Chapter 7

OUTPUTS

Edition 3

Overview

Output Function Blocks are automatically created as part of the PC3000 Hardware Definition i.e. the process of declaring which I/O module type resides in each position within the rack. Each Output Function Block is 'attached' to a physical I/O channel. Once defined they may be manipulated in the same way as function blocks in other classes.

DIGITAL_OUT FUNCTION BLOCK

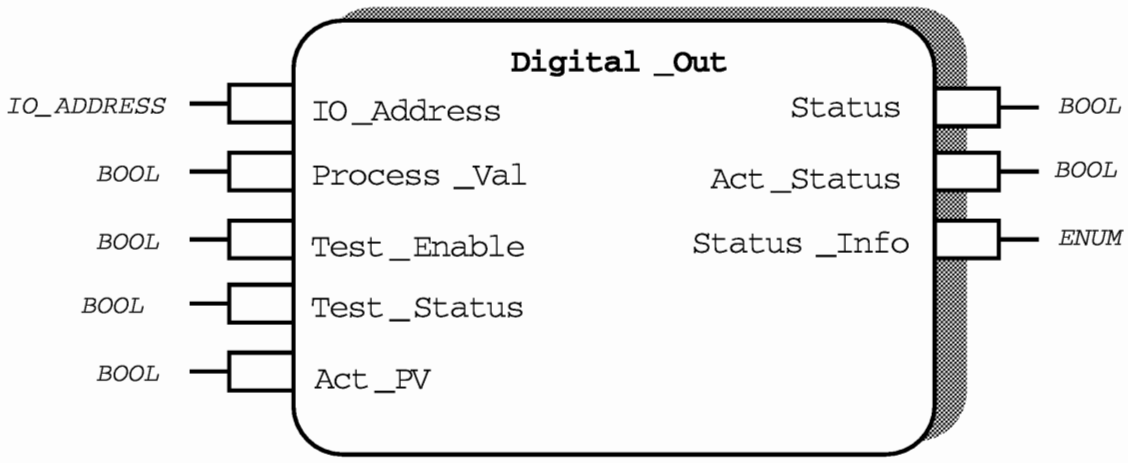


Figure 7-1Digital_Out function block

Functional Description

The Digital_Out function block provides the function block interface to any hardware which can support a digital output. It provides a boolean input parameter that definies the required state of an associated physical digital output.

Test facilities are provided to allow the physical output state to be driven directly by a test value, that is overriding the normal process value. The status of the block can be similarly overridden.

Function Block Attributes

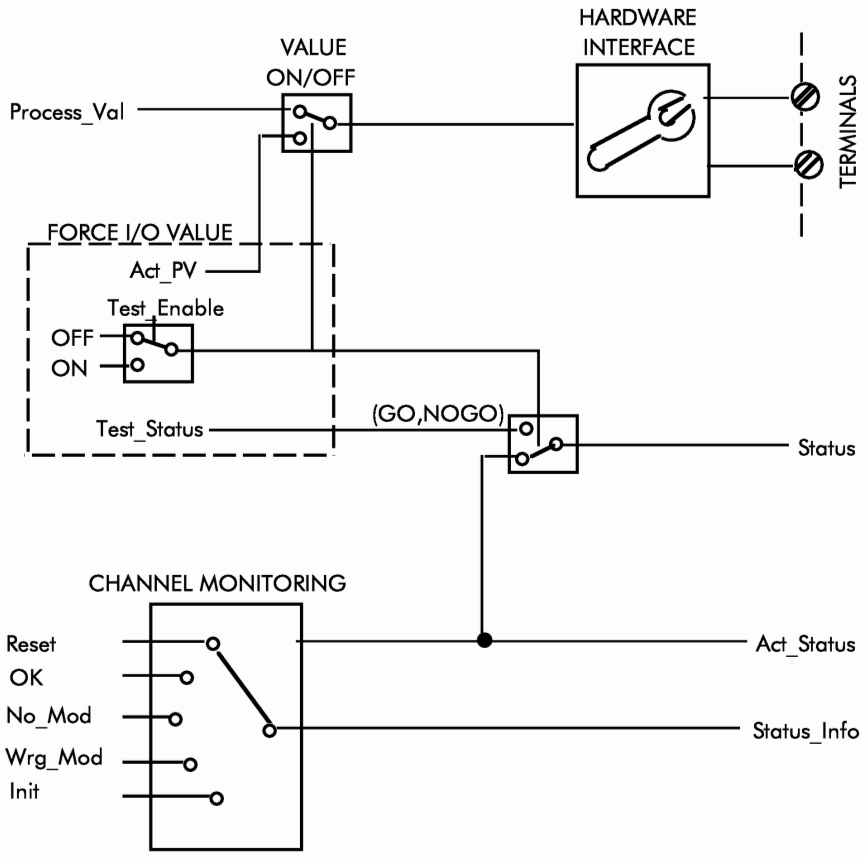
Type:..... 18 10

Class: .....OUTPUTS

Default Task: .....Task_1

Short List: .....Process_Val, Act_PV, Status, Status_Info

Memory Requirements: .....12 Bytes



Parameter Descriptions

IO_Address (IOA)

The parameter IO_Address associates the function block instance with the physical connections on the hardware module to which it is referenced. Its value is assigned automatically when the function block instance is defined. Its value takes the form X:YY:ZZ, where X represents the number of the rack in which the module is resident, YY represents the number of the slot in the rack and ZZ represents the number of the channel within the module.For example, 1:02:03 would mean that the function block instance references the third channel of a module which sits in the second slot of the first rack of the PC3000 system.

Process_Val (PV)

This is the parameter which defines the state of the hardware channel addressed by the function block.

Note : that when Test_Enable is On (1), Process_Val is not used.

This is the input driven by the control strategy.

Test_Enable (TEN)

Test_Enable allows the user to switch the output of the hardware channel between the Process_Val and the Act_PV. If Test_Enable is set to Off (0), the hardware output will read its value from Process_Val and Status will reflect the status of the hardware module. If Test_Enable is set to On (1), the hardware output will read its value from Act_PV and Status will be set to the value of Test_Status.

