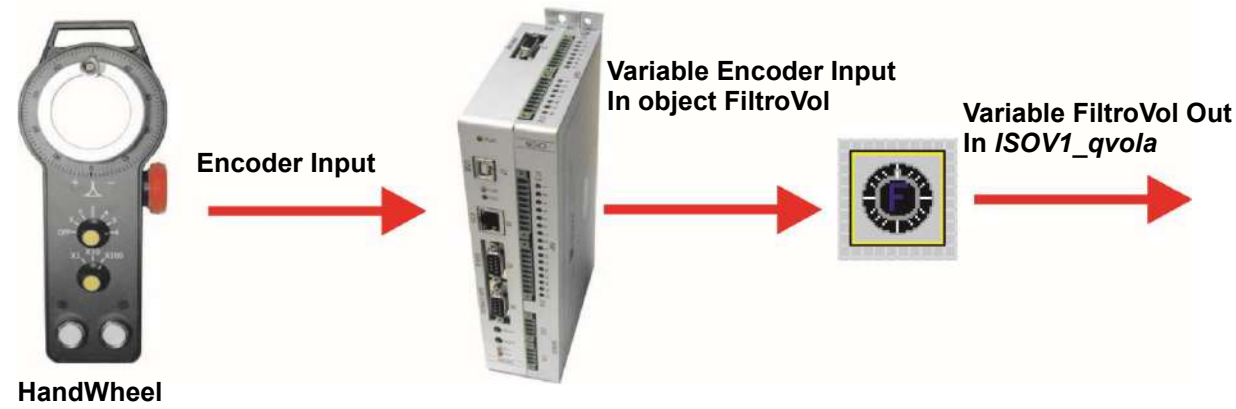
This chapter describe the management Electronic HandWheel.

VTB Variable

ISOV1_soft_sel_man → If Set at value 1 the Axes Virtual Selector on PC is Enabled
→ If Set at value 0 Virtual Selector on PC is Disabled



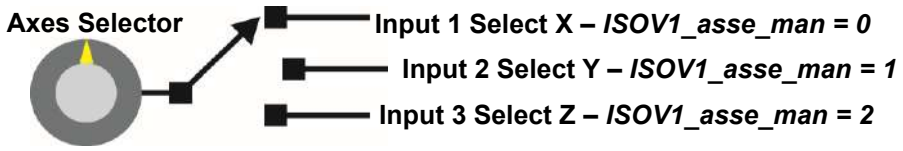
ISOV1_qvola → Electronic HandWheel incremental encodr value
Generally this value is got by a FiltroVol Object, because this Object smoothing the handwheel pulse.



ISOV1_asse_man → Select the axes to move with Handwheel

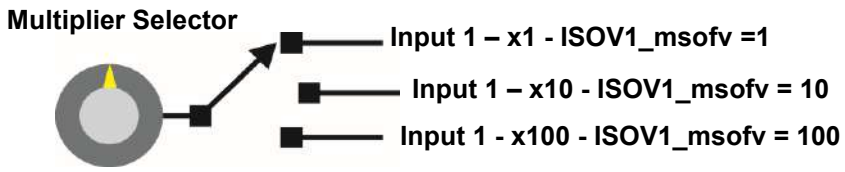
0 → **X**	1 → **Y**	2 → **Z**
3 → **A**	4 → **B**	5 → **C**
6 → **U**	7 → **V**	8 → **W**

Generally this Variable is got by digital input from selector Axis
Only if the variable **ISOV1_soft_sel_man=0**



ISOV1_soft_sel_man → If Set to **0**, the **ISOV1_asse_man** is set by VTB code
If Set to **1**, The **ISOV1_asse_man** is set by IsoNs PC (virtual selector)

ISOV1_msofv → Set the multiplier for pulse (generally x1 x10 x100)
If **ISOV1_soft_sel_man =1** This variable is set by IsoNs PC
This Variable is combined with parameter IsoNs **DSOFV_X**, **_Y** etc
The DSOFV_ generally contains the pulse encoder for revolution multiplier 4
Ex: i/g Handwheel=100 DSOFV_=400



VTB Example

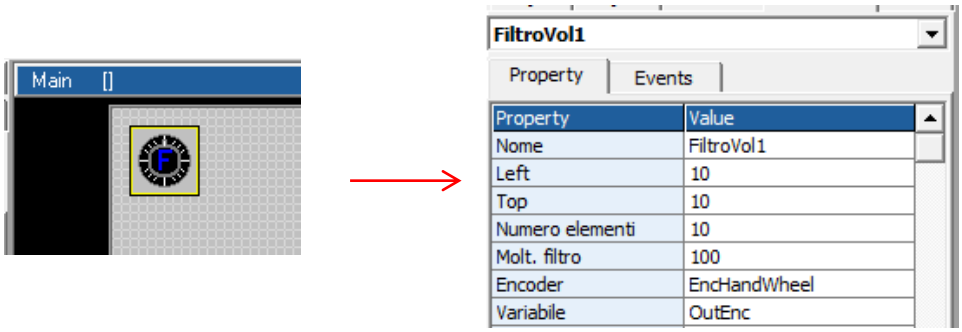
The system is NG35+NGIO with following connection:

Ch0 Encoder → Encoder HandWheel
Digital Input 0 → Selector Axis X
Digital Input 1 → Selector Axis Y
Digital Input 2 → Selector Axis Z
Digital Input 3 → Selector Multiplier x1
Digital Input 4 → Selector Multiplier x10
Digital Input 5 → Selector Multiplier x100
Digital Input 6 → Input JOG Positive
Digital Input 7 → Input JOG Negative

Variable used:

EncHandWheel → Long
OutEnc → Long
Input → Long

Insert the Obiect FiltroVol in Main and set the parameters :
Objects→Motor Control→CFiltrovol.vco



Insert the following code in **Init Task Plc:**

```
ISOV1_soft_sel_man=0    ' Enable the internal VTB selector
FiltroVol1.enable=1     ' Enable filter
```

Insert the following code in **Task Plc:**

```
'-------------------------------------------------------
' Read the HandWheel Encoder,
' Put in EncHandWheel Variable
' Note: the () set the pointer – Very important
'-------------------------------------------------------
ng_enc(0,EncHandWheel())

'-------------------------------
'Set the multiplier
'-------------------------------
if ISOV1.inp3           'multiplier x1
        ISOV1_msofv=1
endif
if ISOV1.inp4           'multiplier x10
        ISOV1_msofv=10
endif
if ISOV1.inp5           'multiplier x100
        ISOV1_msofv=100
endif
```

```
'--------------------------------
'Set the Axis
'--------------------------------
if ISOV1.inp0                   'Axis X
        ISOV1_asse_man=0
endif
if ISOV1.inp1                   'Axis Y
        ISOV1_asse_man=1
endif
if ISOV1.inp2                   'Axis Z
        ISOV1_asse_man=2
endif

'-----------------------------------------
'Update the Handwheel from FiltroVol Object
'-----------------------------------------
if !ISOV1_status_run
        FiltroVol1.enable=true          'enable the handwheel filter
        ISOV1_qvola=OutEnc
else
        FiltroVol1.enable=false         'disable the handwheel filter
        ISOV1_qvola=0
endif

'--------------------
'Update the Jog Input
'--------------------
ISOV1_ext_jogp=ISOV1.inp6
ISOV1_ext_jogm=ISOV1.inp7
```

11 Machine Parameters

With VTB application you can read and write the machine Parameters.
Generally this function is not necessary, because the machine parameters are managed from IsoNs VTB application system, but if you want read or write the parameters this is possible.

All parameters are in the array **ISOV1_PARA**
The array dimension depends of Axes number.
All parameters are type LONG (32 bit signed)

ISOV1_PARA array organization

0-49 General Parameters	**50-99 Axis X Parameters**	**100-149 Axis Y Parameters**	**….**

11.1 General Parameters

Idx ISOV1_Para	Name	Description
0	**VRIPOS**	Axes Velocity repositioning after Pause (if in IsoNs is not present the Macro **GOPAUSE**)
1	**SGLP**	Threshold Edge
2	**SGLR**	Threshold of Arc error
3	**ACQ_MODE**	Acquisition type **0 → Speed** **1 → step by step**
4	**ACQ_VEL**	Feed Acquisition
5	**ACQ_STEP**	Step length for acquisition type 1
6	**ACQ_TIME**	Time for acquisition type 1
7	**ACC_QSTOP**	Acceleration for Quick stop
8	**JERK**	Jerk acceleration
9	**NOSHORT**	Remove the short linee
Free 10 to 49	……	…….

11.2 Axes X Parameters

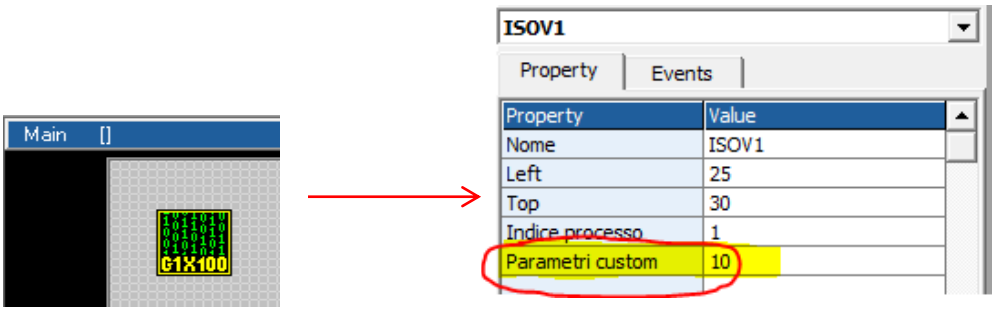
(50 x blocks)

Idx ISOV1_Para	Name	Description
50	VJOG	JOG Feed Axis (mm/min)
51	ACC_JOG	Acceleration JOG Axis (count)
52	LIMITE_N_	Negative Software Limit Axis
53	LIMITE_P_	Positive Software Limit Axis
54	DSOFV	Jog Handwheel Divisor Axis
55	RZERO_MODE	Homing mode
56	RZERO_OFFSET	Homing Offset
57	RZERO_PRESET	Homing Preset
58	RZERO_VEL	Homing High Feed Axis
59	RZERO_VELF	Homing Low Feed Axis
60	RZERO_ACC	Homing Acceleration Axis
61	MSOF	Number Count/Revolution Axis
62	DSOF	Distance for One Revolution Encoder Axis
63	GANTRY	Gantry Axis
64	SGL_3D	Edge Threshold Axis 3D
65	BACKSLASH	Axis Backslash (um)
66	TBCK	Axis Time Backslash (TAU)
67	TSHF	Speed Shift
Free 67 to 79		
The following Parameters are present only for analog +/- 10V drives		
80	PID_KP	(Proportional Costant) Axis
81	PID_KI	(Integral Costant) Axis
82	PID_KV	(Feed Costant) Axis
83	PID_I_LIMIT	IL (Integration Limit) Axis
84	PID_DIV	PID Magnitude Axis
85	PID_SERVO	Servo Error Axis (um)
86	PID_TIME_SERVO	During Time Servo Error Axis
87	PID_DIR	Analog Direction Axis
88	PID_OFFS_ANA	Analog Digital Offset Axis
Free 88 to 99	……	…….
100 to 149 Axis Y parameters		
150 to 199 Axis Z parameters (if present)		
200 to 249 Axis A parameters (if present)		
250 to 299 Axis B parameters (if present)		
300 to 349 Axis C parameters (if present)		
350 to 399 Axis U parameters (if present)		
400 to 449 Axis V parameters (if present)		
450 to 499 Axis W parameters (if present)		

11.3 Custom Parameters

With IsoNs PC Application is possible declare a Custom machine Parameters.
This parameters can be read by VTB application.

