Lenze

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# Programming Pilot

**i500 series**

i510 cabinet & i550 cabinet

i510 protec & i550 protec



# Lenze is more than a product manufacturer; **we are a partner in our customers' success.**

**Regardless of the industry, every automation design presents unique challenges; whether your priority is decentralized flexibility, energy efficiency, simple and expedient configuration, or compact size.**



We partner with you in all phases of your project design, following your goals and requirements. When you design an innovative overall concept, we help you bring it to action. Our experts have been perfecting progress with customers worldwide for over seventy-five years. No matter the challenge, Lenze has the experience to deliver what's next.

**We develop innovative solutions**

- Experts who understand your requirements and goals
- Innovative products for energy-efficient solutions
- Reliable drive systems to cater to your application(s)
- Open software standards (EtherCAT, Ethernet/IP, PROFINET, and MQTT)
- Lenze FAST Programming Modules for simplified, efficient, and quick ramp-up times
- Global production capabilities, superior quality standards and logistics to ensure product availability
- Vast service network and range of training courses

This guided setup pilot flowchart is provided to help you configure the i510/i550 cabinet and protec drive systems easily and quickly.

**Selection setting**

**Question**

**Label**

**Wiring direction**


**Start** ..... 5
**Common Config Subroutine** ..... 6
**Conveyer** ..... 9
**Pump and Fan** ..... 10
**General Application** ..... 15
**Speed Application** ..... 16
**Torque Application** ..... 19
**PID** ..... 22
**Network Setup** ..... 28
**CANopen** ..... 29
**Modbus** ..... 30
**Profibus DP** ..... 31





