Programa listas y diagramas

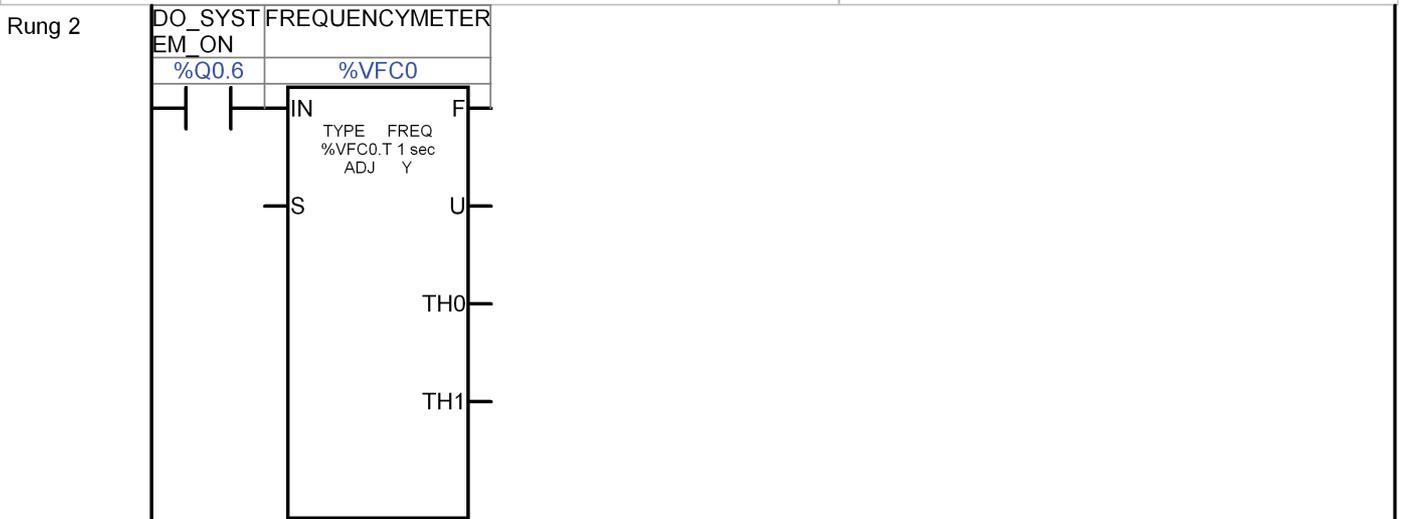| 1 LD	Motor control	

LOCAL SYSTEM ACTIVATION

Rung 0

| DI_SYST_ON %I0.3 | DI_SYST_OFF %I0.5 | | | | | SYSTEM_ON %M5 |

SYSTEM_ON %M5

SYSTEM ON/OFF

Rung 1

| SYSTEM_ON %M5 | SCADA_SYS %M20 | DI_REMOTE %I0.0 | | | | DO_SYSTEM_ON %Q0.6 |

DI_REMOTE %I0.0

FREQUENCYMETER

Rung 2

DO_SYSTEM_ON %Q0.6

FREQUENCYMETER %VFC0

```
IN              F
   TYPE    FREQ
   %VFC0.T 1 sec
   ADJ     Y
S               U

              TH0

              TH1
```

FREQUENCY

Rung 3

DO_SYSTEM_ON %Q0.6

FREQUENCY := FREQUENCYMETER.V

%MW1 := %VFC0.V

LOCAL INPUT

Rung 4

DO_SYSTEM_ON %Q0.6	DI_REMOTE %I0.0	

INPUT := %IW0.0.1
%MW5 := %IW0.0.1

ANALOG_INPUT := DWORD(INPUT)
%MD6 := DWORD(%MW5)

ANALOG_SCALED := ANALOG_INPUT * 100
%MD8 := %MD6 * 100

ANALOG_MAPPED := ANALOG_SCALED / 511
%MD10 := %MD8 / 511

MAPPED_INPUT := LW(ANALOG_MAPPED)
%MW0 := LW(%MD10)

REMOTE INPUT

Rung 5

DO_SYSTEM_ON %Q0.6   DI_REMOTE %I0.0

REMOTE_CONTROL %M22
( )

MAPPED_INPUT := SCADA_AI
%MW0 := %MW19

PROP. CONTROL INIT.

