0

SEPARTED I/O ROUTINE

JSR	
Routine Name	IO

1

MODE SELECTION
ROUTINE

JSR	
Routine Name	MODE_SELECTION

2

PROCESS LOGIC

JSR	
Routine Name	CTRL

3

ALARMS AND
NOTIFICATIONS

JSR	
Routine Name	ALARMS_NOTIFICATION

(End)

ASSIGNS PHYSICAL PUSH-BUTTONS TO LOGICAL TAGS

0

IN_START_PB
<Local:1:I.Data.0>

START_PB

HMI_START

1

IN_STOP_PB
<Local:1:I.Data.1>

STOP_PB

HMI_STOP

2

IN_AUTO_PB
<Local:1:I.Data.2>

AUTO_PB

HMI_AUTO

3

IN_MANUAL_PB
<Local:1:I.Data.3>

MANUAL_PB

HMI_MANUAL

ASSIGNS LOGICAL TAGS TO OUTPUT (CONTROL) SIGNALS

4

FAULT_LT

OUT_FAULT_LT
<Local:2:O.Data.0>

5

PUMP

OUT_PUMP
<Local:2:O.Data.1>

6

VFD

OUT_VFD
<Local:2:O.Data.4>

SCALE TANK TO 0-100% FROM ANALOG SIGNAL OF 4-20mA, ALSO HANDLES EDGE-CASES

7

MOV	
Source	Local:3:I.Ch0Data
	0.0
Dest	RAW_TANK_LEVEL
	0.0

8

CPT	
Dest	TANK_LEVEL
	0.0
Expression	((RAW_TANK_LEVEL-6554)*100)/26213

LES	
Source A	TANK_LEVEL
	0.0
Source B	0

MOV	
Source	0
Dest	TANK_LEVEL
	0.0

GRT	
Source A	TANK_LEVEL
	0.0
Source B	32267

MOV	
Source	100
Dest	TANK_LEVEL
	0.0

9   SCALE FLOW RATE TO 0-500 LMP FROM ANALOG INPUT SIGNAL OF 4-20mA

MOV	
Source	Local:3:I.Ch1Data
	0.0
Dest	RAW_FLOW_LEVEL
	0.0

10

CPT	
Dest	FLOW_LEVEL
	0.0
Expression	((RAW_FLOW_LEVEL-6554)*500)/26213

LES	
Source A	FLOW_LEVEL
	0.0
Source B	0

MOV	
Source	0
Dest	FLOW_LEVEL
	0.0

GRT	
Source A	FLOW_LEVEL
	0.0
Source B	32267

MOV	
Source	500
Dest	FLOW_LEVEL
	0.0

11   CONVERTS SPEED % TO 4-20mA EQUIVALENT ANALOG OUTPUT

CPT	
Dest	RAW_VFD_SPEED
	0.0
Expression	(VFD_SPEED*26213/100)+6554.0

12

MOV	
Source	RAW_VFD_SPEED
	0.0
Dest	Local:4:O.Ch0Data
	0.0

(End)

SYS_START PULSE ON START_PB

0
```
       START_PB   ONS_START                                              SYS_START
         ] [        ] [                                                      (  )
                   [ ONS ]
       SYS_START   STOP_PB
         ] [        ]/[
```

SETS MANUAL MODE

1
```
      MANUAL_PB   SYS_START  AUTO_MODE                                  MANUAL_MODE
         ] [         ] [        ]/[                                          (  )
                                                                        LT_MANUAL_MODE
      MANUAL_MODE   STOP_PB                                            <Local:2:O.Data.2>
         ] [         ]/[                                                     (  )
```

SETS AUTO MODE

2
```
       AUTO_PB    SYS_START  MANUAL_MODE                                  AUTO_MODE
         ] [         ] [         ]/[                                         (  )
                                                                         LT_AUTO_MODE
       AUTO_MODE   STOP_PB                                             <Local:2:O.Data.3>
         ] [         ]/[                                                     (  )
```

(End)