First is necessary declare in the Object ISOVIRTUAL (ISOV1) the MAX NUMBER OF CUSTOM PARAMETERS in the application.



The Custom parameters are available at the following address:

ISOV1_PARA(ISOV1_P_CUSTOM)

Where **ISOV1_P_CUSTOM** is a define automatically calculate by VTB compiler
At this address is present the first custom parameter configured:
the second is present in **ISOV1_PARA(ISOV1_P_CUSTOM+1) etc.**
The real value is:

ISOV1_P_CUSTOM =50 * Axes Number + 50

Ex: 4 Axes configured and 3 custom parameters

CUSTOM_1	Custom parameter 1	100
CUSTOM_2	Custom parameter 2	100
CUSTOM_3	Custom parameter 3	100

The **CUSTOM_1** must have Address **250**
The **CUSTOM_2** must have Address **251**
The **CUSTOM_3** must have Address **252**

CustomPar1=ISOV1_PARA(ISOV1_P_CUSTOM)
CustomPar2=ISOV1_PARA(ISOV1_P_CUSTOM+1)
CustomPar3=ISOV1_PARA(ISOV1_P_CUSTOM+2)

12 Alarms bit mapped

All alarms are bit mapped. If the application, sect the relative bit, the alarm is activated.
Generally these alarms are activated by system IsoNs VTB automatically when the event is occurred.
The application can read and write the single bit.

Bit Name	Alarm Description
ISOV1.allarm0	X Negative Limit Reached
ISOV1.allarm1	X Positive Limit Reached
ISOV1.allarm2	Y Negative Limit Reached
ISOV1.allarm3	Y Positive Limit Reached
ISOV1.allarm4	Z Negative Limit Reached
ISOV1.allarm5	Z Positive Limit Reached
ISOV1.allarm6	A Negative Limit Reached
ISOV1.allarm7	A Positive Limit Reached
ISOV1.allarm8	B Negative Limit Reached
ISOV1.allarm9	B Positive Limit Reached
ISOV1.allarm10	C Negative Limit Reached
ISOV1.allarm11	C Positive Limit Reached
ISOV1.allarm12	U Negative Limit Reached
ISOV1.allarm13	U Positive Limit Reached
ISOV1.allarm14	V Negative Limit Reached
ISOV1.allarm15	V Positive Limit Reached
ISOV1.allarm16	W Negative Limit Reached
ISOV1.allarm17	W Positive Limit Reached
ISOV1.allarm18	X SERVO-EMERGENCY
ISOV1.allarm19	Y SERVO-EMERGENCY
ISOV1.allarm20	Z SERVO-EMERGENCY
ISOV1.allarm21	A SERVO-EMERGENCY
ISOV1.allarm22	B SERVO-EMERGENCY
ISOV1.allarm23	C SERVO-EMERGENCY
ISOV1.allarm24	U SERVO-EMERGENCY
ISOV1.allarm25	V SERVO-EMERGENCY
ISOV1.allarm26	W SERVO-
ISOV1.allarm27	General EMERGENCY Activated
ISOV1.allarm28	Acquisition Error
ISOV1.allarm29	Short line found (active if the NO_SHORT=2)
ISOV1.allarm30	Free
ISOV1.allarm31	Free
ISOV1.allarm32	X Axis Configuration error (CanOpen or Ethercat)

ISOV1.allarm32	**Y Axis Configuration error (CanOpen or Ethercat)**
ISOV1.allarm34	**Z Axis Configuration error (CanOpen or Ethercat)**
ISOV1.allarm35	**A Axis Configuration error (CanOpen or Ethercat)**
ISOV1.allarm36	**B Axis Configuration error (CanOpen or Ethercat)**
ISOV1.allarm37	**C Axis Configuration error (CanOpen or Ethercat)**
ISOV1.allarm38	**U Axis Configuration error (CanOpen or Ethercat)**
ISOV1.allarm39	**V Axis Configuration error (CanOpen or Ethercat)**
ISOV1.allarm40	**W Axis Configuration error (CanOpen or Ethercat)**
ISOV1.allarm41	**Free**
ISOV1.allarm42	**Free**
….	
ISOV1.allarm255	**Free**

13 CanOpen Alarms

The management of Canopen alarms (EMCY-OBJ), is performed directly by Axis object loaded.
When the alarm is present, the single bit is set:
X SERVO-EMERGENCY
Y SERVO-EMERGENCY
Y SERVO-EMERGENCY
etc
In the **ISOV1_last_allarm(node axis)** you can find the CanOpen Code error

14 Examples

Following VTB application examples

14.1 NGQ-NGM EVO 3 Axes Step/Dir

Link RS32 on COM1 NGQ-NGM EVO

Digital Inputs

Digital Input 1 → **Switch Home X (N.C.)**
Digital Input 2 → **Switch Home Y (N.C.)**
Digital Input 3 → **Switch Home Z (N.C.)**
Digital Input 4 → **GENERAL EMERGENCY INPUT (N.C.)**
Digital Input 5 → **Button JOG X+ (N.O.)**
Digital Input 6 → **Button JOG X- (N.O.)**
Digital Input 7 → **Button JOG Y+ (N.O.)**
Digital Input 8 → **Button JOG Y- (N.O.)**
Digital Input 9 → **Button JOG Z+ (N.O.)**
Digital Input 10 → **Button JOG Z- (N.O.)**

Analog Inputs

Analog Inputs 1 → **Feed Potentiometer Override Axes**

For enable this Override, you must select the Enable the "Ext OW" from IsoNs Interface"

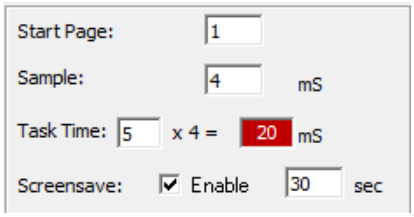
Digital Outputs

Digital outputs 1 → **X axis enabled**
Digital outputs 2 → **Y axis enabled**
Digital outputs 3 → **Z axis enabled**
Digital outputs 4 → **CNC Error**

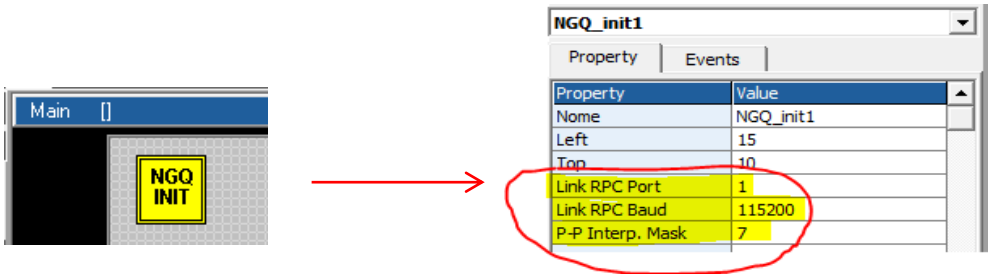
Axes Outputs

Step/Dir Ch 1 → **X**
Step/Dir Ch 2 → **Y**
Step/Dir Ch 3 → **Z**

1) Open new project VTB and select NGQ hardware or NGM EVO (the example is on NGQ)
Select 4 Ms sample



2) Set link on COM1(or COM2) NGQ-NGM EVO and PP Interp mask on 7 (X Y Z channel enabled)



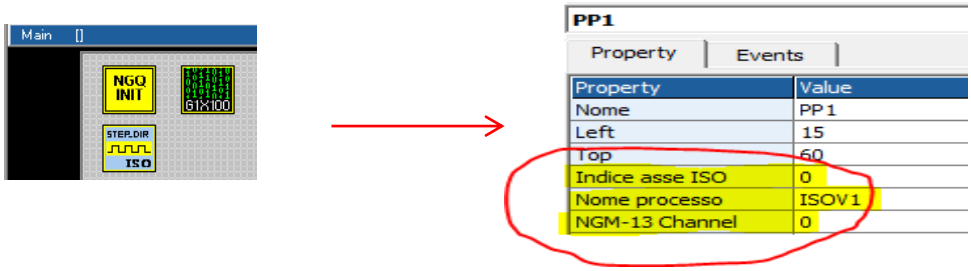
3) Insert object ISOVIRTUAL and set the default properties

Objects → Iso_Ns → IsoVirtual.vco

4) Insert Axis X ISOPP (The NGM EVO object is the same of the NGQ)

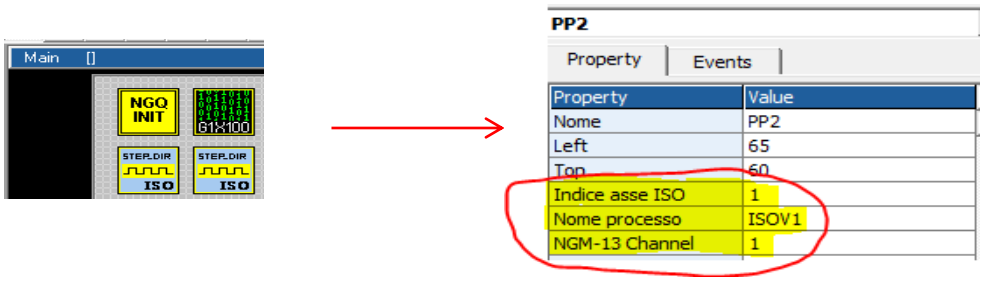
Objects → Iso_Ns → IsoPP.vco

5) Set the following properties



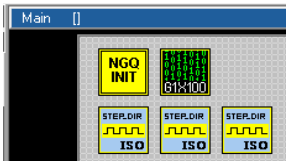
6) Insert Axis Y ISOPP and set the following properties

Objects → Iso_Ns → IsoPP.vco



7) Insert Axis Z ISOPP and set the following properties

Objects → Iso_Ns → IsoPP.vco



PP3

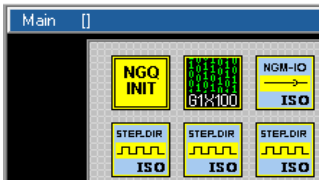
Property | Events

Property	Value
Nome	PP3
Left	115
Top	60
Indice asse ISO	2
Nome processo	ISOV1
NGM-13 Channel	2

8) Insert the ISO I/O

Objects → Iso_Ns → Iso-IO.vco

8) Set the following properties



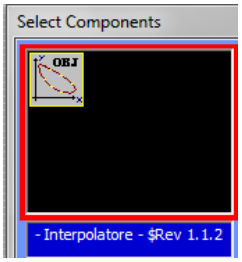
PP3

Property | Events

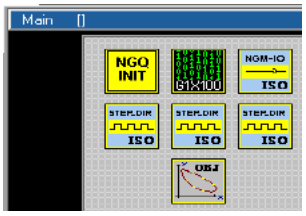
Property	Value
Nome	PP3
Left	115
Top	60
Indice asse ISO	2
Nome processo	ISOV1
NGM-13 Channel	2

9) Insert the object ObjInterpola

Objects → Motor Control → CobjInterpola.vco



10) Set the following properties



Interpola1

Property | Events

Property	Value
Nome	Interpola1
Left	65
Top	110
N.assi	3
N.tratti	16
Vper	1024
Div. Vper	1024
Abilita arcto	1