Lenze
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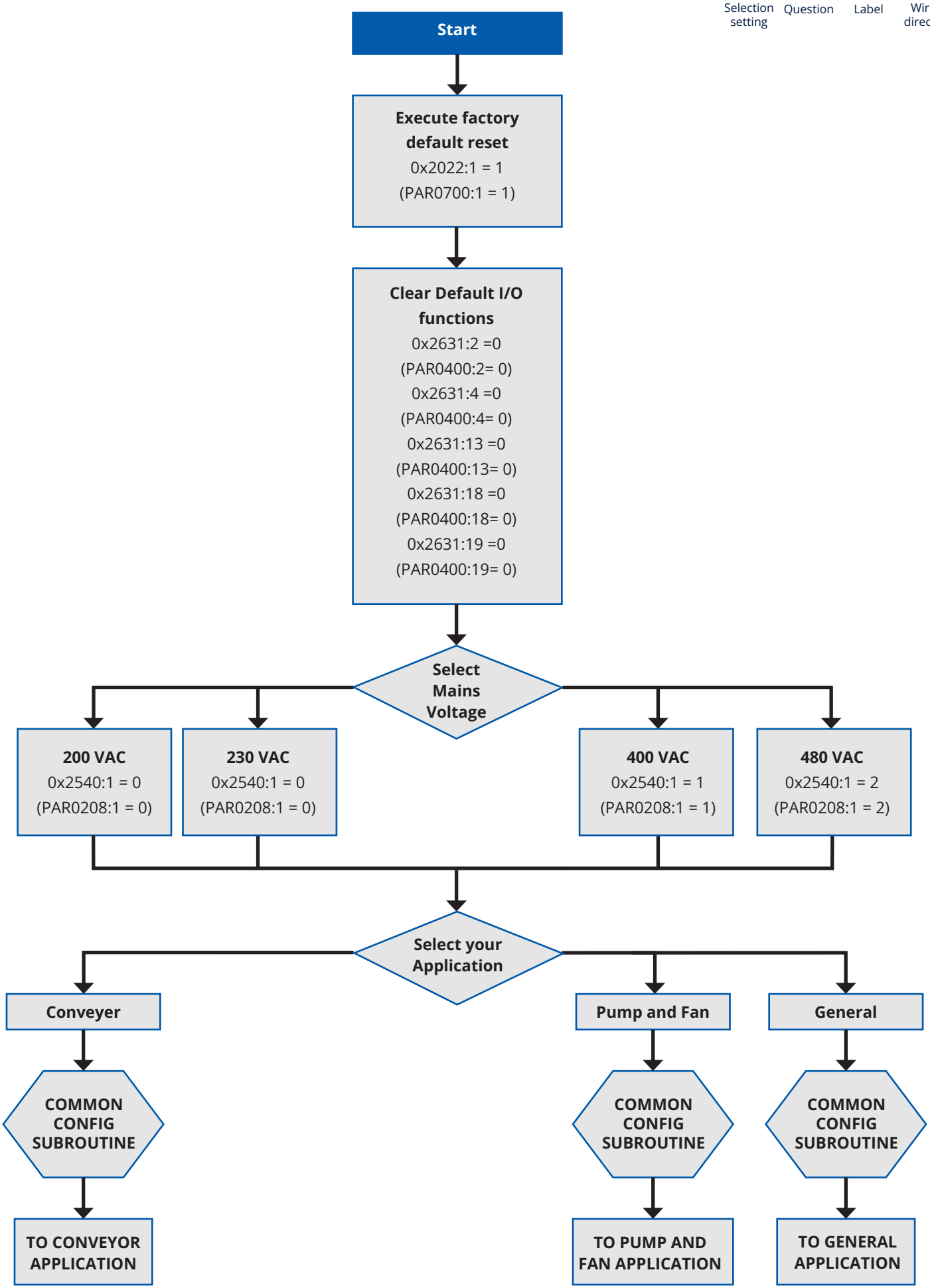
