

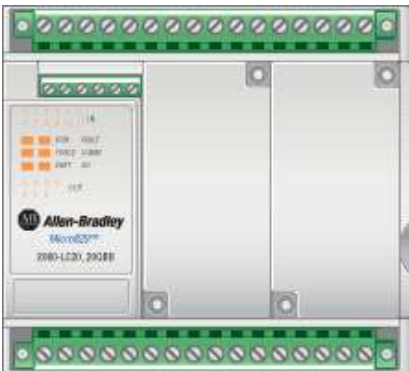
Micro820

Micro820

Device Configuration

Controller

Overview

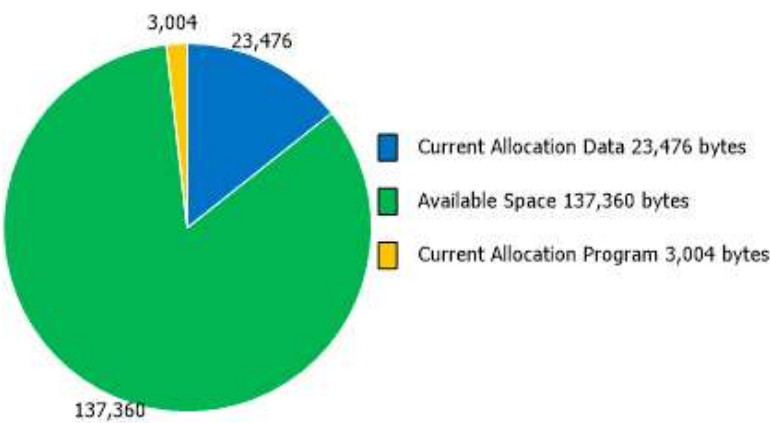


General

Name	Description	Vendor Name	Catalog ID	Product Lifecycle	Controller Project Version	Download Source Code
Micro820		Allen-Bradley	2080-LC20-20QBB	Active	12	Yes

Memory

Memory Statistics



Name	Allocated	Used	Free
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Embedded Project	348,160 bytes	2,430 bytes	345,730 bytes
Temporary Variables	8,420 bytes	228 bytes	8,192 bytes
Retentive Memory (bytes)	400 bytes	0 bytes	400 bytes
Retentive Memory (blocks)	400 blocks	0 blocks	400 blocks

Startup/Faults

Mode Behavior	Fault Override	Memory Card	Hard Fault
Retain previous power-down mode	Do not clear fault	Memory Card	Stop controller

Serial Port

Common Settings

Driver	Baud Rate	Parity	Station Address
CIP Serial	38400	None	1

Remote LCD is configured to overwrite the serial port parameters.

Ethernet

Port Settings

Port State: Enabled

Auto-Negotiate Speed and Duplex Mode: Enabled

Internet Protocol (IP) Settings

Startup Configuration	IP Address	Subnet Mask	Gateway Address	Detect duplicate IP address
DHCP	192.168.1.160	255.255.255.0	192.168.1.1	Enabled

EtherNet/IP

Inactivity Timeout: 120 sec

Modbus TCP

Modbus TCP Server state: Disabled

Interrupts

Id	Type	Type Group	Parameters
15	STI0	Selectable Timed Interrupt (STI)	PID_Control_1000ms_STI0, Auto Start, Set point 1000ms
16	STI1	Selectable Timed Interrupt (STI)	Average_test_1000ms_STI1, Auto Start, Set point 2000ms

Real Time Clock

Allow real time clock to be changed in run mode: Disabled

Embedded I/O

Input Filter

Inputs	0-1	2-3	4-5	6-7	8-9	10-11
Input Filter	Default (DC 8ms)	Default (DC 8ms)	Default (AC 8ms)	Default (AC 8ms)	Default (AC 8ms)	Default (AC 8ms)

Gain & Offset

Input	0	1	2	3
Gain	100	100	100	100
Offset	0	0	0	0

Output	0
Gain	100
Offset	0

Memory Card

Memory Card Settings

Load on power up	Include Project & Logical values upon Backup/Restore
Disabled	False

Remote LCD

Hardware Settings

Enable Push Button Key Read	Backlight Mode	Time Value	Contrast
True	Interval	30 sec	50%

Startup Message

Display Time	Font Size	Max Size	Message
3 sec	Large (8x16 pixel)	96 Characters (24 columns x 4 rows)	2080-REMLCD

Global Variables

Name	Alias	Data Type	Dimension	Initial Value	Project Value	Comment	Direction	Retained	String Size
_IO_EM_DO_00		BOOL			FALSE		VarDirectlyRepresented	False	
_IO_EM_DO_01		BOOL			FALSE		VarDirectlyRepresented	False	
_IO_EM_DO_02		BOOL			FALSE		VarDirectlyRepresented	False	

_IO_EM _DO_03		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DO_04		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DO_05		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DO_06		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DI_00		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DI_01		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DI_02		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DI_03		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DI_04		BOOL			TRUE		VarDire ctlyRepr esented	False	
_IO_EM _DI_05		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DI_06		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DI_07		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DI_08		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DI_09		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DI_10		BOOL			FALSE		VarDire ctlyRepr esented	False	
_IO_EM _DI_11		BOOL			FALSE		VarDire ctlyRepr esented	False	