11) Insert in the Task main (or task plc) the code management

Init Task PLC | Task PLC

```
'-------------------------------
' Read The Analog Inputs
' For override control
'-------------------------------
ISOV1_vper=ng_adc(0)
'-------------------------------
' Test Digital Inputs
'-------------------------------
ISOV1_ext_fcz_x=!ISOV1.inp0  ' Homing switch X
ISOV1_ext_fcz_y=!ISOV1.inp1  ' Homing switch Y
ISOV1_ext_fcz_z=!ISOV1.inp2  ' Homing switch Z
ISOV1_ext_emcy=!ISOV1.inp3   ' General emergency
ISOV1_ext_jogp_x=ISOV1.inp4  ' JOG X +
ISOV1_ext_jogm_x=ISOV1.inp5  ' JOG X -
ISOV1_ext_jogp_y=ISOV1.inp6  ' JOG Y +
ISOV1_ext_jogm_y=ISOV1.inp7  ' JOG Y -
ISOV1_ext_jogp_z=ISOV1.inp8  ' JOG Z +
ISOV1_ext_jogm_z=ISOV1.inp9  ' JOG Z -
'-------------------------------
' Test Digital Outputs
'-------------------------------
ISOV1.out0=ISOV1_status_enable_x     ' X enabled
ISOV1.out1=ISOV1_status_enable_y     ' Y enabled
ISOV1.out2=ISOV1_status_enable_z     ' Z enabled
ISOV1.out2=ISOV1_status_error        ' CNC error
```


```
'-------------------------------
' Read The Analog Inputs
' For override control
'-------------------------------
ISOV1_vper=ng_adc(0)
'-------------------------------
' Test Digital Inputs
'-------------------------------
ISOV1_ext_fcz_x=!ISOV1.inp0      ' Homing switch X
ISOV1_ext_fcz_y=!ISOV1.inp1      ' Homing switch Y
ISOV1_ext_fcz_z=!ISOV1.inp2      ' Homing switch Z
ISOV1_ext_emcy=!ISOV1.inp3       ' General emergency
ISOV1_ext_jogp_x=ISOV1.inp4      ' JOG X +
ISOV1_ext_jogm_x=ISOV1.inp5      ' JOG X -
ISOV1_ext_jogp_y=ISOV1.inp6      ' JOG Y +
ISOV1_ext_jogm_y=ISOV1.inp7      ' JOG Y -
ISOV1_ext_jogp_z=ISOV1.inp8      ' JOG Z +
ISOV1_ext_jogm_z=ISOV1.inp9      ' JOG Z -
'-------------------------------
' Test Digital Outputs
'-------------------------------
ISOV1.out0=ISOV1_status_enable_x     ' X enabled
ISOV1.out1=ISOV1_status_enable_y     ' Y enabled
ISOV1.out2=ISOV1_status_enable_z     ' Z enabled
ISOV1.out2=ISOV1_status_error        ' CNC error
```

14.2 NG35+2xNGIO Axes 3 Analog +/- 10V and handwheel

Link ETHERNET IP: “10.0.0.80” (default)

The follwing project used a handwell connected to Ch 2 second NGIO encoder inputs , selector for JOG AXES and spindle.

To enable a selector is necessary inserti in the init TASK PLC the following code:

ISOV1_soft_sel_man=0 **' Enable the internal VTB selector**

Digital Inputs

Digital Input 1 **→ Switch Home X (N.C.)**
Digital Input 2 **→ Switch Home Y (N.C.)**
Digital Input 3 **→ Switch Home Z (N.C.)**
Digital Input 4 **→ GENERAL EMERGENCY INPUT (N.C.)**
Digital Input 5 **→ Selector JOG X (N.O.)**
Digital Input 6 **→ Selector JOG Y (N.O.)**
Digital Input 7 **→ Selector JOG Z (N.O.)**
Digital Input 8 **→ Button JOG - (N.O.)**
Digital Input 9 **→ Button JOG + (N.O.)**
Digital Input 10 **→ Handwheel Speed x1**
Digital Input 11 **→ Handwheel Speed x10**
Digital Input 12 **→ Handwheel Speed x100**

Analog Inputs

Analog Inputs 1 **→ Feed Potentiometer Override Axes**

For enable this Override, you must select the Enable the “Ext OW” from IsoNs Interface”

Digital Outputs

Digital outputs 1 **→ X axis enabled**
Digital outputs 2 **→ Y axis enabled**
Digital outputs 3 **→ Z axis enabled**
Digital outputs 4 **→ CNC Error**
Digital outputs 5 **→ Spindle start/stop**
Digital outputs 6 **→ Spindle CW (M3)**
Digital outputs 7 **→ Spindle CCW (M4)**

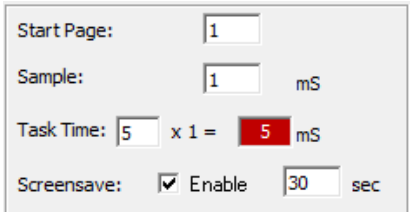
Axes Inputs

Encoder Ch 1 (first NGIO) **→ X encoder feedback**
Encoder Ch 2 (first NGIO) **→ Y encoder feedback**
Encoder Ch 1 (second NGIO) **→ Z encoder feedback**
Encoder Ch 2 (second NGIO) **→ HandWheel encoder**

Axes Outputs

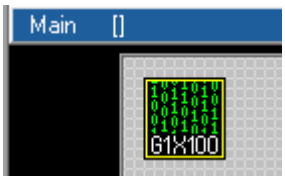
Analog out 1 (first NGIO) **→ X Speed +/-10V**
Analog out 2 (first NGIO) **→ Y Speed +/-10V**
Analog out 1 (first NGIO) **→ Z Speed +/-10V**
Analog out 2 (first NGIO) **→ SPEED Spindle**

1) Open new project VTB and select NG35
Select 1 Ms sample



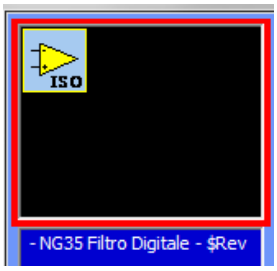
2) Insert object ISOVIRTUAL and set the default properties

Objects → Iso_Ns → IsoVirtual.vco

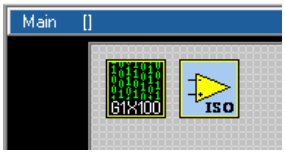


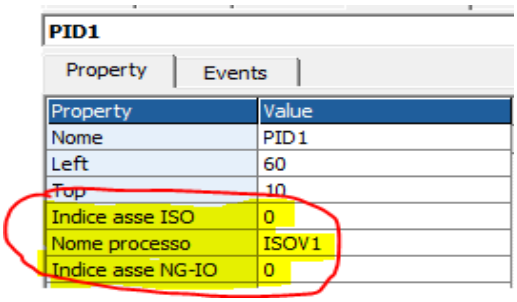
3) Insert Axis X ISOPID

Objects → Iso_Ns → IsoPid.vco



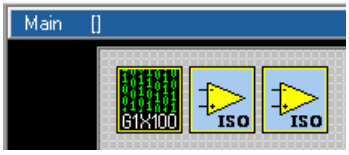
4) Set the following properties

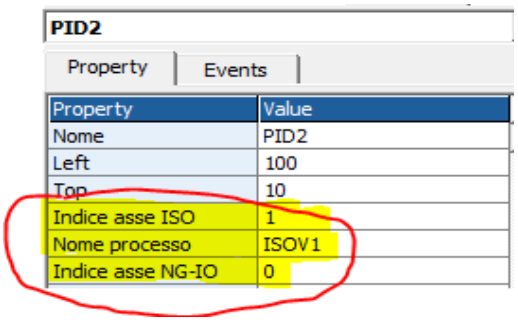




5) Insert Axis Y ISOPID and set the following properties

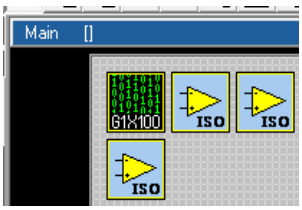
Objects → Iso_Ns → IsoPid.vco





6) Insert Axis Z ISOPID and set the following properties

Objects → Iso_Ns → IsoPid.vco



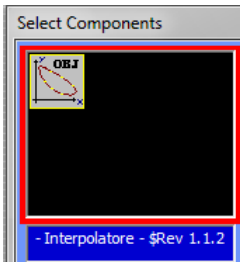
PID3

Property | Events

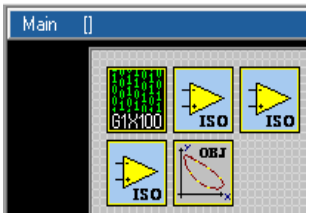
Property	Value
Nome	PID3
Left	10
Top	55
Indice asse ISO	2
Nome processo	ISOV1
Indice asse NG-IO	1

7) Insert the object ObjInterpola

Objects → Motor Control → CobjInterpola.vco



8) Set the following properties



Interpola1

Property | Events

Property	Value
Nome	Interpola1
Left	65
Top	110
N.assi	3
N.tratti	16
Vper	1024
Div. Vper	1024
Abilita arcto	1

9) Declare a following Global Variables

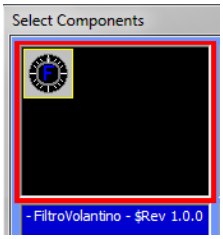
Internal VAR | Bit VAR | Define | Static VAR | VSD VAR | Fixed VA

No | EXP

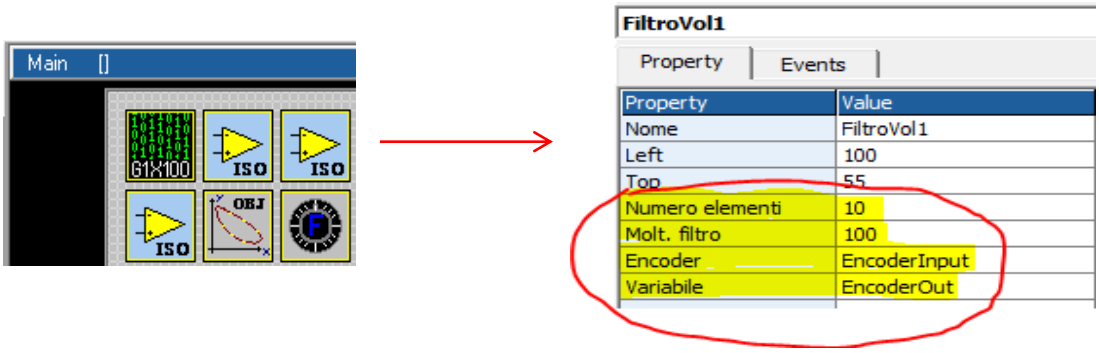
Variable	Type	Shared	Export in Class
EncoderInput	LONG	No	
EncoderOut	LONG	No	

10) Insert the FiltroVol Object for handwheel

Objects → Motor Control → CfiltroVol.vco



11) Set the following properties



12) Insert in "Init task PLC " the entry point for M Functions and the enable external selector

TASK PLC Code

Init Task PLC | Task PLC

```
ISOV1_soft_sel_man=0     ' Enable the internal VTB selector
ISOV1_Start_m=StartMacro ' entry point MACRO management
```