Test_Status (TST)

The value of Test_Status is copied to Status when Test_Enable is set to On (1). When Test_Enable is set to Off (0), Test_Status is not used.

Act_PV (APV)

The parameter Act_PV is copied to the hardware output when Test_Enable is set to On (1). When Test_Enable is set to Off (0), Act_PV is not used.

Status (ST)

When Test_Status is set to Off (0), the parameter Status reflects the status of the hardware channel being referenced by the function block.

If Test_Enable is set to On (1), Status will take the value assigned to Test_Status.

Act_Status (AST)

The parameter Act_Status always reflects the status of the hardware channel. If the hardware indicates a fault Act_Status will be set to NOGO (0). Act_Status should be used for diagnostic purposes only.

Status_Info (STI)

Status_Info is a diagnostic parameter which is used to explain the state of Status. It can have five possible states:

Reset (0):

The user program is not running.

Ok (1):

The channel is functioning normally.

No_Mod (2):

There is no module in the hardware slot being addressed by he function block.

Wrg_Mod (3):

An incorrect module type has been fitted in the slot addressed by the function block.

Init (4):

The module or channel is being initialised.

Parameter Attributes

Name	Type	Cold Start	Read Access	Write Access	Type Specific Information	
Act_PV	**BOOL**	Off (0)	Config	Config	Senses	Off (0) On (1)
Act_Status	**BOOL**	NOGO (0)	Config	Block	Senses	NOGO (0) Go (1)
IO_Address	**IO_ADDRESS**		Config	Config		
Process_Val	**BOOL**	Off (0)	Oper	Oper	Senses	Off (0) On (1)
Status	**BOOL**	NOGO (0)	Oper	Block	Senses	NOGO (0) Go (1)
Status_Info	**ENUM**	Reset (0)	Oper	Block	Senses	Reset(0) Ok(1) No_Mod(2) Wrg_Mod(3) Init(4)
Test_Enable	**BOOL**	Off (0)	Config	Config	Senses	Off (0) On (1)
Test_Status	**BOOL**	NOGO (0)	Config	Config	Senses	NOGO (0) Go (1)

Table 7-1 Digital_Out Parameter Attributes

ANALOG_OUT FUNCTION BLOCK

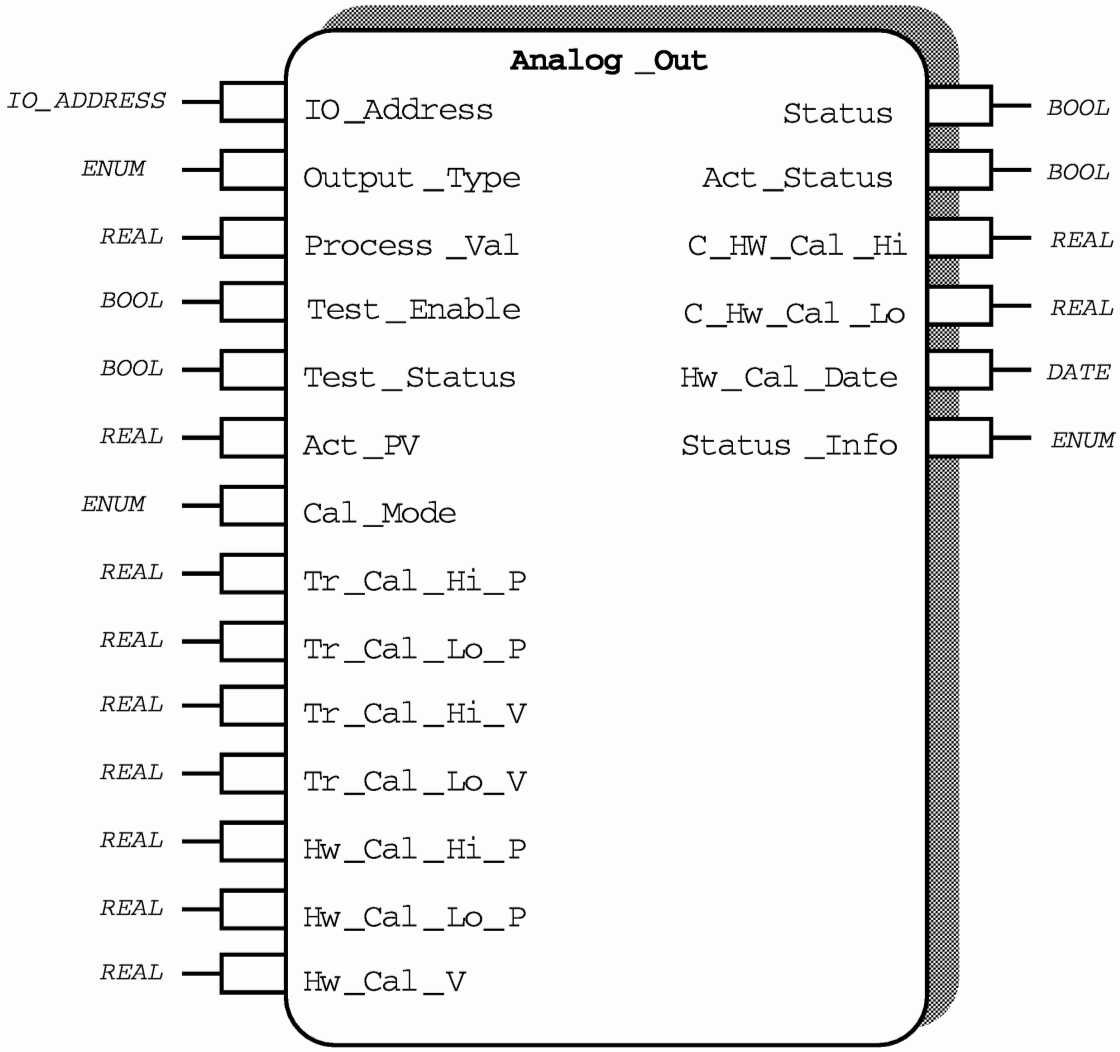


Figure 7-2 Analog_Out Function Block

Functional Description

The Analog_Out function block provides an interface to an analogue channel.