_IO_EM_AI_00		WORD			0		VarDirectlyRepresented	False	
_IO_EM_AI_01		WORD			0		VarDirectlyRepresented	False	
_IO_EM_AI_02		WORD			0		VarDirectlyRepresented	False	
_IO_EM_AI_03		WORD			0		VarDirectlyRepresented	False	
_IO_EM_AO_00		WORD			0		VarDirectlyRepresented	False	
pid_output_scale		REAL		1.0	1.0		Var	False	
output_of_controller	Fifo_source	REAL		0.0	0.0		Var	False	
output_of_model	p_v_of_controller	REAL		0.0	0.0		Var	False	
setpoint	sp_of_controller	REAL		0.0	0.0		Var	False	
pid_output_offset		REAL		0.0	0.0		Var	False	
decay_rate		REAL		1.0e-3	0.001		Var	False	
run_model		BOOL		FALSE	TRUE		Var	False	
pidgains		PID_GAINS		...	...		Var	False	
CVManual		REAL		0.0	0.0		Var	False	
pid_auto		BOOL			FALSE		Var	False	
error		REAL		0.0	0.0		Var	False	
fifo_array_index		DINT			1805		Var	False	
fifo_array		REAL	[0..2047]	...	...		Var	False	

__SYSV A_CYCL ECNT		DINT			193063	Cycle counter	VarGlob al	False	
__SYSV A_CYCL EDATE		TIME			T# 11d8h1 4m2s17 6ms	Timesta mp of the beginni ng of the cycle in millisec onds (ms)	VarGlob al	False	
__SYSV A_KVBP ERR		BOOL			FALSE	Kernel variable binding produc ing error (produc tion error)	VarGlob al	False	
__SYSV A_KVBC ERR		BOOL			FALSE	Kernel variable binding consumi ng error (consu mption error)	VarGlob al	False	
__SYSV A_RESN AME		STRING			'CONTR OLLER \MICRO 820 \MICRO 820'	Resourc e name (max length= 255)	VarGlob al	False	
__SYSV A_SCAN CNT		DINT			193065	Input scan counter	VarGlob al	False	
__SYSV A_TCYC YCTIME		TIME			T#0s	Progra mmed cycle time	VarGlob al	False	
__SYSV A_TCYC URRENT		TIME			T#4ms	Current cycle time	VarGlob al	False	

__SYSV A_TCYM AXIMUM		TIME			T#6ms	Maximum cycle time since last start	VarGlobal	False	
__SYSV A_TCYO VERFLOW		DINT			0	Number of cycle overflows	VarGlobal	False	
__SYSV A_RESMODE		SINT			3	Resource execution mode	VarGlobal	False	
__SYSV A_CCEX EC		BOOL			FALSE	Execute one cycle when applicati on is in cycle to cycle mode	VarGlobal	False	
__SYSV A_REMOTE		BOOL		FALSE	TRUE	Remote status	VarGlobal	False	
__SYSV A_SUSP END_ID		UINT		0	0	Last Suspend ID	VarGlobal	False	
__SYSV A_TCYWDG		UDINT		2000	2000	Software Watchdog	VarGlobal	False	
__SYSV A_MAJ_ ERR_HALT		BOOL		FALSE	FALSE	Major Error Halted status	VarGlobal	False	
__SYSV A_ABORT T_CYCLE		BOOL		FALSE	FALSE	Aborting Cycle	VarGlobal	False	
__SYSV A_FIRST _SCAN		BOOL		TRUE	FALSE	First scan bit	VarGlobal	False	
__SYSV A_USER _DATA_ LOST		BOOL		FALSE	FALSE	User data lost	VarGlobal	False	

__SYSV A_POWERUP_BIT		BOOL		TRUE	FALSE	Power-up bit	VarGlobal	False	
__SYSV A_PROJECT_INCOMPLETE		UDINT		0	0	Project Incomplete	VarGlobal	False	
STI0		IRQSTI		...	...	Selected Timed Interrupt #0	VarGlobal	False	
STI1		IRQSTI		...	...	Selected Timed Interrupt #1	VarGlobal	False	

Programs

Process Model

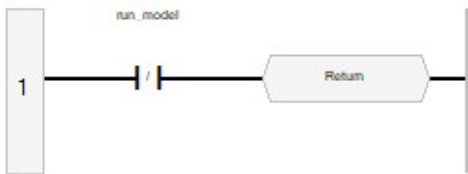
Local Variables

Name	Alias	Data Type	Dimension	Initial Value	Project Value	Comment	Direction	Retained	String Size
fifo_dest		REAL			0.0		Var	False	
target_value		REAL			0.0		Var	False	
target_delta		REAL			0.0		Var	False	
save_output		REAL			0.0		Var	False	
filtered_output		REAL			0.0		Var	False	
AVERAGE_object		AVERAGE		...	...	Only .Fifo is used	Var	False	
unused_average		REAL			-5.91427E-06		Var	False	