13) Insert 2 Define Constant in Global Variables → Define

The MAXSPEEDSPINDLE depend to MAX rpm at 10 Volt your spindle

Internal VAR | Bit VAR | Define | Static VAR

Variable	Type
MAXDAC	2047
MAXSPEEDSPINDLE	24000

14) Insert in Task Main Functions Page M functions management

Page Init | Master Event | Master Cycle | Page Functions

```
1   function StartMacro() as char
2   dim VelSpindle as long
3
4       ISOV1_m_ACK=1
5       select ISOV1_M_cmd
6           case 3                          ' start spindle in CW
7               ISOV1.out5=true             ' set CW mode
8               ISOV1.out6=false            ' reset CCW mode
9               ' calculate the Speed
10              VelSpindle=(ISOV1_generic(9)*MAXDAC)/MAXSPEEDSPINDLE
11              ng_dac(3,VelSpindle)        ' Update the Speed on Dac out
12              ISOV1.out4=true             ' Start spindle
13              ISOV1_status_m_run=0
14          case 4                          ' start spindle in CCW
15              ISOV1.out5=false            ' reset CW mode
16              ISOV1.out6=true             ' set CCW mode
17              ' calculate the Speed
18              VelSpindle=(ISOV1_generic(9)*MAXDAC)/MAXSPEEDSPINDLE
19              ng_dac(3,VelSpindle)        ' Update the Speed on Dac out
20              ISOV1.out4=true             ' Start spindle
21              ISOV1_status_m_run=0
22          case 5                          ' Stop spindle
23              ISOV1.out4=false            ' Stop spindle
24              VelSpindle=0                ' set Speed to 0
25              ng_dac(3,VelSpindle)        ' Update the Speed on Dac out
26              ISOV1_status_m_run=0
27          case else
28              ISOV1_m_ACK=0
29      endselect
30  endfunction
```

```
function StartMacro() as char
dim VelSpindle as long

        ISOV1_m_ACK=1
        select ISOV1_M_cmd
                case 3                          ' start spindle in CW
                        ISOV1.out5=true         ' set CW mode
                        ISOV1.out6=false                ' reset CCW mode
                        ' calculate the Speed
                        VelSpindle=(ISOV1_generic(9)*MAXDAC)/MAXSPEEDSPINDLE
                        ng_dac(3,VelSpindle)    ' Update the Speed on Dac out
                        ISOV1.out4=true                 ' Start spindle
                        ISOV1_status_m_run=0
                case 4                          ' start spindle in CCW
                        ISOV1.out5=false                ' reset CW mode
                        ISOV1.out6=true                 ' set CCW mode
                        ' calculate the Speed
                        VelSpindle=(ISOV1_generic(9)*MAXDAC)/MAXSPEEDSPINDLE
                        ng_dac(3,VelSpindle)    ' Update the Speed on Dac out
                        ISOV1.out4=true                 ' Start spindle
                        ISOV1_status_m_run=0
                case 5                          ' Stop spindle
                        ISOV1.out4=false                ' Stop spindle
                        VelSpindle=0            ' set Speed to 0
                        ng_dac(3,VelSpindle)    ' Update the Speed on Dac out
                        ISOV1_status_m_run=0
                case else
                        ISOV1_m_ACK=0
        endselect
endfunction
```

15) Insert in Task Main (Master Cycle) Or Task PLC the Call at Functions for I/O Management

Page Init | Master Event | Master Cycle | Page Functions

```
1    AssiHoming()          ' Control homing Switch
2    GetEMCY()             ' Get EMERGENCY status
3    AssiManualJog()       ' Control Manual JOG
4    SpeedHeWheel()        ' Control Speed HandWheel
5    GetOverride()         ' Read the Override potentiometer
6    SetOutputs()          ' Set Digital outputs
```

```
AxesHoming()          ' Control homing Switch
GetEMCY()             ' Get EMERGENCY status
AxesManualJog()       ' Control Manuale JOG
SpeedHandWheel()      ' Control Speed HandWheel
GetOverride()         ' Read the Override potentiometer
SetOutputs()          ' Set Digital outputs
```

16) Insert the functions in Task Main (Page Functions)

Page Init | Master Event | Master Cycle | Page Functions

```
1    '*********************************
2    ' Control the switch Axes homing
3    '*********************************
4    function AxesHoming() as void
5        ISOV1_ext_fcz_x=!ISOV1.inp0  ' Homing switch X
6        ISOV1_ext_fcz_y=!ISOV1.inp1  ' Homing switch Y
7        ISOV1_ext_fcz_z=!ISOV1.inp2  ' Homing switch Z
8    endfunction
9    .
10   .
11   .
```

```
'*********************************
' Control the switch Axes homing
'*********************************
function AxesHoming() as void
        ISOV1_ext_fcz_x=!ISOV1.inp0      ' Homing switch X
        ISOV1_ext_fcz_y=!ISOV1.inp1      ' Homing switch Y
        ISOV1_ext_fcz_z=!ISOV1.inp2      ' Homing switch Z
endfunction
'*********************************
' Control the General Emergency
'*********************************
function GetEMCY() as void
        ISOV1_ext_emcy=!ISOV1.inp3       ' General emergency
endfunction
'*********************************
' Control Manuale JOG
'*********************************
function AxesManualJog() as void
        if ISOV1.inp4            ' Set Axis X
                ISOV1_asse_man=0
        endif
        if ISOV1.inp5            ' Set Axis Y
                ISOV1_asse_man=1
        endif
        if ISOV1.inp6            'Set Axis Z
                ISOV1_asse_man=2
```

```
        endif
        ISOV1_ext_jogp=ISOV1.inp8 'Update the Jog Input +
        ISOV1_ext_jogm=ISOV1.inp7 'Update the Jog Input -
endfunction
'*********************************
' Control Manuale JOG
' The update Encoder is in Task PLC
'*********************************
function SpeedHandWheel() as void
        if ISOV1.inp9           'multiplier x1
                ISOV1_msofv=1
        endif
        if ISOV1.inp10          'multiplier x10
                ISOV1_msofv=10
        endif
        if ISOV1.inp11          'multiplier x100
                ISOV1_msofv=100
        endif
endfunction
'*********************************
' Control Override potentiometer
'*********************************
function GetOverride()as void
        ISOV1_vper=ng_adc(0)
endfunction
'*********************************
' Set digital outputs
'*********************************
function SetOutputs()as void
        ISOV1.out0=ISOV1_status_enable_x        ' X enabled
        ISOV1.out1=ISOV1_status_enable_y        ' Y enabled
        ISOV1.out2=ISOV1_status_enable_z        ' Z enabled
        ISOV1.out3=ISOV1_status_error   ' CNC error
endfunction
```

17) Insert in theTask PLC the handwheel encoder update

This functions must be sync with task PLC

TASK PLC Code

Init Task PLC | Task PLC

```
1   ng_enc(3,EncoderInput())      ' read the HandWheel encoder
2   ISOV1_qvola=EncoderOut        'Update the Handwheel from FiltroVol Object
```

```
        ng_enc(3,EncoderInput())        'read the HandWheel encoder
        ISOV1_qvola=EncoderOut                  'Update the Handwheel from FiltroVol Object
```

14.3 NG35+1xNGIO Axes 3 CanOpen

Link ETHERNET IP: “10.0.0.80” (default)

The follwing project used a axes Canopen type ESTUN

Digital Inputs

Digital Input 1 → **Switch Home X (N.C.)**
Digital Input 2 → **Switch Home Y (N.C.)**
Digital Input 3 → **Switch Home Z (N.C.)**
Digital Input 4 → **GENERAL EMERGENCY INPUT (N.C.)**

Digital Input 5 → **Button JOG X+ (N.O.)**
Digital Input 6 → **Button JOG X- (N.O.)**
Digital Input 7 → **Button JOG Y+ (N.O.)**
Digital Input 8 → **Button JOG Y- (N.O.)**
Digital Input 9 → **Button JOG Z+ (N.O.)**
Digital Input 10 → **Button JOG Z (N.O.)**

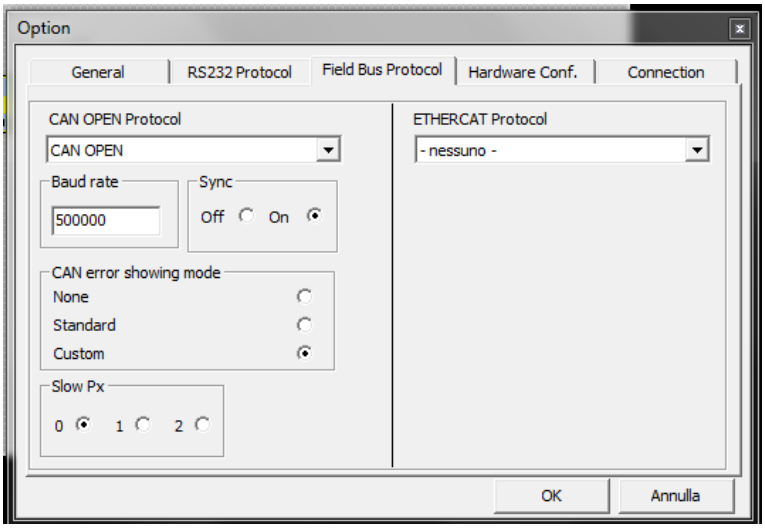
Analog Inputs

Analog Inputs 1 → **Feed Potentiometer Override Axes**
For enable this Override, you must select the Enable the "Ext OW" from IsoNs Interface"

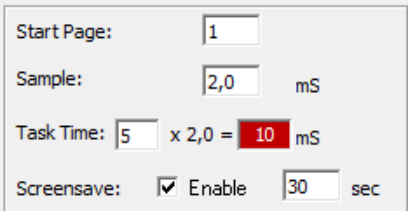
Digital Outputs

Digital outputs 1 → **X axis enbled**
Digital outputs 2 → **Y axis enbled**
Digital outputs 3 → **Z axis enbled**
Digital outputs 4 → **CNC Error**

1) Open new project VTB and select NG35 – Enable the CanOpen Fieldbus – see following