STARTS 5S TIMER IF TANK LEVEL < 20%

0

LES	
Source A	TANK_LEVEL
	0.0
Source B	20

SYS_START   MANUAL_MODE

SYS_START   AUTO_MODE

TON		
Timer	PUMP_DELAY_TIMER	⟨EN⟩
Preset	5000	⟨DN⟩
Accum	0	

1

PUMP_DELAY_TIMER.DN

TRIGGER_PUMP

STARTS 5S TIMER IF TANK LEVEL > 80%

2

GRT	
Source A	TANK_LEVEL
	0.0
Source B	80

SYS_START   MANUAL_MODE

SYS_START   AUTO_MODE

TON		
Timer	PUMP_STOP_DELAY_TIMER	⟨EN⟩
Preset	5000	⟨DN⟩
Accum	0	

3

PUMP_STOP_DELAY_TIMER.DN

TRIGGER_PUMP_STOP

LATCHES PUMP ON BASED ON TRIGGER AND SYSTEM CONDITIONS

4

TRIGGER_PUMP

PUMP

PUMP   STOP_PB   TRIGGER_PUMP_STOP   LL_ALARM   HH_ALARM

TURNS ON VFD WHEN PUMP STARTS

5

PUMP

VFD

MANUAL SPEED CONTROL OF VFD IN MANUAL MODE

6

MANUAL_MODE   PUMP

MOV	
Source	MANUAL_VFD_SPEED
	0.0
Dest	VFD_SPEED
	0.0

7

MOV	
Source	FLOW_SP
	0.0
Dest	PID_CTRL.SP
	0.0

PID LOOP TO CONTROL VFD SPEED IN AUTO MODE

8

PUMP   AUTO_MODE

PID		
PID		PID_CTRL […]
Process Variable		FLOW_LEVEL
Tieback		0
Control Variable		VFD_SPEED
PID Master Loop		0
Inhold Bit		0
Inhold Value		0
Setpoint		0.0
Process Variable		0.0
Output %		0.0

(End)

SETS LOW LEVEL ALARM AND NOTIFICATION IF TANK LEVEL STAYS < 10% FOR 5S

0
```
LES                              TON
Source A  TANK_LEVEL             Timer   LL_ALARM_DELAY    (EN)
            0.0                  Preset             5000    (DN)
Source B         10              Accum                 0
```

1
```
LL_ALARM_DELAY.DN   ONS_LL                                    TRIGGER_LL_ALM
    ] [             [ONS]                                          ( )
```

LATCHES ALARM NOTIFICATIONS UNTILL OPERATOR ACKNOWLEDGES IT

2
```
TRIGGER_LL_ALM                                               LL_NOTIFICATION
    ] [                                                           ( )

LL_NOTIFICATION    RESET_ALARM
    ] [              ]/[
```

LATCHES LL_ALARM

3
```
TRIGGER_LL_ALM                                                   LL_ALARM
    ] [                                                             ( )

LL_ALARM      LES                      RESET_ALARM
    ] [     Source A  TANK_LEVEL          ]/[
                        0.0
            Source B         10
```

SETS HIGH LEVEL ALARM AND NOTIFICATION IF TANK LEVEL STAYS < 90% FOR 5S

4
```
GRT                              TON
Source A  TANK_LEVEL             Timer   HH_ALARM_DELAY    (EN)
            0.0                  Preset             5000    (DN)
Source B         90              Accum                 0
```

5
```
HH_ALARM_DELAY.DN   ONS_HH                                    TRIGGER_HH_ALM
    ] [             [ONS]                                          ( )
```

LATCHES ALARM NOTIFICATIONS UNTILL OPERATOR ACKNOWLEDGES IT

6
```
TRIGGER_HH_ALM                                               HH_NOTIFICATION
    ] [                                                           ( )

HH_NOTIFICATION    RESET_ALARM
    ] [              ]/[
```

LATCHES HH_ALARM

7
```
TRIGGER_HH_ALM                                                   HH_ALARM
    ] [                                                             ( )

HH_ALARM      GRT                      RESET_ALARM
    ] [     Source A  TANK_LEVEL          ]/[
                        0.0
            Source B         90
```

(End)