It provides a floating point (REAL) input parameter that defines the output value for a physical analogue output. Test facilities are provided to allow the physical output value to be driven directly by a test value, overridding the normal process value. The status of the block can be similarly overridden.

Function Block Attributes

Type:.....18 20

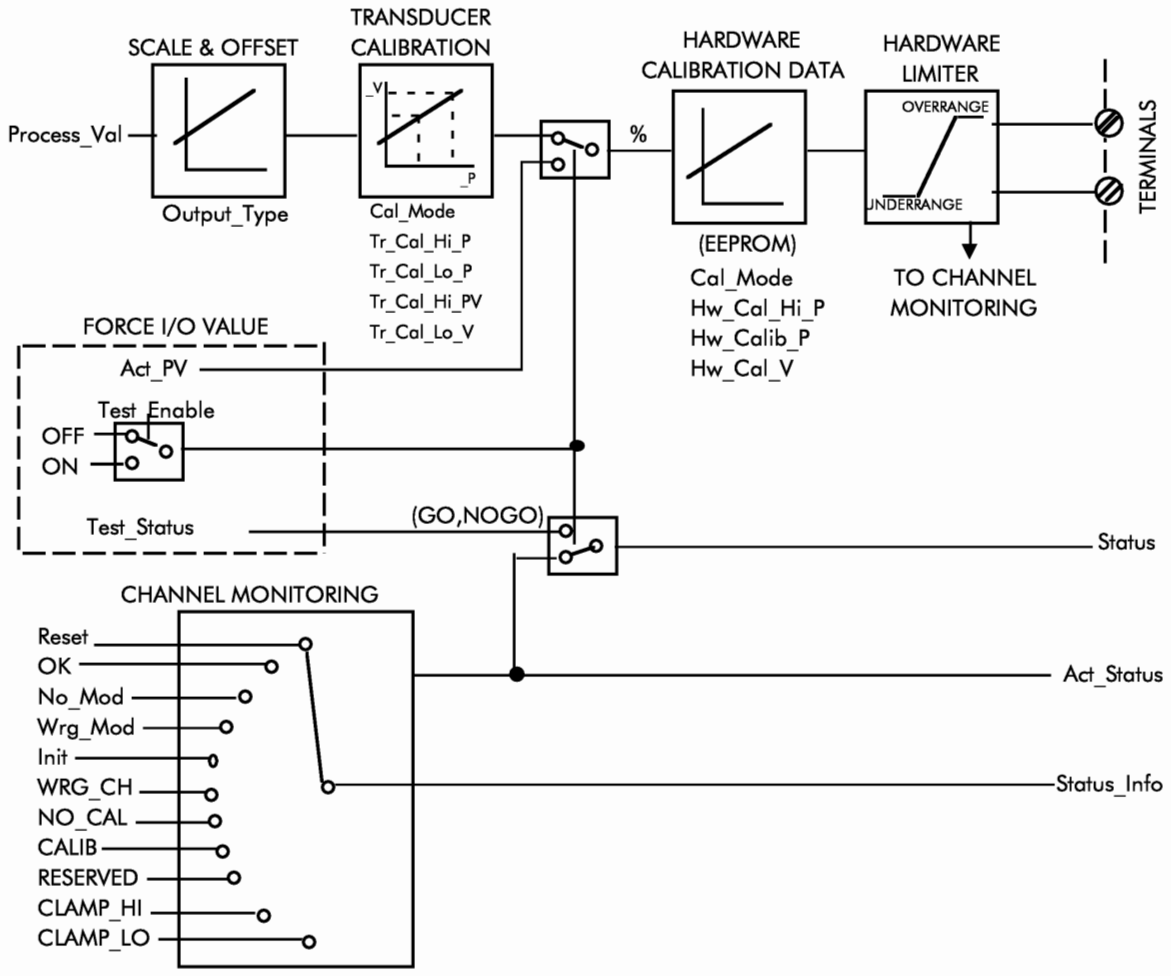
Class: ..... OUTPUTS

Default Task: ..... Task_2

Short List: ..... Process_Val, Act_PV, Status, Status_Info

Memory Required:..... 82 Bytes

Execution time: ..... 154 µ Secs



Parameter Descriptions

Parameters marked with '*' must be confirmed prior to running the program. All other parameters are optional.

IO_Address (IOA)

The parameter IO_Address associates the function block instance with the physical connections on the hardware module to which it is referenced. Its value is assigned automatically when the function block instance is defined. Its value takes the form X:YY:ZZ, where X represents the number of the rack in which the module is resident, YY represents the number of the slot in the rack and ZZ represents the number of the channel within the module.For example, 1:02:03 would mean that the function block instance references the third channel of a module which sits in the second slot of the first rack of the PC3000 system.

Output_Type (OT) *

Output_Type defines the type and range of output which is employed by the hardware module. The parameter can be set to one of six options, which must be selected in accordance with setting the appropriate hardware links on the board, which are described in the PC3000 Installation book. The options are:

mA0_20 (0):
supports a d.c. current output, 0 - 20 mA @ 12 V

mA4_20 (1):
supports a d.c. current output, 4 - 20 mA @ 12 V

V0_10 (2):
supports a d.c. voltage output, 0 - 10 V @ 20 mA

V2_10 (3):
supports a d.c. voltage output, 2 - 10 V @ 20 mA

V0_5 (4):
supports a d.c. voltage output, 0 - 5 V @ 20 mA

V1_5 (5):
supports a d.c. voltage output, 1 - 5 V @ 20 mA.

Other ranges may be configured using the scale and offset facilities provided under the transducer calibration mode.

Process_Val (PV)

Process_Val is the value which defines the output level of the hardware channel being addressed by the function block. If the input to Process_Val exceeds 100%, the output will be limited to 100% (full on). If the Process_Val is negative, the output will be 0% (off).

Note:- That when Test_Enable is On (1), Process_Val is not used.

This is the input driven by the control strategy.

Transducer Calibration

Transducer calibration provides a method of scaling and offsetting non-standard output ranges. It also provides a means for correcting actuator errors e.g. 100% or 10V output does not correspond to valve fully open due to valve inaccuracy.