Rung1 Diagram

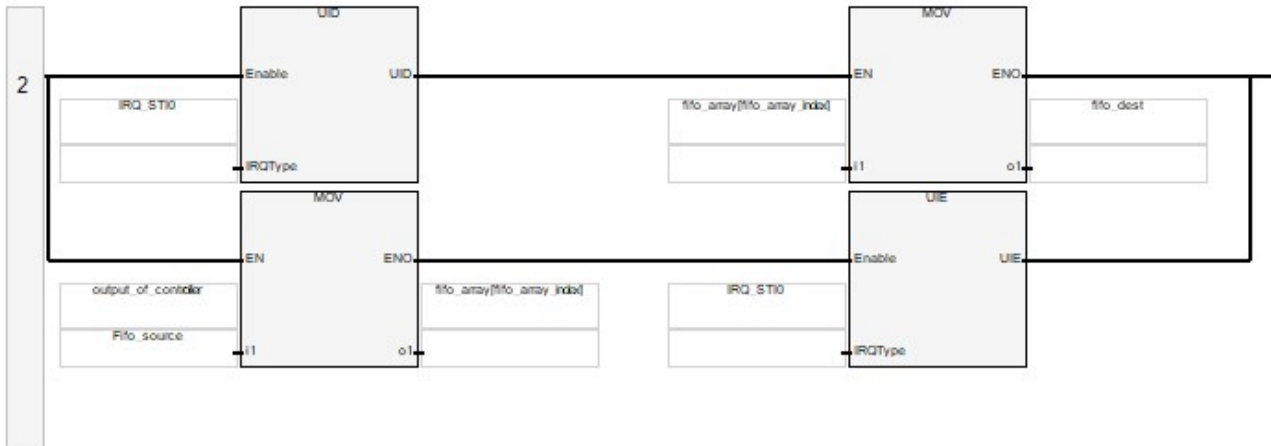
Process model First-Order Plus Dead Time (FOPDT)

This model is only active when BOOL run_model is TRUE. Actual dead time is a function of scan time and the length of global array fifo_array[0..2047], so unless this Program is driven by an interrupt, th



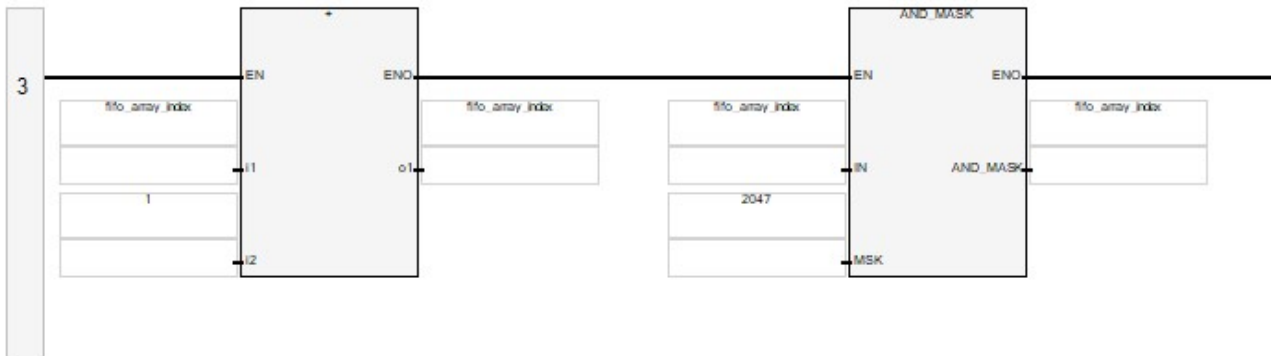
Rung2 Diagram

Extract dead-time-applied target PID output value from FIFO into REAL Var fifo_dest, replace with output of controller