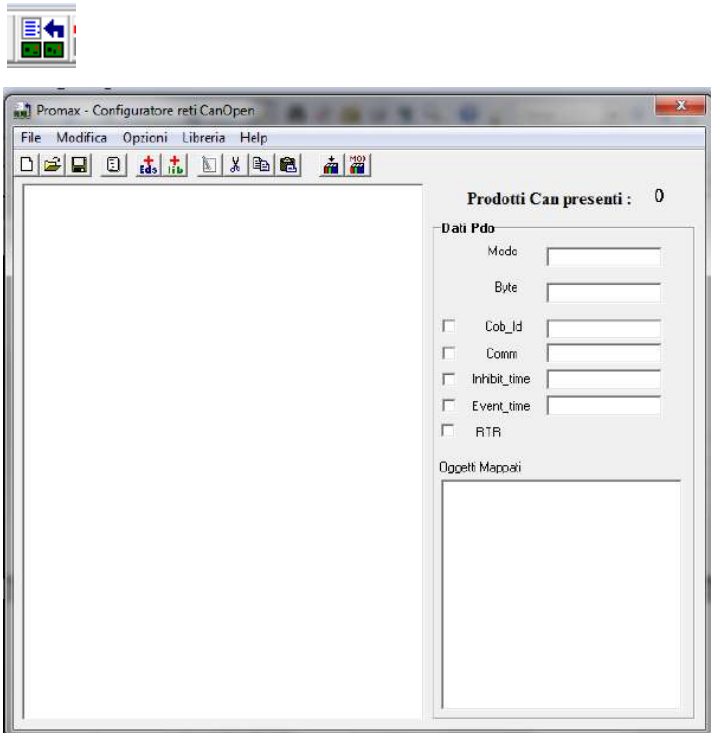


Select a 2 Ms sample



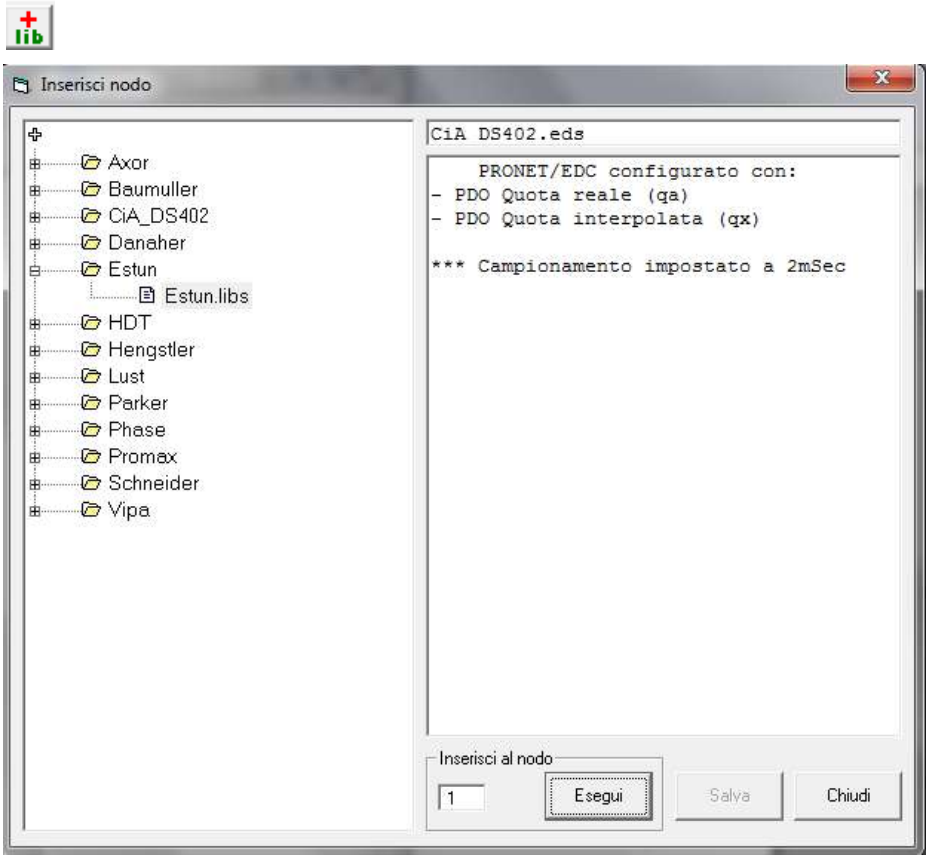
2) Prepare the file COP with CanOpen configurator

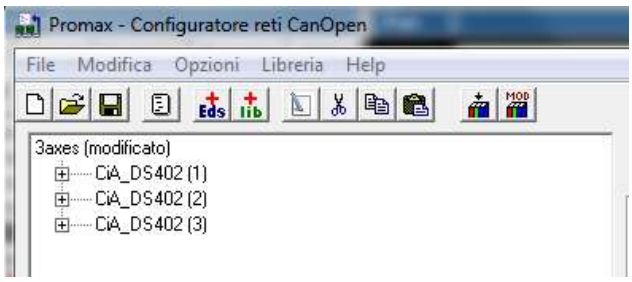
A) Open the CanOpen configurator



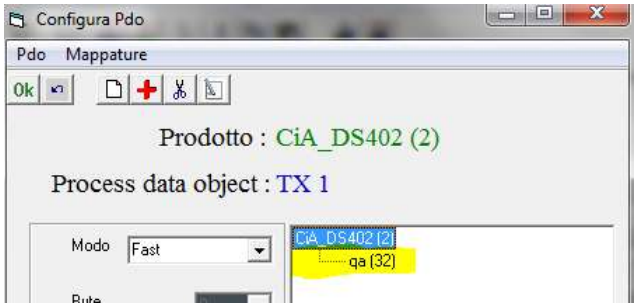
B) Add from Lib the estun type and insert node 1 – Press button *"esegui"*

Repeat for Node 2 and Node 3

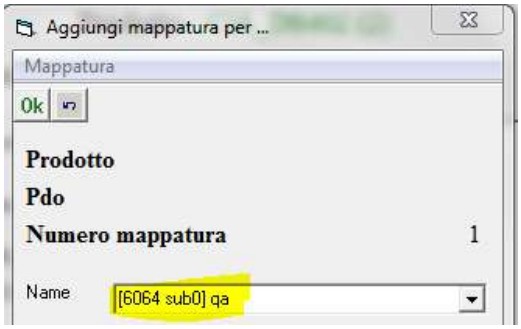




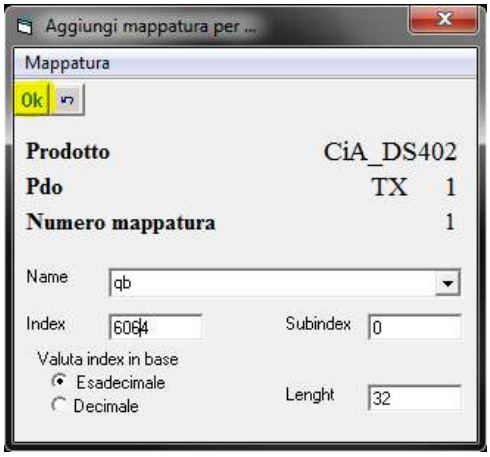
C) Expand node 2 and double click on pdo_Tx1 (Fast)



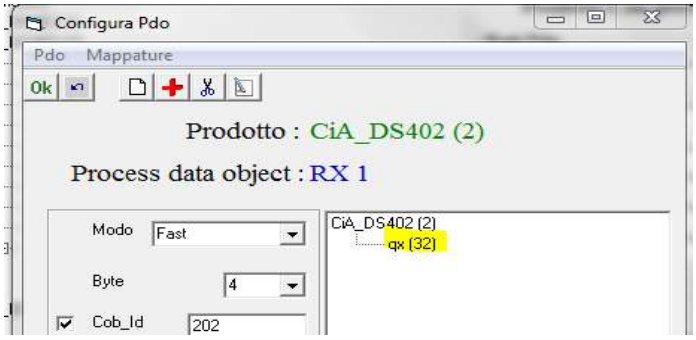
D) Double click on qa(32)



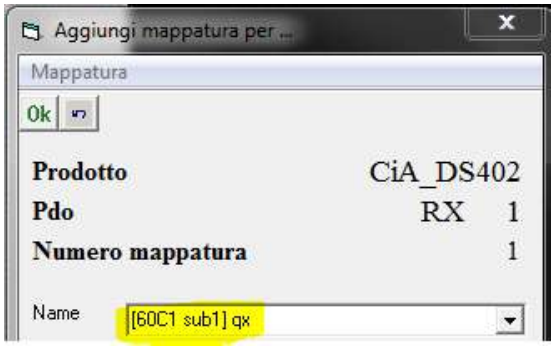
Delete all text Name – (6064 sub0) qa
And Insert only text Qb and press button Ok



E) Double clik on pdo_Rx1 (fast)

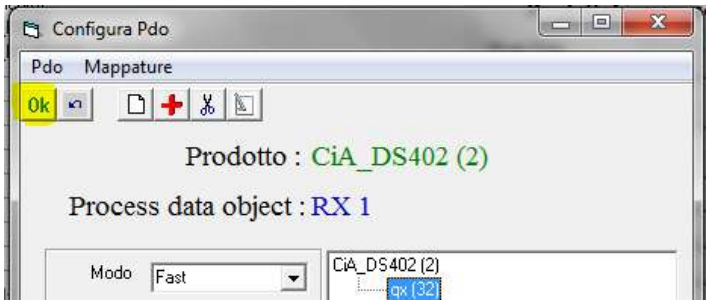


F) Double click on qx(32)



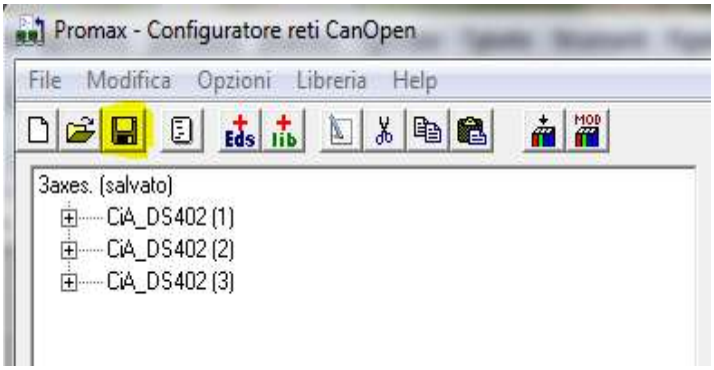
Delete all text Name – (60C1 sub1) qx
And Insert only text Qy and press button Ok

G) Press Ok for enable the modify



Repeat point C to G for node 3 Inserting Qc(Qb) and Qz(Qy)

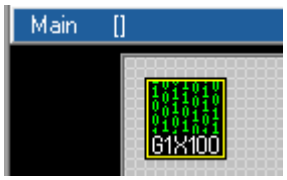
H) Press Save for save configuration



Now the CanOpen Axes configuration is Ready.
The CanOpen Drives must be set in the following mode:

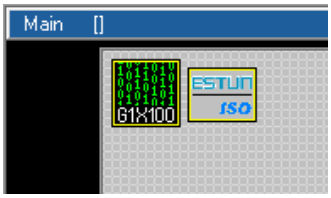
X AXIS	***Node 1***	***Baud 500 Kb***
Y AXIS	***Node 2***	***Baud 500 Kb***
Z AXIS	***Node 3***	***Baud 500 Kb***

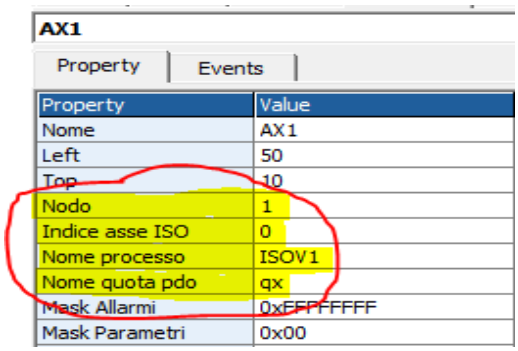
3) Insert object ISOVIRTUAL and set the default properties
Objects → Iso_Ns → IsoVirtual.vco



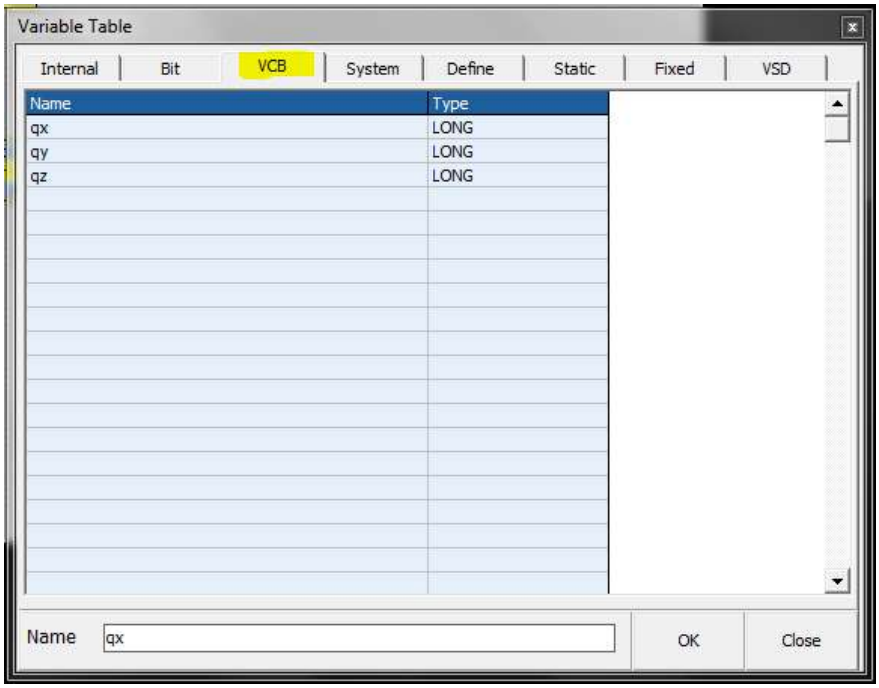
4) Insert Axis X ISOCanOpen
Objects → Iso_Ns → IsoCanOpen.vco