The PC3000 analogue output module uses a two point transducer calibration scheme in order to correct for both gain and zero offset errors. Two arbitrary points may be specified.

Transducer calibration is performed on the currently selected range and configuration e.g. 0 to 10V, 0 to 20mA etc. Each range/configuration has separate calibration data associated with it.

Transducer calibration data is stored in the LCMs' memory not in the module. This ensures that spare modules will be compatible; the transducer calibration data is downloaded to the module when the PC3000 is placed in the Run state.

All parameters associated with transducer calibration are included in the Analogue Output Module function block (Analog_Out).

Tr_Cal_Lo_P (TLP)

This is the lower of the two calibration input values e.g. 0%

Tr_Cal_Hi_P (THP)

This is the upper of the two calibration input values e.g. 100%

Tr_Cal_Lo_V (TLV)

This is the actual output value required to achieve the low calibration point value e.g. -0.1% results in valve fully shut.

Tr_Cal_Hi_V (THV)

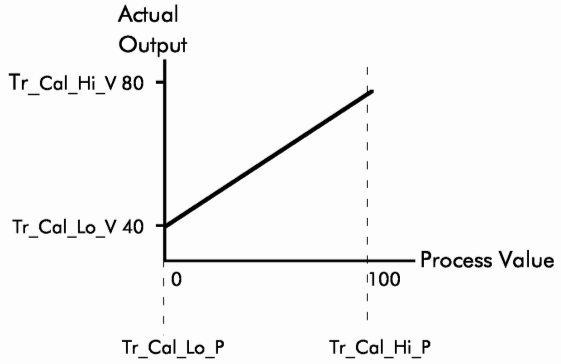
This is the actual output value required to achieve the high calibration point value e.g. 100.2% results in valve fully open.

Cal_Mode (CAL)

This parameter provides the mode of operation for the channel. Normally, the channel is in the Run state. During calibration the states TCal_Hi and TCal_Lo are selected from the list.

Example

Consider an output which is to deliver 8-16mA. Output_Type should be set to mA0-20 (0)



Carry out the following:

(1) Change the parameter Cal_Mode from Run (0) to TCal_Lo (2).

(2) Select Tr_Cal_Lo_P and enter a value of zero corresponding to the percentage of full scale required for the low calibration point. The module will output its value corresponding to the percentage entered as the Tr_Cal_Lo_P.

(3) Enter the required output value for a requested output of Tr_Cal_Lo_P. As the example requires 8mA output enter 40% (8/20 x 100%) via the parameter, Tr_Cal_Lo_V. The analogue output will take on this value.

(4) Change the parameter Cal_Mode from TCal_Lo (2) to TCal_Hi (3).

(5) Select Tr_Cal_Hi_P and enter a value of 100%. The module will output its value corresponding to the percentage entered as the Tr_Cal_Hi_P

(6) Enter the required output value for a requested output of Tr_Cal_Hi_P. As the example requires 16mA output enter 80% (16/20 x 100) via the parameter Tr_Cal_Hi_V. The analogue output will take on this value.

(7) Change the parameter Cal_Mode from TCal_Hi (3) to Run (0) in order to store the new calibration data.

(8) In the event of an error occurring whilst calibrating e.g. entering the wrong value for the desired output level, simply re-enter the value via Tr_Cal_Hi_V or Tr_Cal_Lo_V.

Forcing _I/O Value

These parameters provide the ability to decouple the output from the value produced by the program. This allows the plant interface to be tested independent of the PC3000 program values. This means that failure mechanisms may be easily tested or commissioning problems such as 'limit switch not yet installed' may be overcome.

The parameters are used in combination as follows:

Test_Enable (TEN)

Theis must be set to the On (1) state in order to force the Process_Value Once set the values of Status and Process_Value are set by the following parameters.

Test_Status (TST)

With the channel placed in test mode, this parameter may be used to directly control the Status parameter of the channel.

> **Note:** The value of the Status_Info parameter will always indicate OK (1) in this mode of operation.

Act_PV (APV)

With the channel placed in test mode, this parameter may be used to directly control the output level of the channel.

Status (ST)

When Test_Status is set to Off (0), Status reflects the status of the analog output hardware channel being referenced by the function block. If Test_Status is set to On (1), Status will take the value assigned to Test_Status.

Act_Status (AST)

The parameter Act_Status always reflects the status of the hardware channel. The parameter should be used for diagnostic purposes only.

Status_Info (STI)

Status_Info is a diagnostic parameter which is used to explain the state of status. It can have twelve possible states:

Reset (0):

The user program is not running.

Ok (1):

The channel is functioning normally.

No_Mod (2):

There is no module in the hardware slot being addressed by the

function block.

Wrg_Mod (3):

An incorrect module type has been fitted in the slot addressed by the function block.

Init (4):

The module or channel is being initialised.

Wrg_Ch (5):

The wrong channel type has been selected on the module. To correct the fault, the jumpers on the module must be set to correspond with the range selected by the parameter Output_Type.

No_Cal (6):

The output range selected at Output_Type has not been calibrated.

Calib (7):

The module is currently in calibration mode.

_ (8)

This option has no function.

_ (9)

This option has no function.

Clamp_H (10):

The requested output level is too large to be achieved. The output is clamped to the maximum value.

Clamp_L (11):

The requested output level is too small to be achieved, or is negative. The output is clamped to the minimum value.

Calibration Parameters

The parameters listed below are used for calibrating the hardware channel.