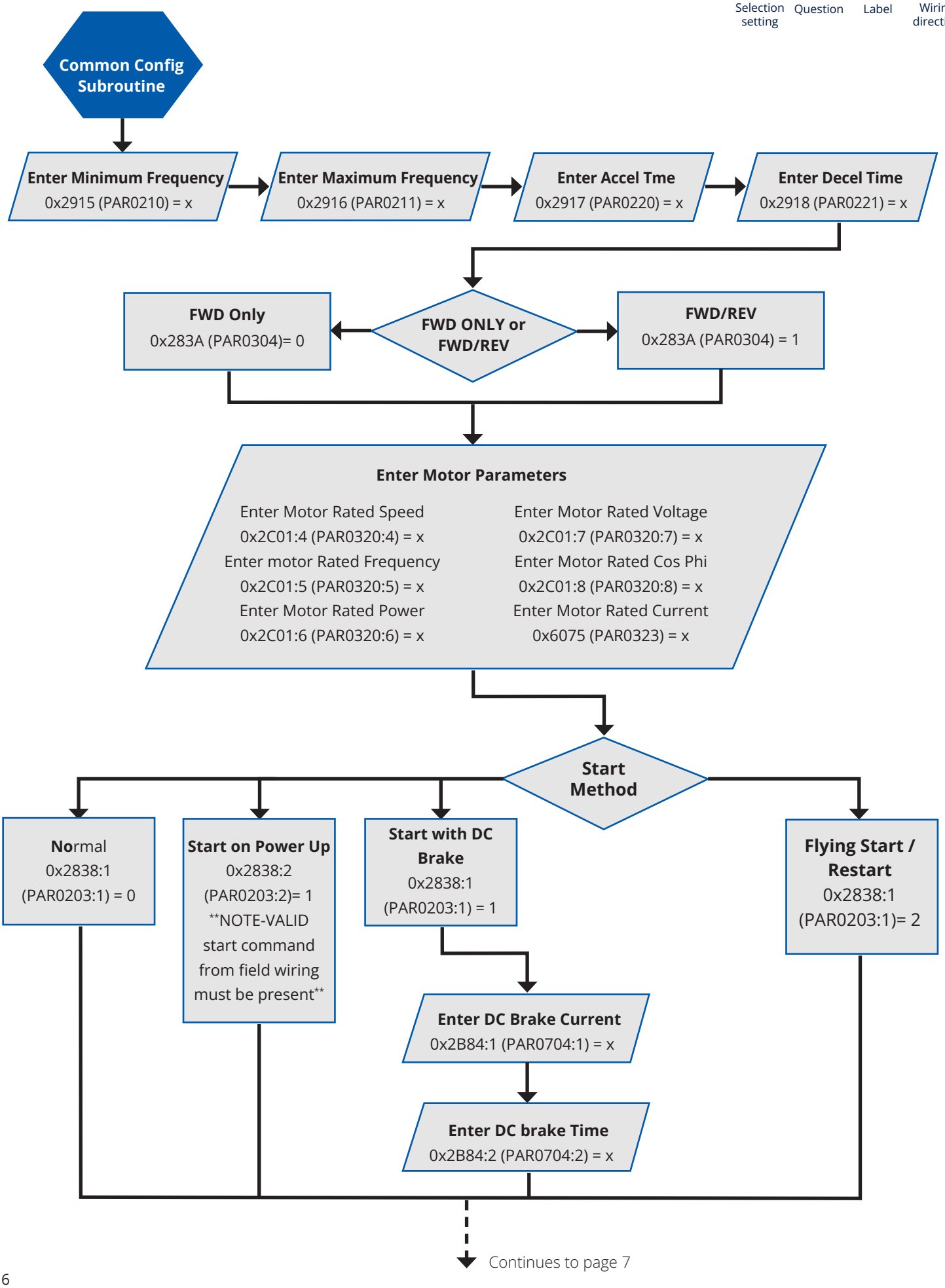
180 s
180 s
24E
GND
DO1
DI1
DI2
DI3
DI4
DI5