5) Set the following properties

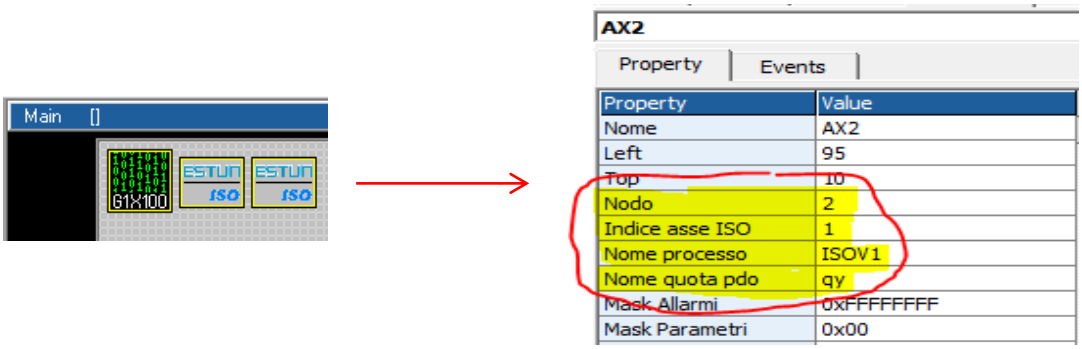




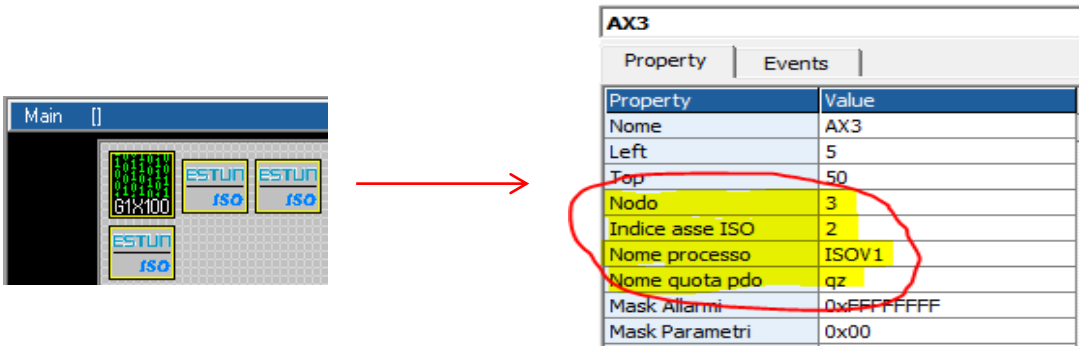
Note:
For select the PDO QX,QY and QZ, you must have first created the configuration CanOpen.
When you Double Click on "Nome quota pdo", the windows Variable List is open.
Select the VCB tab and choose the variable name with double click



6) Insert Axis Y ISOCanOpen and set the following properties
Objects → Iso_Ns → IsoCanOpen.vco

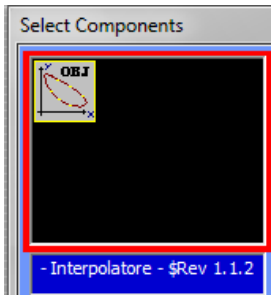


7) Insert Axis Z ISOCanOpen and set the following properties
Objects → Iso_Ns → IsoCanOpen.vco



8) Insert the object ObjInterpola

Objects → Motor Control → CobjInterpola.vco



9) Set the following properties

Interpola1

Property | Events

Property	Value
Nome	Interpola1
Left	65
Top	110
N.assi	3
N.tratti	16
Vper	1024
Div. Vper	1024
Abilita arcto	1

10) Insert in the Task main (or task plc) the code management

TASK PLC Code

Init Task PLC | Task PLC

```
'-------------------------------
' Read The Analog Inputs
' For override control
'-------------------------------
ISOV1_vper=ng_adc(0)
'-------------------------------
' Test Digital Inputs
'-------------------------------
ISOV1_ext_fcz_x=!ISOV1.inp0  ' Homing switch X
ISOV1_ext_fcz_y=!ISOV1.inp1  ' Homing switch Y
ISOV1_ext_fcz_z=!ISOV1.inp2  ' Homing switch Z
ISOV1_ext_emcy=!ISOV1.inp3   ' General EMERGENCY
ISOV1_ext_jogp_x=ISOV1.inp4  ' JOG X +
ISOV1_ext_jogm_x=ISOV1.inp5  ' JOG X -
ISOV1_ext_jogp_y=ISOV1.inp6  ' JOG Y +
ISOV1_ext_jogm_y=ISOV1.inp7  ' JOG Y -
ISOV1_ext_jogp_z=ISOV1.inp8  ' JOG Z +
ISOV1_ext_jogm_z=ISOV1.inp9  ' JOG Z -
'-------------------------------
' Test Digital Outputs
'-------------------------------
ISOV1.out0=ISOV1_status_enable_x     ' X enabled
ISOV1.out1=ISOV1_status_enable_y     ' Y enabled
ISOV1.out2=ISOV1_status_enable_z     ' Z enabled
ISOV1.out2=ISOV1_status_error        ' CNC error
```


```
'-------------------------------
' Read The Analog Inputs
' For override control
'-------------------------------
ISOV1_vper=ng_adc(0)
'-------------------------------
' Test Digital Inputs
'-------------------------------
ISOV1_ext_fcz_x=!ISOV1.inp0      ' Homing switch X
ISOV1_ext_fcz_y=!ISOV1.inp1      ' Homing switch Y
ISOV1_ext_fcz_z=!ISOV1.inp2      ' Homing switch Z
ISOV1_ext_emcy=!ISOV1.inp3       ' General EMERGENCY
ISOV1_ext_jogp_x=ISOV1.inp4      ' JOG X +
ISOV1_ext_jogm_x=ISOV1.inp5      ' JOG X -
ISOV1_ext_jogp_y=ISOV1.inp6      ' JOG Y +
ISOV1_ext_jogm_y=ISOV1.inp7      ' JOG Y -
ISOV1_ext_jogp_z=ISOV1.inp8      ' JOG Z +
ISOV1_ext_jogm_z=ISOV1.inp9      ' JOG Z -
'-------------------------------
' Test Digital Outputs
'-------------------------------
ISOV1.out0=ISOV1_status_enable_x     ' X enabled
ISOV1.out1=ISOV1_status_enable_y     ' Y enabled
ISOV1.out2=ISOV1_status_enable_z     ' Z enabled
ISOV1.out2=ISOV1_status_error        ' CNC error
```

14.4 NGM EVO+NGQx (CanOpen) Axes 3 Step/Dir, Spindle and handwheel

Link RS32 on COM1 NGM EVO

The following project use a handwheel connect to Ch 1 encoder inputs NGQx , selector for JOG AXES and spindle in Analog output 1 in NGQx. The selector Axes JOG and Handwheel speed are connect to NGQx digital inputs in CanOpen

To enable a selector is necessary insert in the init TASK PLC the following code:

ISOV1_soft_sel_man=0 ' Enable the internal VTB selector

Digital Inputs

Digital Input 1 (NGM EVO *ISOV1.inp0*) → Switch Home X (N.C.)
Digital Input 2 (NGM EVO *ISOV1.inp1*) → Switch Home Y (N.C.)
Digital Input 3 (NGM EVO *ISOV1.inp2*) → Switch Home Z (N.C.)
Digital Input 4 (NGM EVO *ISOV1.inp3*) → GENERAL EMERGENCY INPUT (N.C.)
.
.
Digital Input 1 (NGQx *ISOV1.inp16*) → Selector JOG X (N.O.)
Digital Input 2 (NGQx *ISOV1.inp17*) → Selector JOG Y (N.O.)
Digital Input 3 (NGQx *ISOV1.inp18*) → Selector JOG Z (N.O.)
Digital Input 4 (NGQx *ISOV1.inhp19*) → Button JOG - (N.O.)
Digital Input 5 (NGQx *ISOV1.inp20*) → Button JOG + (N.O.)
Digital Input 6 (NGQx *ISOV1.inp21*) → Handwheel Speed x1
Digital Input 7 (NGQx *ISOV1.inp22*) → Handwheel Speed x10
Digital Input 8 (NGQx *ISOV1.inp23*) → Handwheel Speed x100

Analog Inputs

Analog Inputs 1 (NGQx) → Feed Potentiometer Override Axes
For enable this Override, you must select the Enable the "Ext OW" from IsoNs Interface"

Digital Outputs

Digital outputs 1 (NGM EVO *ISOV1.out0*) → X axis enabled
Digital outputs 2 (NGM EVO *ISOV1.out1*) → Y axis enabled
Digital outputs 3 (NGM EVO *ISOV1.out2*) → Z axis enabled
Digital outputs 4 (NGM EVO *ISOV1.out3*) → CNC Error
.
.
Digital outputs 1 (NGQx *ISOV1.out16*) → Spindle start/stop
Digital outputs 2 (NGQx *ISOV1.out17*) → Spindle CW (M3)
Digital outputs 3 (NGQx *ISOV1.out18*) → Spindle CCW (M4)

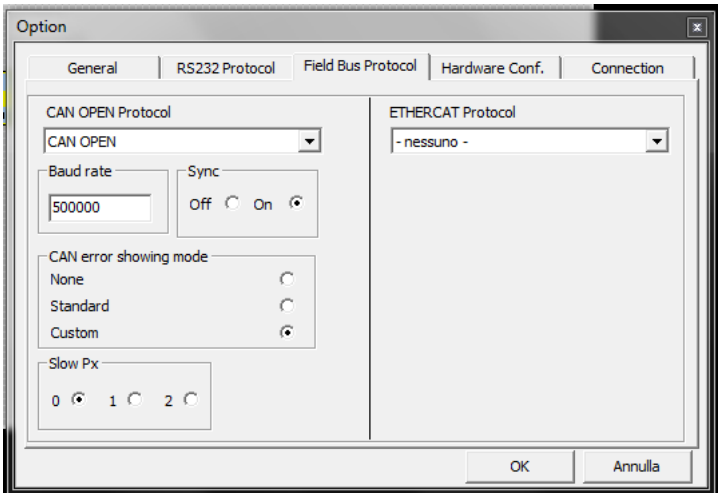
Encoder Inputs

Encoder Ch 1 (NGQx) → HandWheel encoder

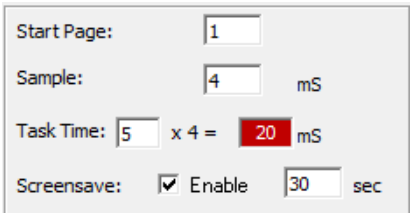
Analog Outputs

Analog out 1 (NGQx) → SPEED Spindle

1) Open new project VTB and select NGM EVO – Enable the CanOpen Fieldbus – see following