Cal_Mode	
Tr_Cal_Hi_P	
Tr_Cal_Lo_P	
Tr_Cal_Hi_V	See 'PC3000 Installation
Tr_Cal_Lo_V	handbook, HA022231 for
Hw_Cal_Hi_P	full details of calibration
Hw_Cal_Lo_P	procedure.
Hw_Cal_V	
C_Hw_Cal_Hi	
C_Hw_Cal_Lo	
Hw_Cal_Date	

Parameter Attributes

Name	Type	Cold Start	Read Access	Write Access	Type Specific Information	
Act_PV	**REAL**	0 %	Config	Config	High Limit Low Limit	100 % 0%
Act_Status	**BOOL**	NOGO (0)	Config	Block	Senses	NOGO (0) Go (1)
C_Hw_Cal_Hi	**REAL**	0%	Config	Block	High Limit Low Limit	100 % C_Hw_Cal_Lo
C_Hw_Cal_Lo	**REAL**	0%	Config	Block	High Limit Low Limit	C_Hw_Cal_Hi 0%
Cal_Mode	**ENUM**	Run (0)	Config	Config	Enumerat ed Values	Run (0) Save (1) Tcal_Lo (2) Tcal_Hi (3) Hcal_Lo (4) Hcal_Hi (5)
Hw_Cal_Hi_P	**REAL**	0%	Config	Config	High Limit Low Limit	110 % Hw_Cal_Lo_P
Hw_Cal_Lo_P	**REAL**	0%	Config	Config	High Limit Low Limit	Hw_Cal_Hi_P 0%
IO_Address	**IO_ADDRESS**		Config	None		
Output_Type	**ENUM**	mA0_20 (0)	Config	Config	Senses	mA0_20 (0) mA4_20 (1) V0_10 (2) V2_10 (3) V0_5 (4) V1_5 (5)
Process_Val	**REAL**	0 %	Oper	Oper	High Limit Low Limit	100 % 0%
Status	**BOOL**	NOGO (0)	Oper	Block	Senses	NOGO (0) Go (1)

Table 7-2 Analog_Out Parameter Attributes (continued)

Name	Type	Cold Start	Read Access	Write Access	Type Specific Information	
Status_Info	**ENUM**	Reset (0)	Oper	Block	Senses	See Parameter Description
Test_Enable	**BOOL**	Off (0)	Config	Config	Senses	Off (0) On (1)
Test_Status	**BOOL**	NOGO (0)	Config	Config	Senses	NOGO (0) Go (1)
Tr_Cal_Hi_P	**REAL**	100 %	Config	Config	High Limit Low Limit	100 % Tr_Cal_Lo_P
Tr_Cal_Hi_V	**REAL**	100 %	Config	Config	High Limit Low Limit	100 % Tr_Cal_Lo_V
Tr_Cal_Lo_P	**REAL**	0%	Config	Config	High Limit Low Limit	Tr_Cal_Hi_P 0%
Tr_Cal_Lo_V	**REAL**	0%	Config	Config	High Limit Low Limit	Tr_Cal_Hi_V 0%

Table 7-2 Analog_Out Parameter Attributes

T_PROP_OUT FUNCTION BLOCK

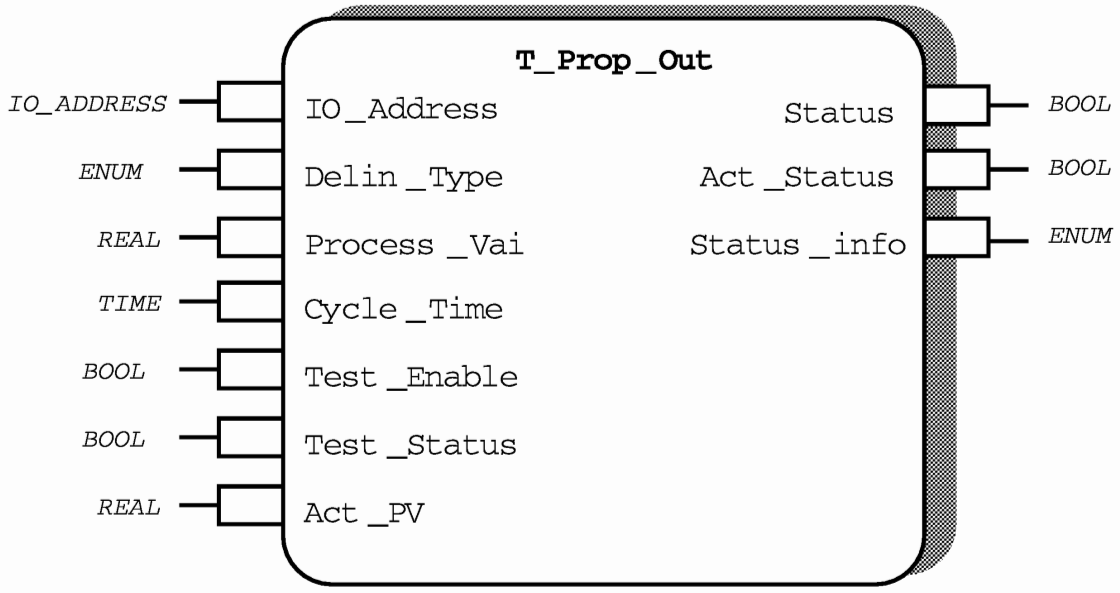


Figure 7-3 T_Prop_Out Function Block Diagram

Functional Description

The T_Prop_Out function block provides the function block interface to any hardware modules which can support a time proportioning output.

It reads a floating point (REAL) input parameter that defines the mark/space ratio for a physical digital output. Test facilities are provided to allow the mark/space ratio to be driven directly by a test value. The status of the block can be similarly overridden.

Function Block Attributes

Type: 24 50

Class:..... OUTPUTS

Default Task: ..... Task_2

Short List:..... Process_Val, Act_PV. Status, Status_Info

Memory Requirements: ..... 54 Bytes

Parameter Descriptions

IO_Address (IOA)

The parameter IO_Address associates the function block instance with the physical connections on the hardware module to which it is referenced. Its value is assigned automatically when the function block instance is defined. Its value takes the form X:YY:ZZ, where X represents the number of the rack in which the module is resident, YY represents the number of the slot in the rack and ZZ represents the number of the channel within the module.For example, 1:02:03 would mean that the function block instance references the third channel of a module which sits in the second slot of the first rack of the PC3000 system.

Delin_Type (DT)

The parameter Delin_Type defines the type of de-linearisation function which is employed by the output channel.