Rung3 Diagram

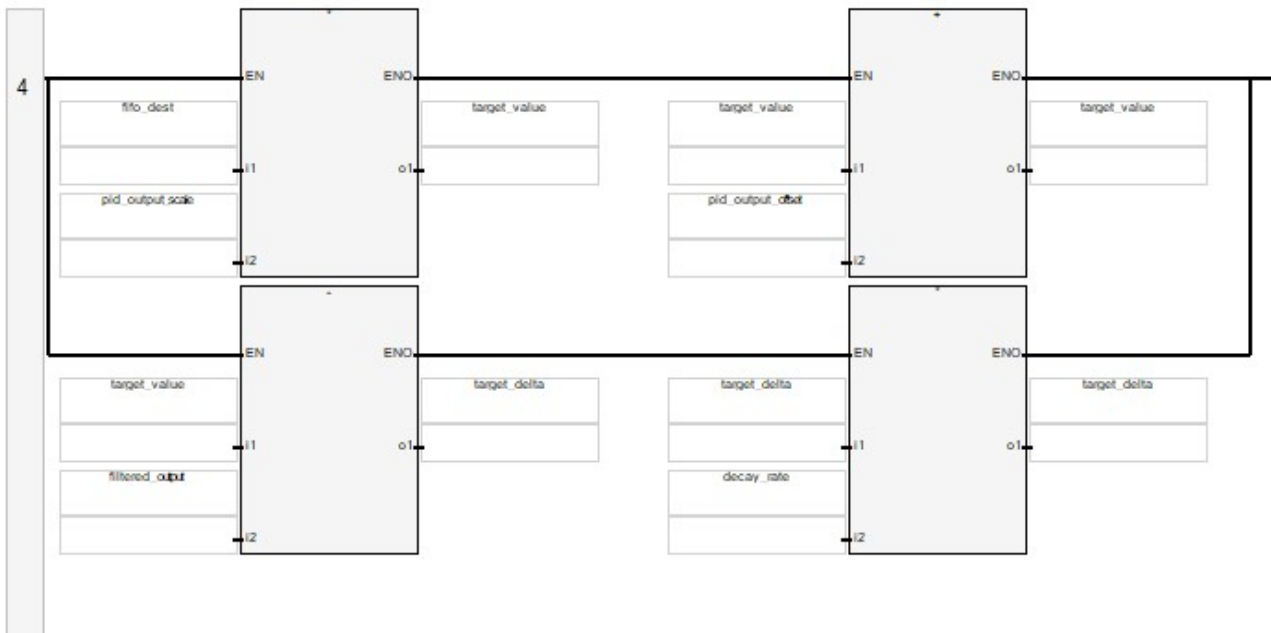
Increment index into FIFO



Rung4 Diagram

Apply scale and offset to fifo_dest

Calculate delta from current filtered output, apply First-Order decay to calculate delta change from current filtered model output