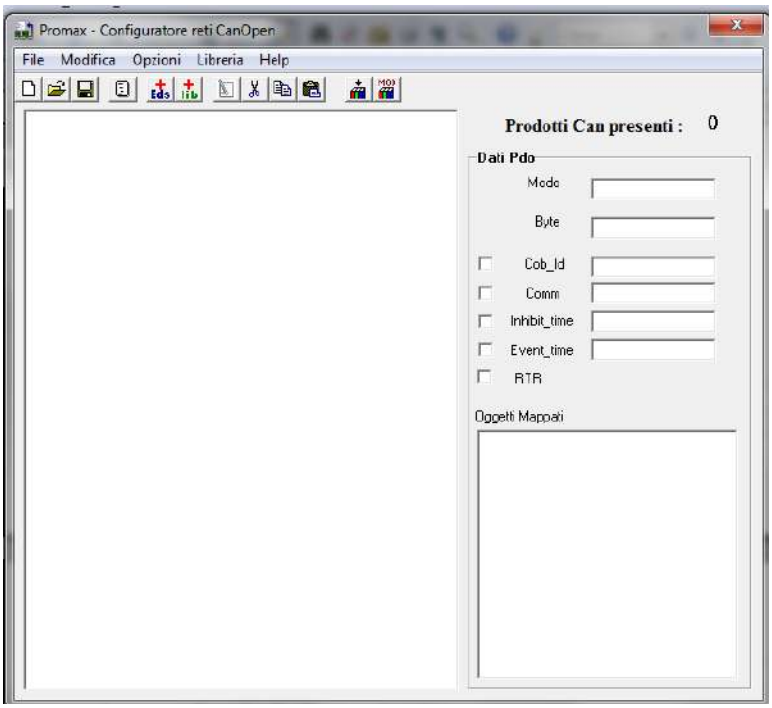


Select a 4 Ms sample

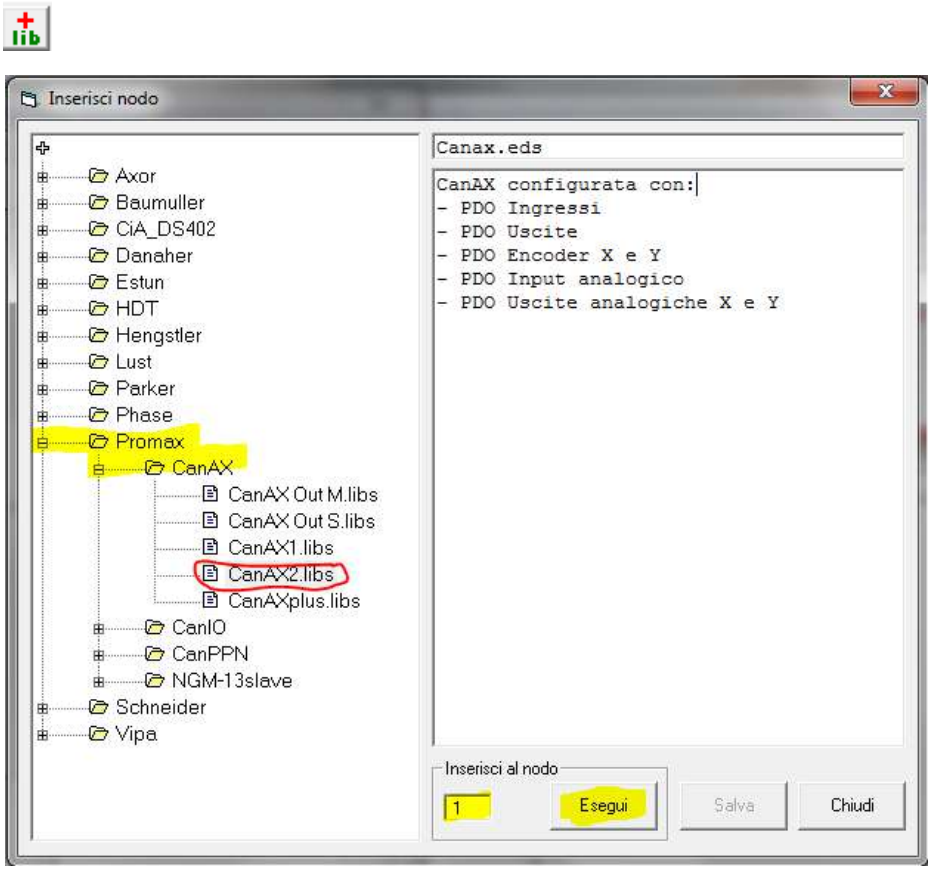


2) Prepare the file COP with CanOpen configurator

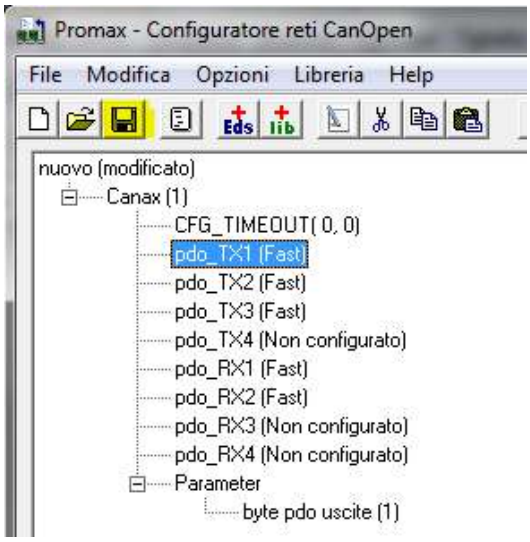
A) Open the CanOpen configurator



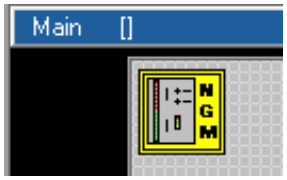
B) Add from Lib the Promax type Canax → CanAX2.libs and insert node 1 – Press button *"esegui"*



C) Press button Save



3) Set link on COM2 NGM EVO and PP Interp mask on 7 (X Y Z channel enabled)



NGM13_init1

Property | Events

Property	Value
Nome	NGM13_init1
Left	3
Top	4
Link RPC Port	2
Link RPC Baud	115200
ADC enable Mask	0
P-P enable Mask	7
P-P Interp. Mask	7
Num. NGM-IO	0
L-SYNC enable Mask	0
L-SYNC Prescaler	6

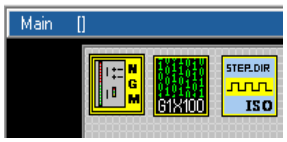
4) Insert object ISOVIRTUAL and set the default properties

Objects → Iso_Ns → IsoVirtual.vco

5) Insert Axis X ISOPP

Objects → Iso_Ns → IsoPP.vco

6) Set the following properties



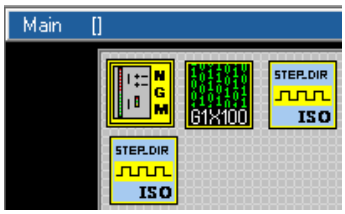
PP1

Property | Events

Property	Value
Nome	PP1
Left	15
Top	60
Indice asse ISO	0
Nome processo	ISOV1
NGM-13 Channel	0

7) Insert Axis Y ISOPP and set the following properties

Objects → Iso_Ns → IsoPP.vco



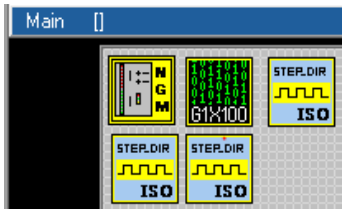
PP2

Property | Events

Property	Value
Nome	PP2
Left	65
Top	60
Indice asse ISO	1
Nome processo	ISOV1
NGM-13 Channel	1

8) Insert Axis Z ISOPP and set the following properties

Objects → Iso_Ns → IsoPP.vco



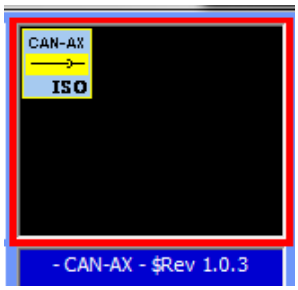
PP3

Property | Events

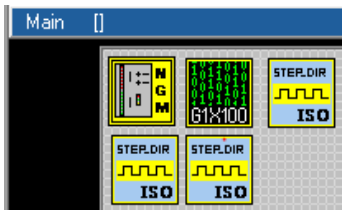
Property	Value
Nome	PP3
Left	115
Top	60
Indice asse ISO	2
Nome processo	ISOV1
NGM-13 Channel	2

9) Insert the ISO-IO Can-Ax (is the same of NGQx)

Objects → Iso_Ns → ISO-IO.vco



10) Set the following properties

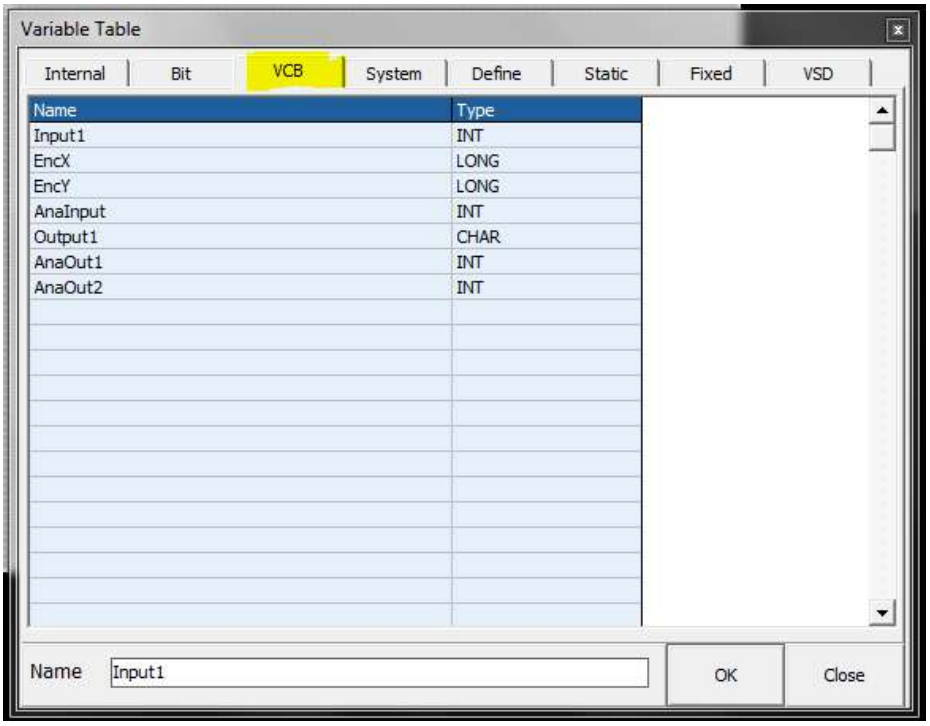


digio1

Property | Events

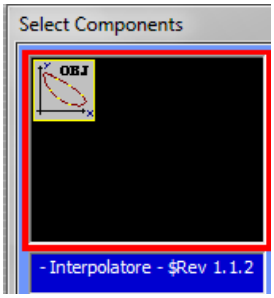
Property	Value
Nome	digio1
Nodo	0
Allarme cfg	41
Nome processo	ISOV1
Indice ISO-IO (16 bit)	1
Hardware enable	True
Variabile inp	Input1
Variabile out	Output1

Note:
For select the Variabile Inp and Variabile out, you must have first created the configuration CanOpen.
When you Double Click on "Variabile Inp" or " Variabile out", the windows Variable List is open.
Select the VCB tab and choose the variable name with double click