De-linearisation algorithms are employed to compensate for the non-linear cooling effect found in water cooled processes when vaporisation occurs in the cooling water. This effect is governed principally by the rate of flow and the difference between the water inlet temperature and the cooling coil temperature. If the water temperature rises to 100 ^{o} C before it reaches the output, then at least some of the water will be vaporised and the amount of heat removed will increase by a factor of about ten, due to the latent heat of vaporisation.

The de-linearisation algorithms should be applied to the control of the mean water flow rate in the cooling coils, which is governed by the time proportioning output driving the water control solenoid. When the controller and the water flow valve are both correctly set up, the non linearity of the output channel cancels out that of the cooling system.

Delin_Type can be set to one of three options. These are:

None (0):

When None is selected, the hardware output follows the Process_Val linearly.

D_800 (1):

This is the delinearisation law employed by Eurotherm's 800 series instruments. The law consists of a break point at 80% input power.

When the input power is below 80%, the output power is equal to input power / 4. When the power is above 80%, the output power is equal to (4.0 * input power) - 300.

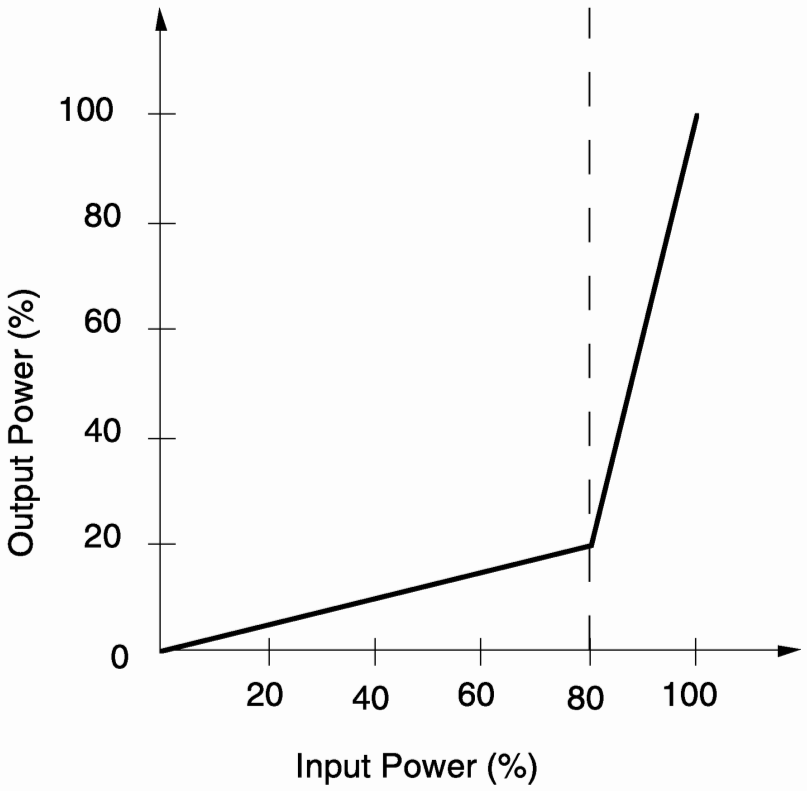


Figure 7-4 D_800 Delinearisation Relationship.

D_EM1 (2):

This is the delinearisation law employed by Eurotherm's EM1 instrument. The law consists of two breakpoints at 33.3% and 66.6% input power. When the input power is below 33.3%, the output power is equal to the 0.06 * input power. In the mid region from 33.3% to 66.6% input power, the output power is equal to (0.54*input power) - 16. In the upper region greater than 66.6% input power, the output power is equal to (2.4*input power) - 140.

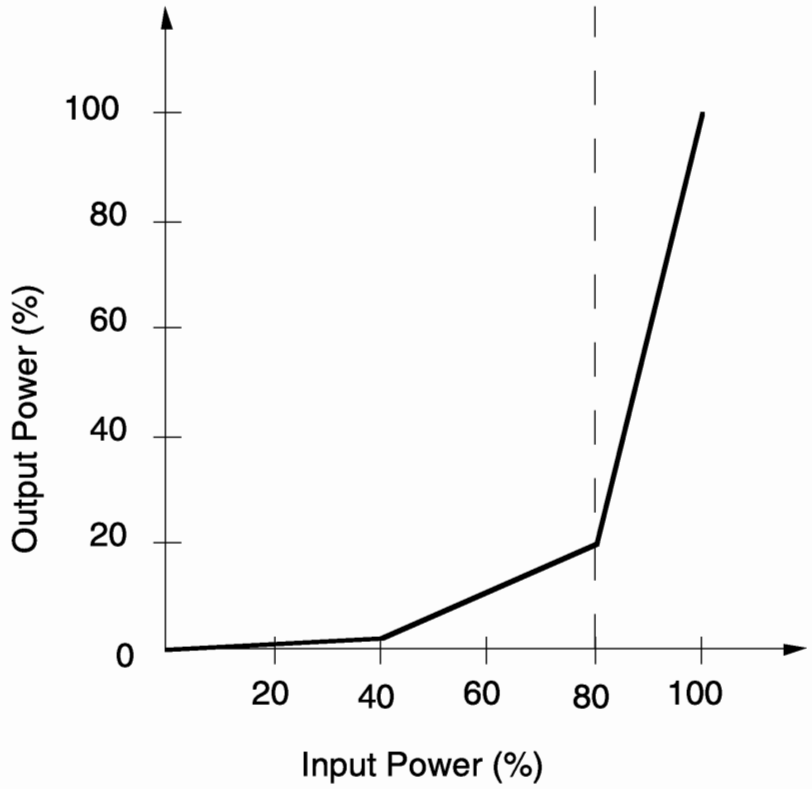


Figure 7-5 D_EM1 Delinearisation Relationship.

Process_Val (PV)

The Parameter Process_Val is the value which defines the output level of the hardware channel referenced by the function block during normal operation. If the Process_Val exceeds 100% the output will be limited to 100% (logic 1). If the Process_Val is negative, the output channel will be set to 0% (logic 0).

Note:- That when Test_Enable is On (1), Process_Val is not used.

This is the input driven by the control strategy.