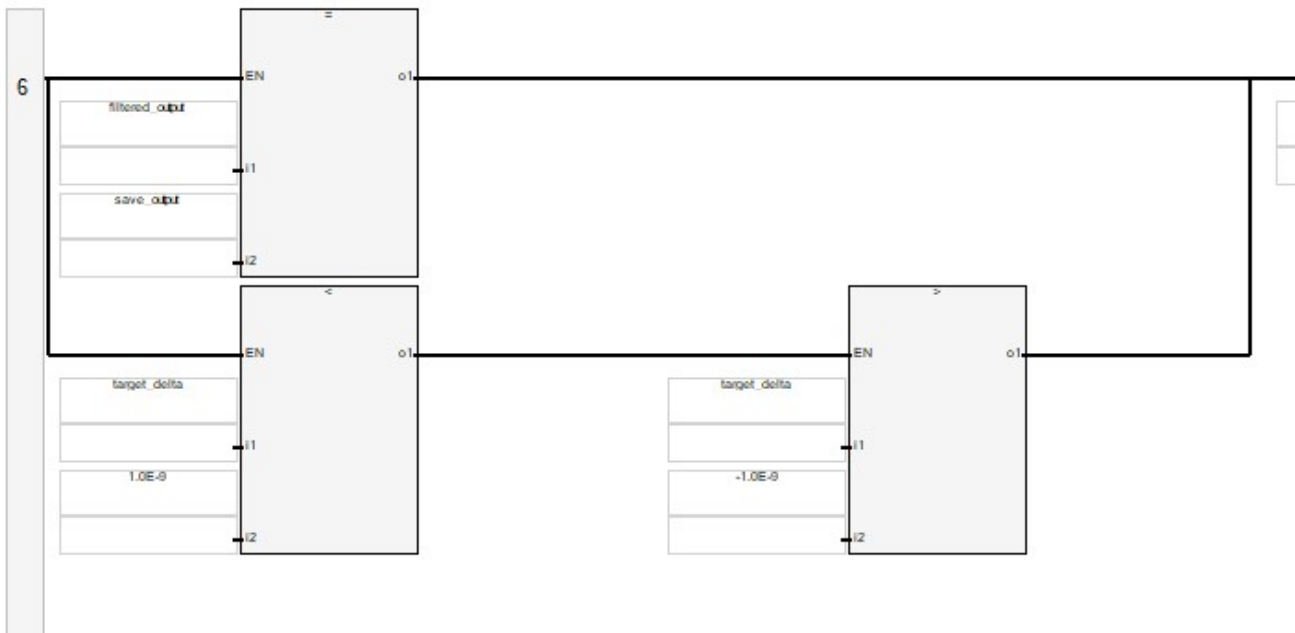
Rung5 Diagram

Add delta to filtered model output



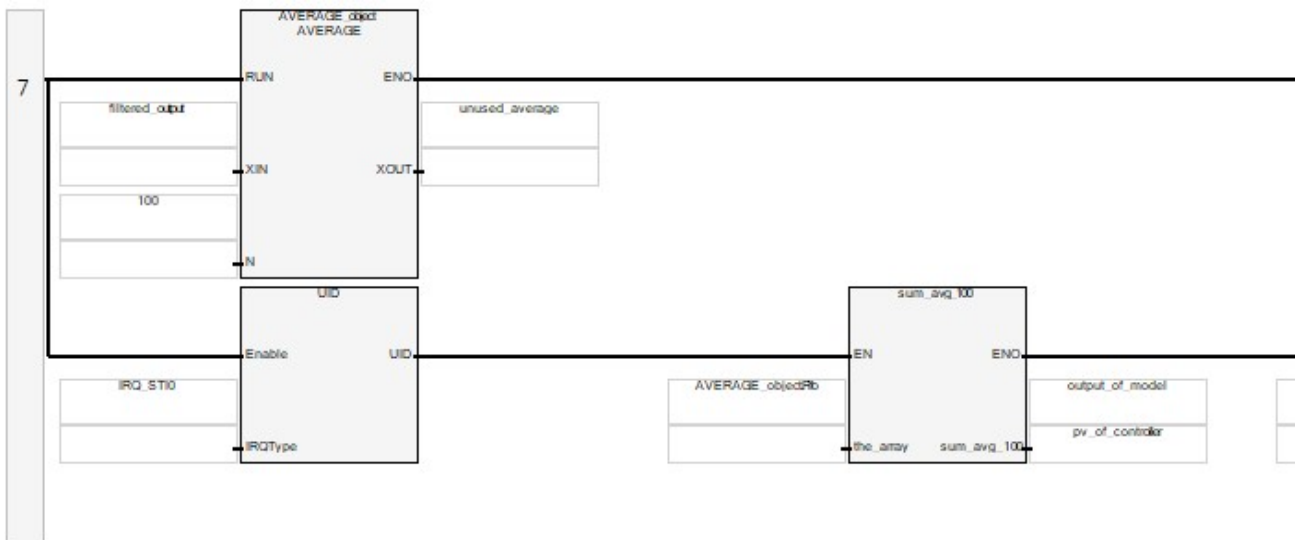
Rung6 Diagram

If filtered model output does not change due to truncation in addition of delta, or delta magnitude is less than $1e-9$, then force filtered model output to target value.



Rung7 Diagram

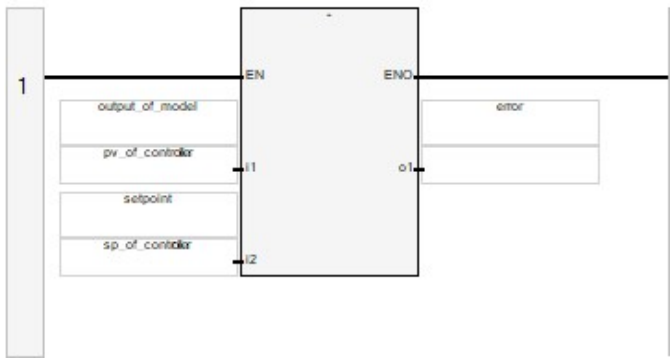
Average the last 100 filtered model outputs, then discard the resulting average, because this is only used to place the value into the AVERAGE_AVERAGE_object.Fifo array
Sum the values in that FIFO, and use that sum as this model's final output



Main

Rung1 Diagram

Calculate PID error as (PresentValue - SetPoint)