Rung 6

SYSTEM_ON %M5 —| P |—

KP = 0
%MW20 = 0
| < |

KP := KP0
%MW20 := %KW0

BIAS := B0
%MW23 := %KW1

PROPORTIONAL CONTROL

Rung 7

DO_SYSTEM_ON %Q0.6   REMOTE_PID %M23 —|/|—

DI_REMOTE %I0.0 —|/|—

DIFFERENCE := MAPPED_INPUT - FREQUENCY
%MW2 := %MW0 - %MW1

PROP_ERROR := DIFFERENCE * KP
%MW3 := %MW2 * %MW20

DUTY_CYCLE := PROP_ERROR + BIAS
%MW4 := %MW3 + %MW23

PID WITH PWM OUTPUT

Rung 8

DO_SYSTEM_ON %Q0.6   DI_REMOTE %I0.0   REMOTE_PID %M23

PID 0
PID 0

LIMITS

Rung 9

DO_SYSTEM_ON	DUTY_CYCLE < 0		DUTY_CYCLE := 0
%Q0.6	%MW4 < 0		%MW4 := 0
	<		
	DUTY_CYCLE > 100		DUTY_CYCLE := 100
	%MW4 > 100		%MW4 := 100
	<		

DUTY CYCLE

Rung 10

DO_SYSTEM_ON		PWM_MOTOR.R := DUTY_CYCLE
%Q0.6		%PWM0.R := %MW4

PWM

Rung 11

DO_SYSTEM_ON — %Q0.6

PWM_MOTOR — %PWM0

```
IN
      TB    10 ms
      ADJ    Y
      %PWM0.P
      10
```

---

2) LD | **Variables**

PLC TO SCADA

Rung 0

DO_SYSTEM_ON — %Q0.6
DI_REMOTE — %I0.0 (normally closed)

		TIME_1_CLOSED_P := TOFF_CLOSE_1.P
		%MW24 := %TM0.P
		TIME_1_OPEN_P := TOFF_OPEN_1.P
		%MW25 := %TM1.P
		TIME_2_CLOSED_P := TOFF_CLOSE_2.P
		%MW26 := %TM2.P
		TIME_2_OPEN_P := TOFF_OPEN_2.P
		%MW27 := %TM3.P
		CONT_1_P := REPET_CIL_2.P
		%MW28 := %C1.P
		CONT_2_P := %C2.P
		%MW29 := %C2.P
		PWM_P := PWM_MOTOR.P
		%MW30 := %PWM0.P

SCADA TO PLC

Rung 1

DO_SYST EM_ON	DI_REMO TE
%Q0.6	%I0.0

TOFF_CLOSE_1.P := TIME_1_CLOSED_P
%TM0.P := %MW24

TOFF_OPEN_1.P := TIME_1_OPEN_P
%TM1.P := %MW25

TOFF_CLOSE_2.P := TIME_2_CLOSED_P
%TM2.P := %MW26

TOFF_OPEN_2.P := TIME_2_OPEN_P
%TM3.P := %MW27

REPET_CIL_2.P := CONT_1_P
%C1.P := %MW28

%C2.P := CONT_2_P
%C2.P := %MW29

PWM_MOTOR.P := PWM_P
%PWM0.P := %MW30

Rung 2

DO_SYST EM_ON
%Q0.6

TIME_1_CLOSED_V := TOFF_CLOSE_1.V
%MW12 := %TM0.V

TIME_1_OPEN_V := TOFF_OPEN_1.V
%MW13 := %TM1.V

TIME_2_CLOSED_V := TOFF_CLOSE_2.V
%MW14 := %TM2.V

TIME_2_OPEN_V := TOFF_OPEN_2.V
%MW15 := %TM3.V

WAITING_TIME := TOFF_FINAL.V
%MW16 := %TM5.V

CONT_1_V := REPET_CIL_1.V
%MW17 := %C0.V

CONT_2_V := REPET_CIL_2.V
%MW18 := %C1.V

Rung 3

```
DO_SYST
EM_ON
%Q0.6
──]/[──────┬────────────────────────────
           │
```