Cycle_Time (CT)

The parameter Cycle_Time governs the on time (logic 1) and off time (logic 0) of the time proportioned output. The cycle time is defined as the time taken for the time proportioned output to undergo one complete cycle at fifty percent power . To reduce wear on the controlled equipment, the relationship between on time, off time and requested power level (Process_Val) is not linear. The on time and off time are governed by the relationships:

off time = $\frac{25.0.\ Cycle\_Time}{Process\_Val}$ on time = $\frac{25.0.\ Cycle\_Time}{(100\text{-}Process\_Val)}$

At power levels below 0.2%, the output will be permanently off (logic 0). At power levels above 99.8%, the output will be permanently on (logic 1).

It should be noted from the above relationship that Cycle_Time is only equal to on time + off time at 50% power. Cycle_Time represents the minimum period of the time proportioned output. At all output power levels other than 50%, the on time + off time duty cycle will be greater than the Cycle_Time.

The relationship between on time, off time, Cycle_Time and Process_Val is illustrated in the figure below.

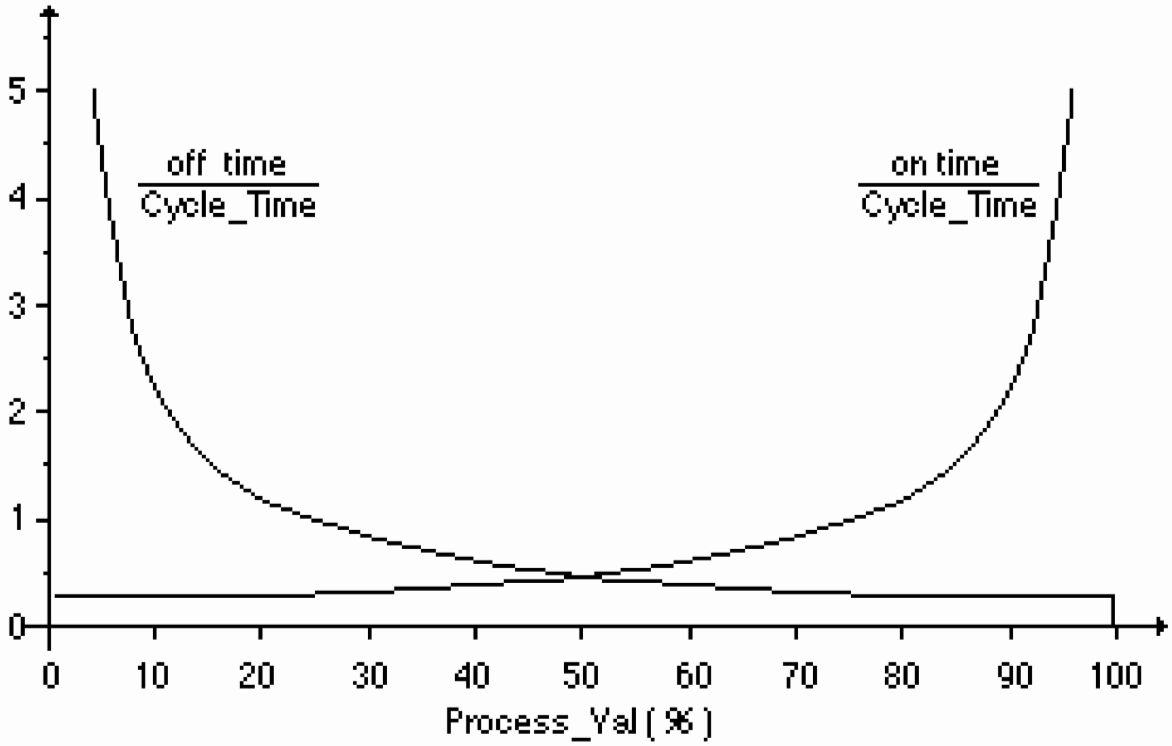


Figure 7-6 Relationship between on time, off time, Cycle_Time and Process_Val.

Forcing I/O Value

These parameters provide the ability to decouple the output from the value produces by the program. This allows the plant interface to be tested independent of the PC3000 program values. This means that failure mechanisms may be easily tested or commissioning problems such as 'limit switch not yet installed may be overcome.

Refer to the block diagram of the Function Block for details.

The parameters are used in combinations as shown below.

Test_Enable (TEN)

This must be set to the On state to force the output value at the terminals. Once set the value of Status and the signal at the terminals are set by the following parameters.

Test_Status (TST)

With the channel placed in test mode this parameter may be used to directly control the Status parameter of the channel.

Note: The value of the Status_Info parameter will always indicate OK in this mode of operation.

Act_PV (APV)

With the channel placed in test mode this parameter may be used to directly control the output state of the channel.

Status (ST)

When Test_Status is set to Off (0), the parameter Status reflects the status of the hardware channel being referenced by the function block. In this mode, if the requested power is greater than 100 % or is negative, Status will be set to NOGO (0)

If Test_Enable is set to On (1), Status will take the value assigned to Test_Status.

Act_Status (AST)

The parameter Act_Status always reflects the status of the hardware channel. If the requested power is greater than 100 % or is negative, Act_Status will be set to NOGO (0). Act_Status should be used for diagnostic purposes only.

Status_Info (STI)

Status_Info is a diagnostic parameter which is used to explain the state of Status. It can have five possible states:

Reset (0)	The user program is not running.
Ok (1):	The channel is functioning normally.
No_Mod (2):	There is no module in the hardware slot being addressed by the function block.
Wrg_Mod (3):	An incorrect module type has been fitted in the slot addressed by the function block.
Init (4):	The module or channel is being initialised.