PID_reset

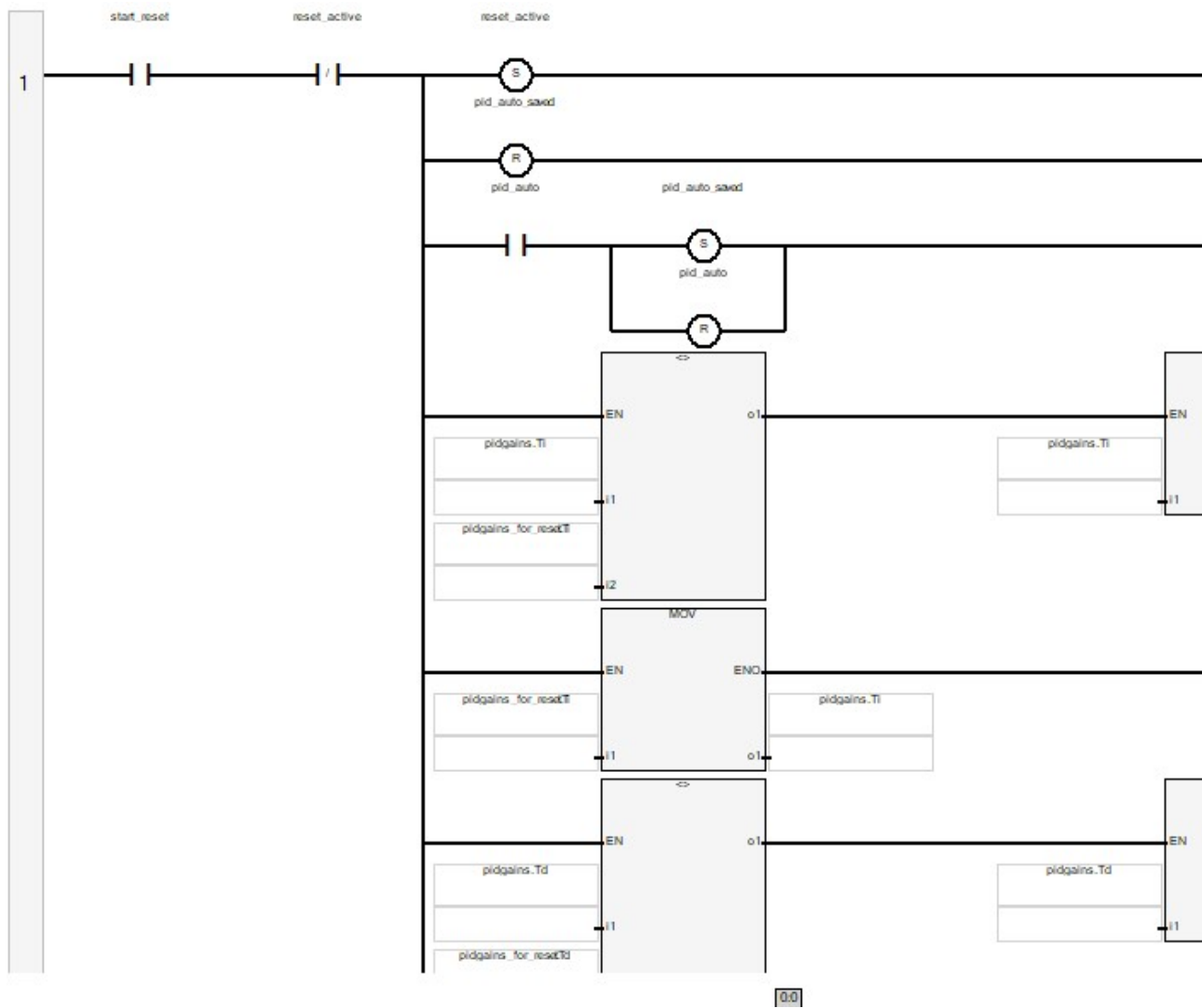
Local Variables

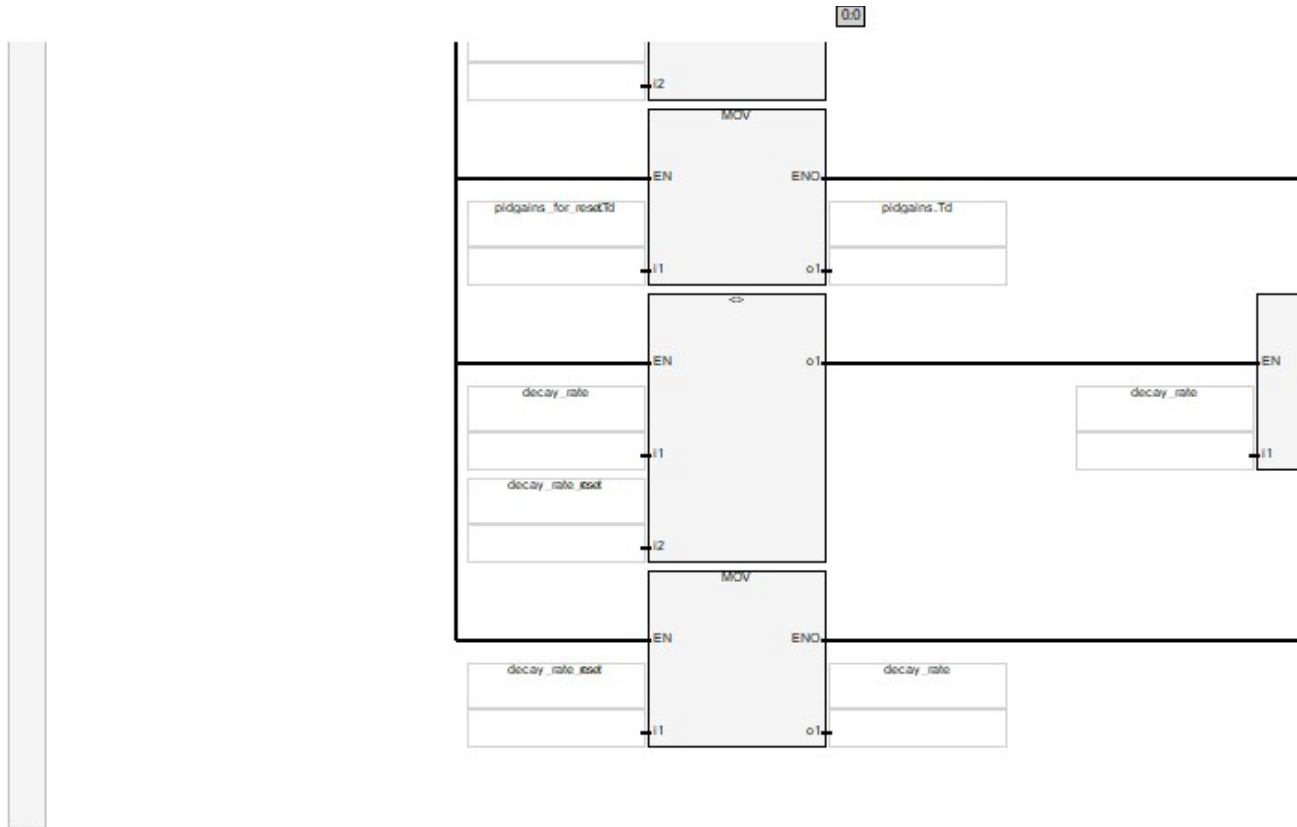
Name	Alias	Data Type	Dimension	Initial Value	Project Value	Comment	Direction	Retained	String Size
start_reset		BOOL		FALSE	FALSE		Var	False	
reset_active		BOOL			FALSE		Var	False	
pidgains_saved		PID_GAINS		...	...		Var	False	
pidgains_for_reset		PID_GAINS		...	...		Var	False	
NewVariable2		BOOL			FALSE		Var	False	
pid_auto_saved		BOOL			FALSE		Var	False	
PID_reset_ton		TON		...	...		Var	False	
decay_rate_saved		REAL		1.0e-3	0.001		Var	False	
decay_rate_reset		REAL		1.0	1.0		Var	False	

Rung1 Diagram

Perform reset of PID and Process_Model

- Initiation is rising edge of BOOL start_reset on one scan: ensure PID is not in auto; save several current values; assign reset-values that will return PID and Process Model to steady state.
- Rising edge of sta