TIME_1_CLOSED_V := 0	%MW12 := 0
TIME_1_OPEN_V := 0	%MW13 := 0
TIME_2_CLOSED_V := 0	%MW14 := 0
TIME_2_OPEN_V := 0	%MW15 := 0
WAITING_TIME := 0	%MW16 := 0
CONT_1_V := 0	%MW17 := 0
CONT_2_V := 0	%MW18 := 0

---

(3) LD   Cylinders

Rung 0

```
DO_SYST  DI_CYL_O  DI_CYL_O                                    CYL_ON
EM_ON    N         FF
%Q0.6    %I0.2     %I0.4                                        %M6
──] [──┬──] [──┬──] [────────────────────────────────────────( )──
       │       │
       │CYL_ON │
       │%M6    │
       └──] [──┘
```

Rung 1

```
CYL_ON   DI_REMO   SCADA_C                                    DO_CYLI
         TE        YL                                         NDERS_O
                                                              N
%M6      %I0.0     %M21                                       %Q0.5
──] [──┬──] [──┬──]/[────────────────────────────────────────( )──
       │       │
       │DI_REMO│
       │TE     │
       │%I0.0  │
       └──]/[──┘
```

Rung 2

DO_CYLINDERS_ON	FINAL_TOFFF	DI_OPENED_C1			OPENED_C1
%Q0.5	%M13	%I0.6			%M14
┤├	┤/├	┤├			─( )─

		DI_OPENED_C2			OPENED_C2
		%I0.8			%M15
		┤├			─( )─

		DI_CLOSED_C1	DI_CLOSED_C2		INIT_CONDITION
		%I0.7	%I0.9		%M0
		┤├	┤├		─( )─

		INIT_CONDITION	
		%M0	
		┤├	

Rung 3

DO_CYLINDERS_ON	DI_CLOSED_C1			CLOSED_C1
%Q0.5	%I0.7			%M1
┤├	┤├			─( )─

	DI_CLOSED_C2			CLOSED_C2
	%I0.9			%M3
	┤├			─( )─

---

④ LD | **Cylinder 1**

Rung 0

DO_CYLINDERS_ON	INIT_CONDITION	DO_OPEN_C1	DI_CLOSED_C1	CYL_TOGGLE	TOFF_1_C1	TOFF_CLOSE_1	TOFF_0_C1
%Q0.5	%M0	%Q0.1	%I0.7	%M9	%M7	%TM0	%M2
┤├	┤├	┤/├	┤├	┤/├	┤/├		─( )─

```
IN        Q
   TYPE  TOF
   TB    1 sec
   ADJ   Y
   %TM0.P
   2
```

Rung 1

DO_CYLINDERS_ON	INIT_CONDITION	DO_CLOSE_C1	DI_OPENED_C1	CYL_TOGGLE	TOFF_0_C1	TOFF_OPEN_1		TOFF_1_C1
%Q0.5	%M0	%Q0.2	%I0.6	%M9	%M2	%TM1		%M7

```
┤├──┤├──┤/├──┤├──┤/├──┤/├──┌IN      Q┐──────────( )
                           │  TYPE TOF  │
                           │  TB  100 ms│
                           │  ADJ   Y   │
                           │  %TM1.P    │
                           │    20      │
                           └────────────┘
```