Parameter Attributes

Name	Type	Cold Start	Read Access	Write Access	Type Specific Information	
Act_PV	**REAL**	0 %	Config	Config	High Limit Low Limit	100 % 0%
Act_Status	**BOOL**	NOGO (0)	Config	Block	Senses	NOGO (0) Go (1)
Cycle_Time	**TIME**	2 S	Super	Super	High Limit Low Limit	02 h_46 m_40 s 300ms(Logics) O2s (Relays)
Delin Type	**ENUM**	None (0)	Config	Config	Senses	None (0) D_800 (1) D_EM1 (2)
IO_Address	**IO_ADDRESS**		Super	Super		
Process_Val	**REAL**	0 %	Oper	Oper	High Limit Low Limit	100 % 0%
Status	**BOOL**	NOGO (0)	Oper	Block	Senses	NOGO (0) Go (1)
Status_Info	**ENUM**	Reset (0)	Oper	Block	Senses	Reset(0) Ok(1) No_Mod(2) Wrg_Mod(3) Init(4)
Test_Enable	**BOOL**	Off (0)	Config	Config	Senses	Off (0) On (1)
Test_Status	**BOOL**	NOGO (0)	Config	Config	Senses	NOGO (0) Go (1)

Table 7-3 T_Prop_Out Parameter Attributes

XFAST_AN_O FUNCTION BLOCK (Not for new design)

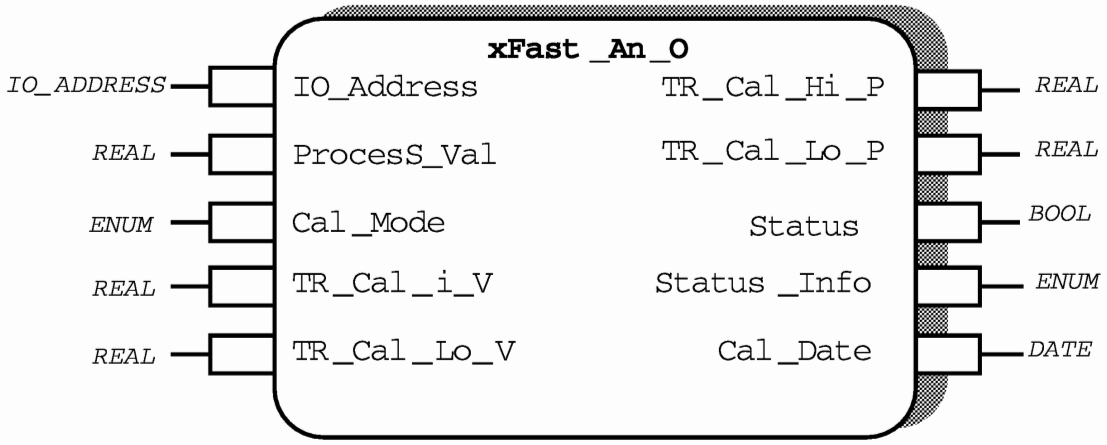


Figure 7-7 xFast_An_O Function Block Diagram

Functional Description

The xFast_An_O function block provides the function block interface to hardware modules which can support a Fast Analogue Output channel, for example, the fast analogue IO module (AI08).

It should be used where lower functionality than is provided by the Analog_Out function block is acceptable xFast_An_O presents a lower performance overhead than Analog_Out and can therefore run at higher task scan rates.

Function Block Attributes

Type:.....18 40

Class:..... ... OUTPUTS

Default Task: ..... Task_2

Short List: ..... Process_Val, Status, Status_Info

Memory Requirements: ..... 48 Bytes

Parameter Descriptions

Calibration Parameters

The parameters listed below are used for calibrating the hardware module addressed by the function block instance.

Cal_Mode

TR_Cal_Hi_V

TR_Cal_Lo_V

IO_Address (IOA)

The parameter IO_Address associates the function block instance with the physical connections on the hardware module to which it is referenced. Its value is assigned automatically when the function block instance is defined. Its value takes the form X:YY:ZZ, where X represents the number of the rack in which the module is resident, YY represents the number of the slot in the rack and ZZ represents the number of the channel within the module.For example, 1:02:03 would mean that the function block instance references the third channel of a module which sits in the second slot of the first rack of the PC3000 system.

Process_Val (PV)

The Process_Val is the value which defines the output level of the hardware channel being referenced by the function block. If the value input to Process_Val is greater than 102.4 %, the Status will be NOGO (0), Status_Info will be Clmp_Hi (6) and the output channel will be held at 100 % power. If the value input to Process_Val is less than -102.4 %, the status will be NOGO (0), Status_Info will be Clmp_Lo (7) and the output channel will be held at -100 % power.

Status (ST)

Status reflects the status of the hardware channel being addressed by the function block.

Status_Info (STI)

Status_Info is a diagnostic parameter which is used to explain the state of status. It can have eight possible states:

Reset (0):	The user program is not running.
Ok (1):	The channel is functioning normally.
No_Mod (2):	There is no module in the hardware slot being addressed by the function block.
Wrg_Mod (3):	An incorrect module type has been fitted in the slot addressed by the function block.
Calib (4):	The module is currently in calibration mode.
Init (5):	The module or channel is being initialised.
Clmp_Hi (6):	The requested output level is too large to be achieved.
Clmp_Lo (7):	The requested output level is too small to be achieved, or is negative.

Parameter Attributes

Name	Type	Cold Start	Read Access	Write Access	Type Specific Information	
Cal_Date	**DATE**	01-Jan-1970	Config	Config		
Cal_Mode	**ENUM**	Run (0)	Config	Config	Senses	Run (0) Save (1) Hcal_Hi (2) Hcal_Lo (3) Tcal_Hi (4) Tcal_Lo (5) Dflt_TR (6)
IO_Address	**IO_ADDRESS**		Config	Config		
Process_Val	**REAL**	0%	Config	Config	High Limit Low Limit	110 % -110 %
Status	**BOOL**	Go (1)	Oper	Block	Senses	NOGO (0) Go (1)
Status_Info	**ENUM**	Ok (1)	Oper	Block	Senses	See Parameter Description
TR_Cal_Hi_P	**REAL**	100%	Config	Config	High Limit Low Limit	110 % TR_Cal_Lo_P
TR_Cal_Hi_V	**REAL**	100%	Config	Config	High Limit Low Limit	110 % TR_Cal_Lo_V
TR_Cal_Lo_P	**REAL**	-100%	Config	Config	High Limit Low Limit	TR_Cal_Hi_P -110 %
TR_Cal_Lo_V	**REAL**	-100%	Config	Config	High Limit Low Limit	TR_Cal_Hi_V -110 %

Table 7-4 Fast_An_Out Parameter Attributes