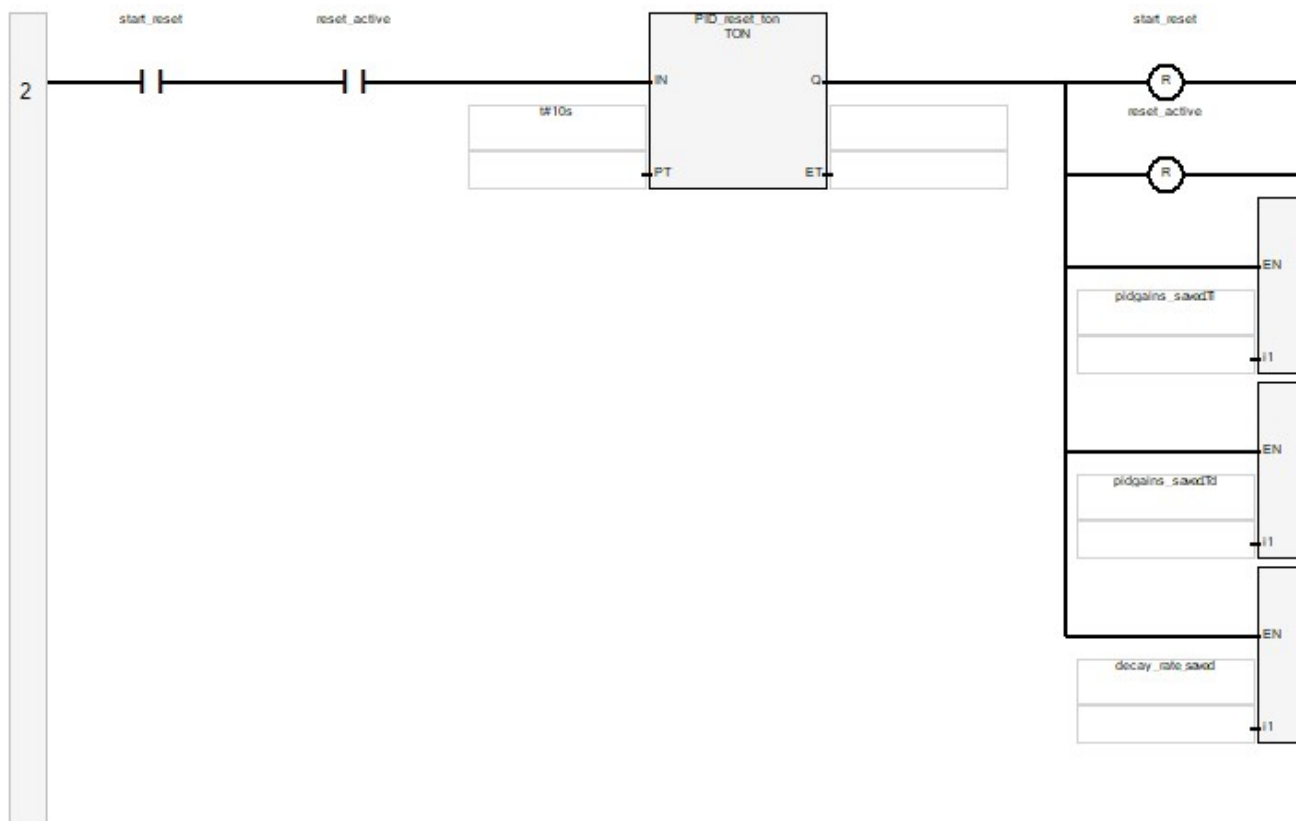




Rung2 Diagram

Start 10s timer when reset_active becomes 1 on previous rung

On timer expiry: restore PID and Process Model values from *_saved values on previous rung at initiation; assign 0s to reset_active and start_reset to end reset activity