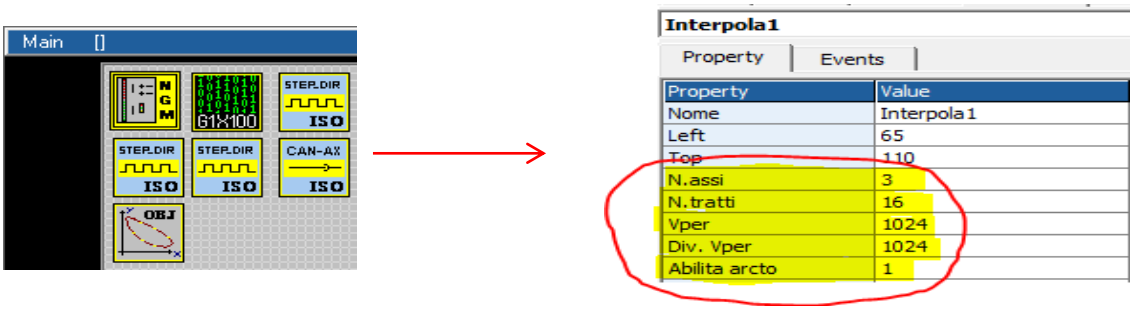


11) Insert the object ObjInterpola

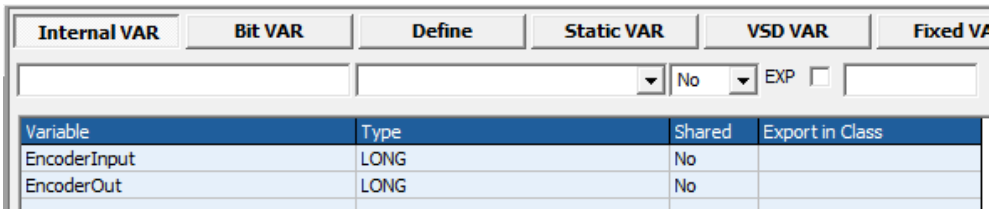
Objects → Motor Control → CobjInterpola.vco



12) Set the following properties



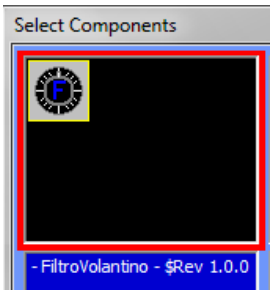
13) Declare a following Global Variables



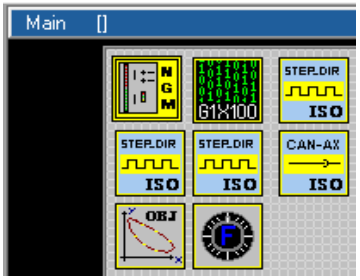
Variable	Type	Shared	Export in Class
EncoderInput	LONG	No	
EncoderOut	LONG	No	

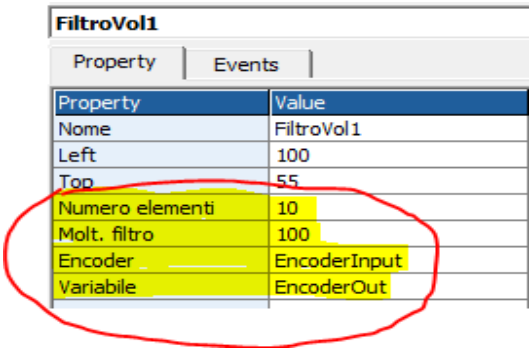
14) Insert the FiltroVol Object for handwheel

Objects → Motor Control → CfiltroVol.vco



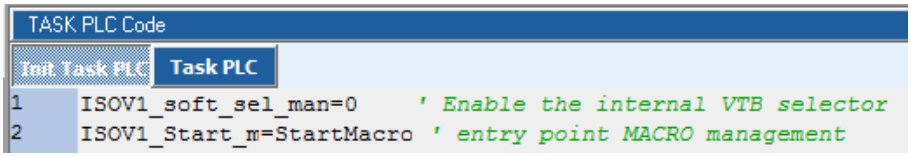
15) Set the following properties





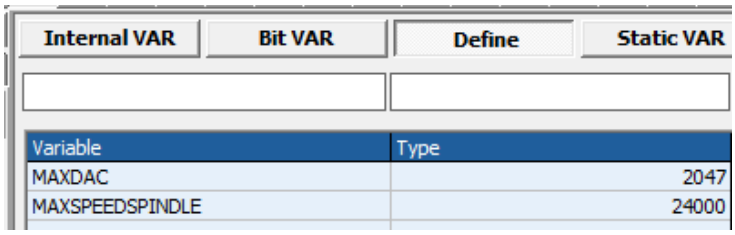
Property	Value
Nome	FiltroVol1
Left	100
Top	55
Numero elementi	10
Molt. filtro	100
Encoder	EncoderInput
Variabile	EncoderOut

16) Insert in "Init task PLC " the entry point for M Functions and the enable external selector



17) Insert 2 Define Constant in Global Variables → Define

The MAXSPEEDSPINDLE depend to MAX rpm at 10 Volt your spindle



Variable	Type
MAXDAC	2047
MAXSPEEDSPINDLE	24000

18) Insert in Task Main Functions Page M functions management

Page Init | Master Event | Master Cycle | Page Functions

```
1   function StartMacro() as char
2   dim VelSpindle as long
3
4       ISOV1_m_ACK=1
5       select ISOV1_M_cmd
6           case 3                  ' start spindle in CW
7               ISOV1.out17=true            ' set CW mode
8               ISOV1.out18=false           ' reset CCW mode
9               ' calculate the Speed
10              VelSpindle=(ISOV1_generic(9)*MAXDAC)/MAXSPEEDSPINDLE
11              AnaOut1=VelSpindle   ' Update the Speed on PDO
12              ISOV1.out16=true            ' Start spindle
13              ISOV1_status_m_run=0
14          case 4                  ' start spindle in CCW
15              ISOV1.out17=false    ' reset CW mode
16              ISOV1.out18=true            ' set CCW mode
17              ' calculate the Speed
18              VelSpindle=(ISOV1_generic(9)*MAXDAC)/MAXSPEEDSPINDLE
19              AnaOut1=VelSpindle   ' Update the Speed on PDO
20              ISOV1.out16=true            ' Start spindle
21              ISOV1_status_m_run=0
22          case 5                  ' Stop spindle
23              ISOV1.out16=false    ' Stop spindle
24              VelSpindle=0         ' set Speed to 0
25              AnaOut1=VelSpindle   ' Update the Speed on PDO
26              ISOV1_status_m_run=0
27          case else
28              ISOV1_m_ACK=0
29      endselect
30  endfunction
31
```

```
function StartMacro() as char
dim VelSpindle as long

        ISOV1_m_ACK=1
        select ISOV1_M_cmd
                case 3                          ' start spindle in CW
                        ISOV1.out17=true                ' set CW mode
                        ISOV1.out18=false               ' reset CCW mode
                        ' calculate the Speed
                        VelSpindle=(ISOV1_generic(9)*MAXDAC)/MAXSPEEDSPINDLE
                        AnaOut1=VelSpindle      ' Update the Speed on PDO
                        ISOV1.out16=true                ' Start spindle
                        ISOV1_status_m_run=0
                case 4                          ' start spindle in CCW
                        ISOV1.out17=false       ' reset CW mode
                        ISOV1.out18=true                ' set CCW mode
                        ' calculate the Speed
                        VelSpindle=(ISOV1_generic(9)*MAXDAC)/MAXSPEEDSPINDLE
                        AnaOut1=VelSpindle      ' Update the Speed on PDO
                        ISOV1.out16=true                ' Start spindle
                        ISOV1_status_m_run=0
                case 5                          ' Stop spindle
                        ISOV1.out16=false       ' Stop spindle
                        VelSpindle=0            ' set Speed to 0
                        AnaOut1=VelSpindle      ' Update the Speed on PDO
                        ISOV1_status_m_run=0
                case else
                        ISOV1_m_ACK=0
        endselect
endfunction
```

19) Insert in Task Main (Master Cycle) Or Task PLC the Call at Functions for I/O Management

Page Init | Master Event | Master Cycle | Page Functions

```
1   AxesHoming()          ' Contro homing Switch
2   GetEMCY()             ' Get emergency status
3   AxesManualJog()       ' Control Manuale JOG
4   SpeedHandWheel()      ' Control Speed handwheel
5   GetOverride()         ' Read the Override potentiometer
6   SetOutputs()          ' Set Digital outputs
```

```
AxesHoming()            ' Contro homing Switch
GetEMCY()               ' Get emergency status
AxesManualJog()         ' Control Manuale JOG
SpeedHandWheel()        ' Control Speed handwheel
GetOverride()           ' Read the Override potentiometer
SetOutputs()            ' Set Digital outputs
```

20) Insert the functions in Task Main (Page Functions)

Page Init | Master Event | Master Cycle | Page Functions

```
1   '*********************************
2   ' Control the switch Axes homing
3   '*********************************
4   function AxesHoming() as void
5       ISOV1_ext_fcz_x=!ISOV1.inp0  ' Homing switch X
6       ISOV1_ext_fcz_y=!ISOV1.inp1  ' Homing switch Y
7       ISOV1_ext_fcz_z=!ISOV1.inp2  ' Homing switch Z
8   endfunction
9   .
10  .
11  .
```

```
'*********************************
' Control the switch Axes homing
'*********************************
function AxesHoming() as void
        ISOV1_ext_fcz_x=!ISOV1.inp0     ' Homing switch X
        ISOV1_ext_fcz_y=!ISOV1.inp1     ' Homing switch Y
        ISOV1_ext_fcz_z=!ISOV1.inp2     ' Homing switch Z
endfunction
'*********************************
' Control the General Emergency
'*********************************
function GetEMCY() as void
        ISOV1_ext_emcy=!ISOV1.inp3      ' General emergency
endfunction
'*********************************
' Control Manuale JOG
'*********************************
function AxesManualJog() as void
        if ISOV1.inp16          ' Set Axis X
                ISOV1_asse_man=0
        endif
        if ISOV1.inp17          ' Set Axis Y
                ISOV1_asse_man=1
        endif
        if ISOV1.inp18          'Set Axis Z
                ISOV1_asse_man=2
```

```
        endif
        ISOV1_ext_jogp=ISOV1.inp20 'Update the Jog Input +
        ISOV1_ext_jogm=ISOV1.inp19 'Update the Jog Input -
endfunction
'*********************************
' Control Manuale JOG
' The update Encoder is in Task PLC
'*********************************
function SpeedHandWheel() as void
        if ISOV1.inp21          'multiplier x1
                ISOV1_msofv=1
        endif
        if ISOV1.inp22          'multiplier x10
                ISOV1_msofv=10
        endif
        if ISOV1.inp23          'multiplier x100
                ISOV1_msofv=100
        endif
endfunction
'*****************************************
' Control Override potentiometer
' from PDO declare in configurator CanOpen
'*****************************************
function GetOverride()as void
        ISOV1_vper=AnalInput
endfunction
'*********************************
' Set digital outputs
'*********************************
function SetOutputs()as void
        ISOV1.out0=ISOV1_status_enable_x        ' X enabled
        ISOV1.out1=ISOV1_status_enable_y        ' Y enabled
        ISOV1.out2=ISOV1_status_enable_z        ' Z enabled
        ISOV1.out3=ISOV1_status_error   ' CNC error
endfunction
```

21) Insert in theTask PLC the handwheel encoder update

This functions must be sync with task PLC

TASK PLC Code

Init Task PLC | Task PLC

```
EncoderInput=EncX          'read the HandWheel encoder from NGQx PDO EncX
ISOV1_qvola=EncoderOut     'Update the Handwheel from FiltroVol Object
```

```
EncoderInput=EncX          'read the HandWheel encoder from NGQx PDO EncX
ISOV1_qvola=EncoderOut     'Update the Handwheel from FiltroVol Object
```

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