Selection setting
Question
Label
Wiring direction
Start
Execute factory default reset
0x2022:1 = 1
(PAR0700:1 = 1)
Clear Default I/O functions
0x2631:2 =0
(PAR0400:2= 0)
0x2631:4 =0
(PAR0400:4= 0)
0x2631:13 =0
(PAR0400:13= 0)
0x2631:18 =0
(PAR0400:18= 0)
0x2631:19 =0
(PAR0400:19= 0)
Select Mains Voltage
200 VAC
0x2540:1 = 0
(PAR0208:1 = 0)
230 VAC
0x2540:1 = 0
(PAR0208:1 = 0)
400 VAC
0x2540:1 = 1
(PAR0208:1 = 1)
480 VAC
0x2540:1 = 2
(PAR0208:1 = 2)
Select your Application
Conveyer
Pump and Fan
General
COMMON CONFIG SUBROUTINE
COMMON CONFIG SUBROUTINE
COMMON CONFIG SUBROUTINE
TO CONVEYOR APPLICATION
TO PUMP AND FAN APPLICATION
TO GENERAL APPLICATION

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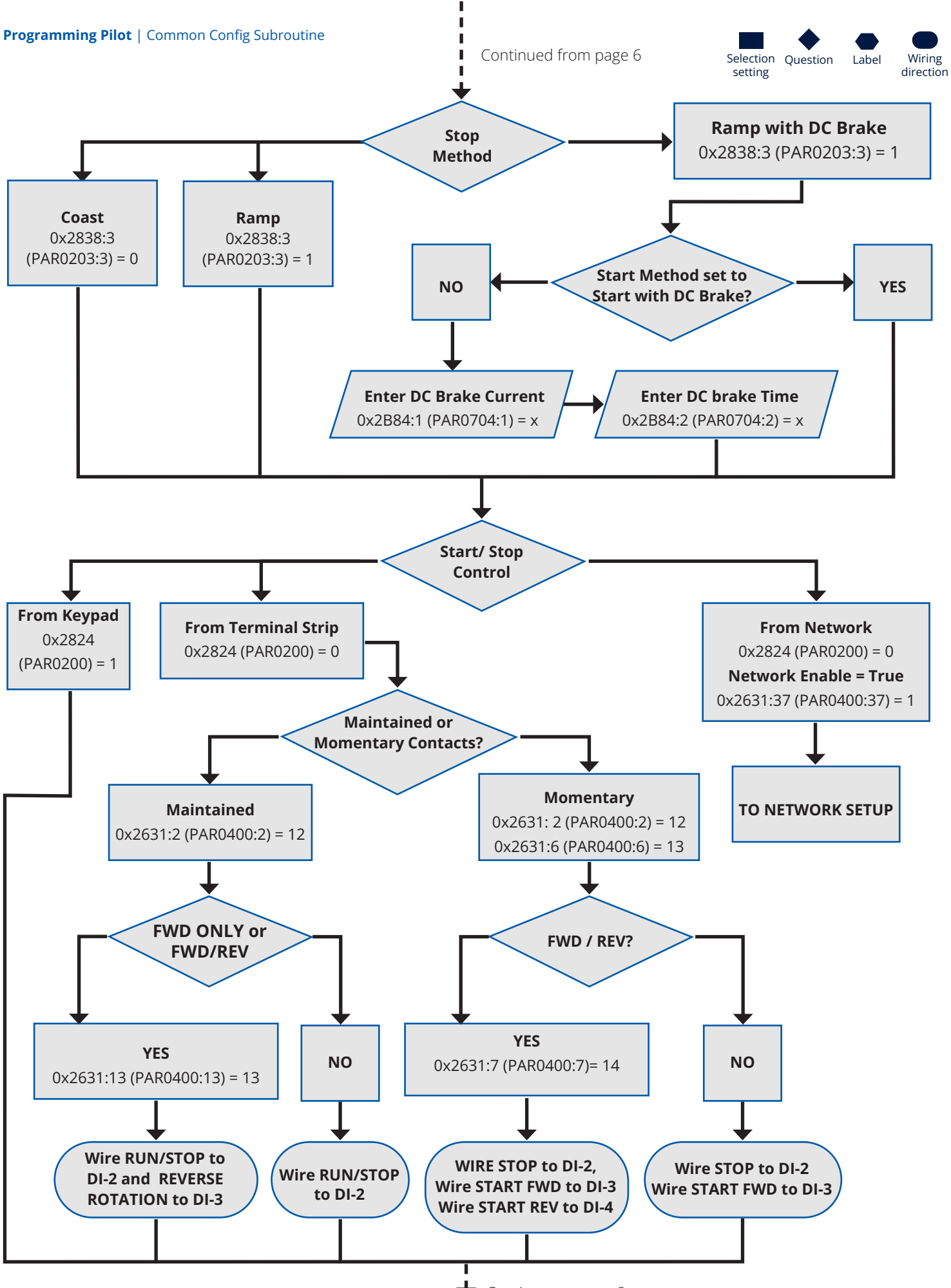