PID_Control_1000ms_STIO

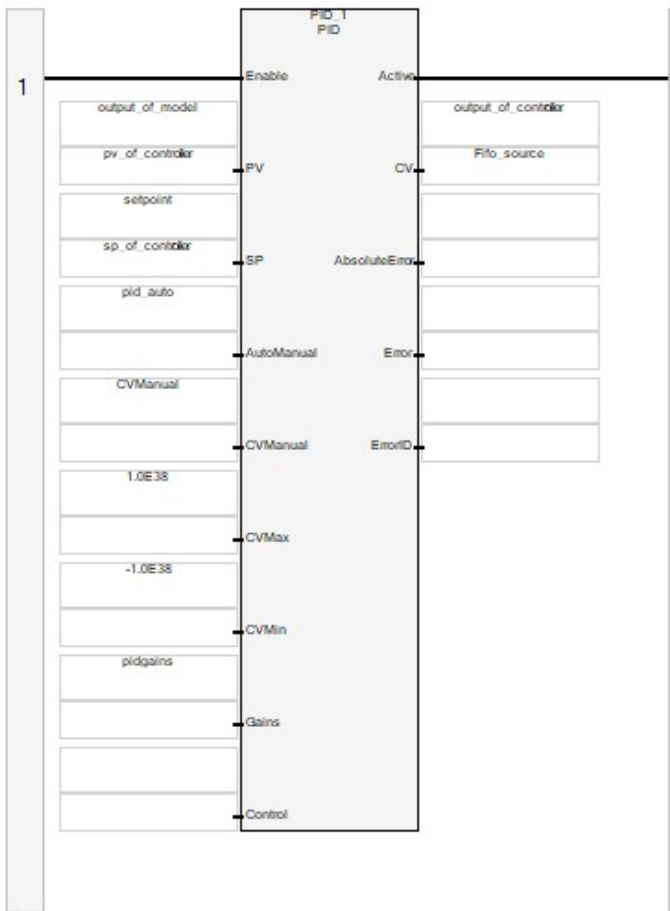
Local Variables

Name	Alias	Data Type	Dimension	Initial Value	Project Value	Comment	Direction	Retained	String Size
PID_1		PID		...	...		Var	False	

Rung1 Diagram

Apply PID control to drive model output to setpoint

- CV affects neither PV nor SP unless BOOL run_model is 1



Average_test_1000ms_STI1

Local Variables

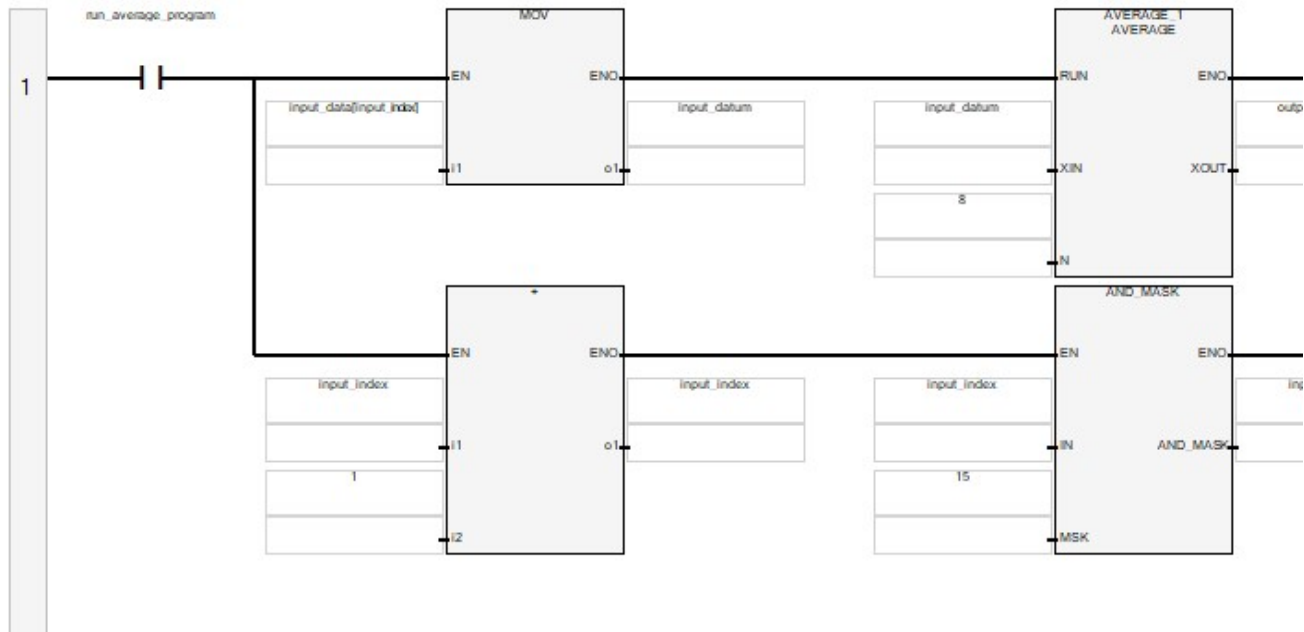
Name	Alias	Data Type	Dimension	Initial Value	Project Value	Comment	Direction	Retained	String Size
input_data		REAL	[0..15]	...	...		Var	False	
input_index		DINT			0		Var	False	
output_average		REAL			0.0		Var	False	
AVERAGE_1		AVERAGE		...	...		Var	False	
input_datum		REAL			0.0		Var	False	
output_dint		DINT			0		Var	False	

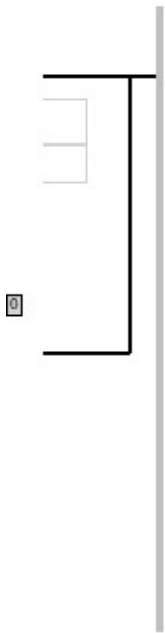
run_ave rage_pr ogram		BOOL		FALSE	FALSE		Var	False	
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Rung1 Diagram

Calculate a running average of 8 consecutive wrapped elements out of the 16 elements in REAL array `input_data[0..15]`. The `input_data` array comprises 14 values from 1.125 to 2.875 in steps of 0.125 (one-eighth i.e. 2^{-3}), plus a 15th value of 2^{-29} .

Sin





User-Defined Functions

sum_avg_100

Local Variables

Name	Alias	Data Type	Dimension	Initial Value	Project Value	Comment	Direction	String Size
idx		DINT					Var	
sumtmp		REAL					Var	
the_array		REAL	[0..127]	...	...		VarInput	
sum_avg_100		REAL					VarOutput	

Programs