Rung 2

DO_CYLINDERS_ON	INIT_CONDITION	CYL_TOGGLE		REPET_CIL_1		COUNT_C1
%Q0.5	%M0	%M9	%C0.D	%C0		%M8

DI_OPENED_C1 %I0.6

```
R       E
     ADJ  Y
     %C0.P
       5
S       D
CU      F
CD
```

Rung 3

DO_CYLINDERS_ON	INIT_CONDITION	COUNT_C1			CYL_TOGGLE
%Q0.5	%M0	%M8			%M9

CYL_TOGGLE %M9

5) LD	**Cylinder 2**	

Rung 0

DO_CYLINDERS_ODION	INIT_CONDITION	DO_OPEN_C2	DI_CLOSED_C2	CYL_TOGGLE	TOFF_3_C2	TOFF_CLOSE_2	TOFF_2_C2
%Q0.5	%M0	%Q0.3	%I0.9	%M9	%M10	%TM2	%M4

```
─┤ ├──┤ ├──┤/├──┤ ├──┤/├───┤IN        Q├──────────────────( )
                              TYPE  TOF
                              TB    1 sec
                              ADJ    Y
                              %TM2.P
                              2
```

Rung 1

DO_CYLINDERS_ODION	INIT_CONDITION	DO_CLOSE_C2	DI_OPENED_C2	CYL_TOGGLE	TOFF_2_C2	TOFF_OPEN_2	TOFF_3_C2
%Q0.5	%M0	%Q0.4	%I0.8	%M9	%M4	%TM3	%M10

```
─┤ ├──┤ ├──┤/├──┤ ├──┤ ├──┤/├───┤IN        Q├──────────────( )
                                   TYPE  TOF
                                   TB    10 ms
                                   ADJ    Y
                                   %TM3.P
                                   200
```

Rung 2

DO_CYLINDERS_ODION	INIT_CONDITION	CYL_TOGGLE			REPET_CIL_2	COUNT_C2
%Q0.5	%M0	%M9	%C1.D		%C1	%M11

```
─┤ ├──┤ ├──┤ ├──┬──┤ ├────────────┤R        E├
                │                 ADJ   Y
        DI_OPENED_C2             %C1.P
          %I0.8                   3
                └──┤ ├────────────┤S        D├──────────────( )
                             ─────┤CU       F├
                                  ┤CD
```

Rung 3

DO_CYLINDERS_ODION	INIT_CONDITION	COUNT_C2	CYL_TOGGLE				ROUTINE_END
%Q0.5	%M0	%M11	%M9				%M12

```
─┤ ├──┤ ├──┬─┤ ├──┤ ├──────────────────────────────────────( )
           │
    ROUTINE_END
      %M12
           └─┤ ├──┘
```

Rung 4

DO_CYLINDERS_ON	INIT_CONDITION	CYL_TOGGLE	ROUTINE_END	TOFF_FINAL		FINAL_TOFFF
%Q0.5	%M0	%M9	%M12	%TM5		%M13

```
TYPE  TOF
TB    1 sec
ADJ   Y
%TM5.P
2
```
IN — Q

---

6) LD — Outputs

Rung 0

DO_CYLINDERS_ON	OPENED_C1	INIT_CONDITION		DO_CLOSE_C1
%Q0.5	%M14	%M0		%Q0.2

	TOFF_1_C1	INIT_CONDITION		C1_CLOSE
	%M7	%M0		%M18

	OPENED_C2	INIT_CONDITION		DO_CLOSE_C2
	%M15	%M0		%Q0.4

	TOFF_3_C2	INIT_CONDITION		C2_CLOSE
	%M10	%M0		%M19

Rung 1

DO_CYLINDERS_ON	TOFF_0_C1	INIT_CONDITION		DO_OPEN_C1
%Q0.5	%M2	%M0		%Q0.1

				C1_OPEN
				%M16

	TOFF_2_C2	INIT_CONDITION		DO_OPEN_C2
	%M4	%M0		%Q0.3

				C2_OPEN
				%M17