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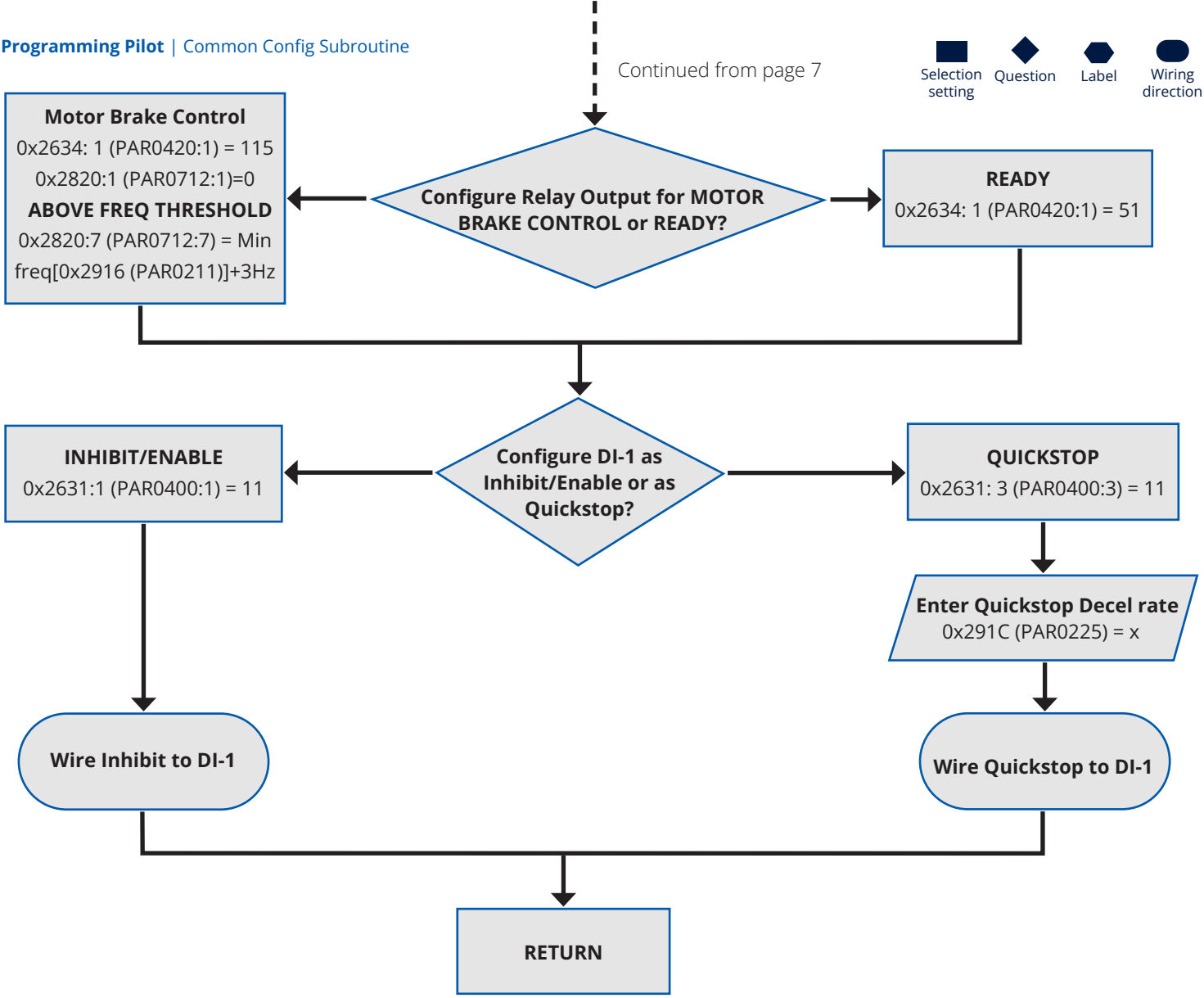
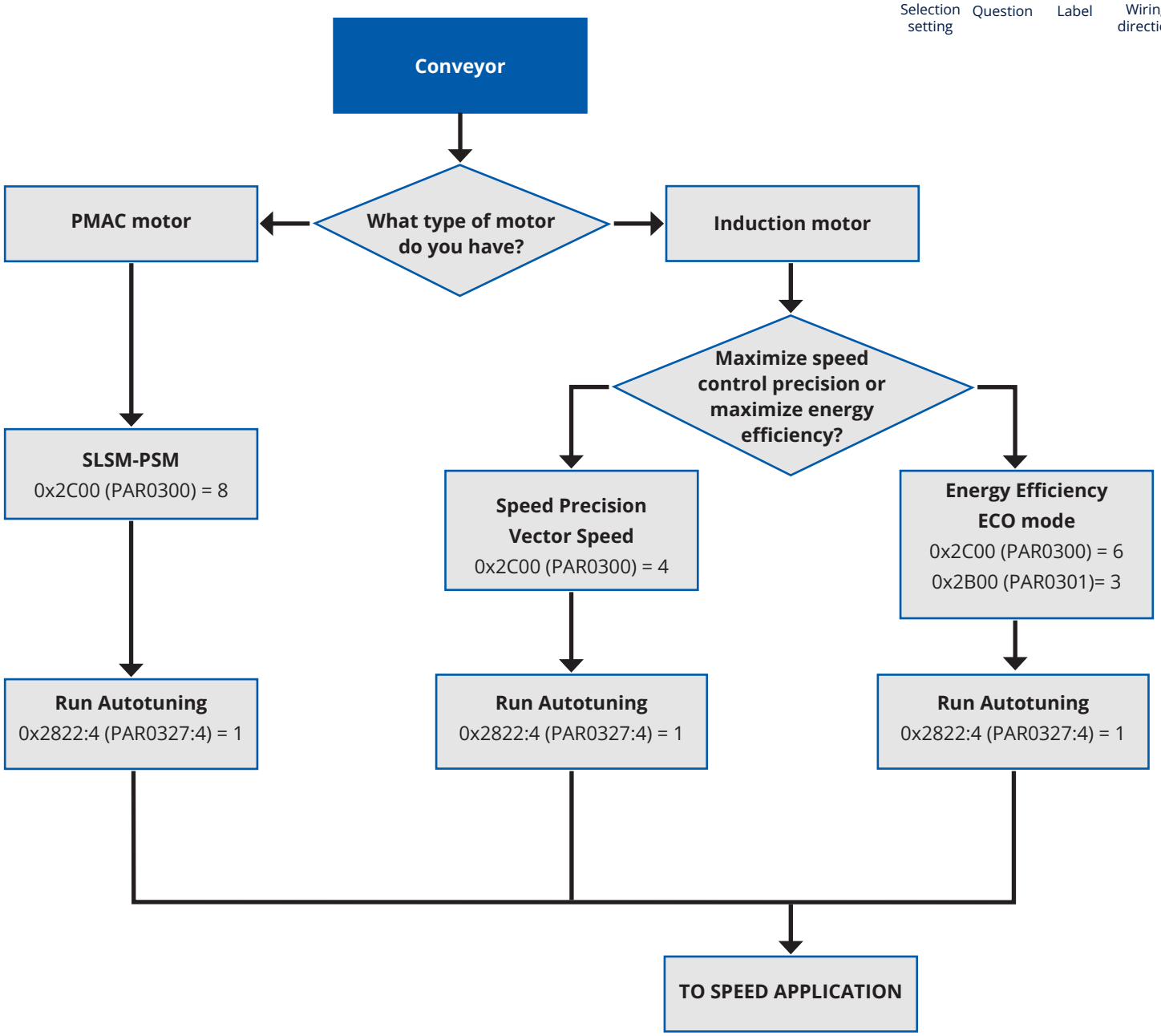



Selection setting
Question
Label
Wiring direction
Conveyor
What type of motor do you have?
PMAC motor
Induction motor
SLSM-PSM
0x2C00 (PAR0300) = 8
Maximize speed control precision or maximize energy efficiency?
Speed Precision
Vector Speed
0x2C00 (PAR0300) = 4
Energy Efficiency
ECO mode
0x2C00 (PAR0300) = 6
0x2B00 (PAR0301)= 3
Run Autotuning
0x2822:4 (PAR0327:4) = 1
Run Autotuning
0x2822:4 (PAR0327:4) = 1
Run Autotuning
0x2822:4 (PAR0327:4) = 1
TO SPEED APPLICATION

Selection setting · Question · Label · Wiring direction

**Pump and Fan**

**Select Fan or Pump**

**FAN**

**PUMP**

**Begins on page 12**

**Select Fan Type**

Continues across to page 11

Continued from page 10

**HVLS (High Volume Low Speed)**

**What type of motor do you have?**

**Induction motor**
0x2C00 (PAR0300)= 6
0x2B00 (PAR0302) = 1

**Enter Fixed Boost % to increase starting torque**
0x2B12:1 (PAR0316:1)= x

**PMAC motor**
(SLSM-PSM)
0x2C00 (PAR0300) = 8

**Run Autotuning**
0x2822:4 (PAR0327:4) = 1

**Centrifugal**
**0x2C00 (PAR0300)= 6**
**0x2B00 (PAR0302) = 1**

**What type of motor do you have?**

**Induction motor**
0x2C00 (PAR0300)= 6
0x2B00 (PAR0302) = 1

**PMAC motor**
(SLSM-PSM)
0x2C00 (PAR0300) = 8

**Run Autotuning**
0x2822:4 (PAR0327:4) = 1

Continues across to page 11

Continues to page 14

**Axial**

**What type of motor do you have?**

**Induction motor**
0x2C00 (PAR0300)= 6
0x2B00 (PAR0302) = 1

**PMAC motor**
(SLSM-PSM)
0x2C00 (PAR0300) = 8

**Run Autotuning**
0x2822:4 (PAR0327:4) = 1

**Enable Belt Break Detection?**

**NO**

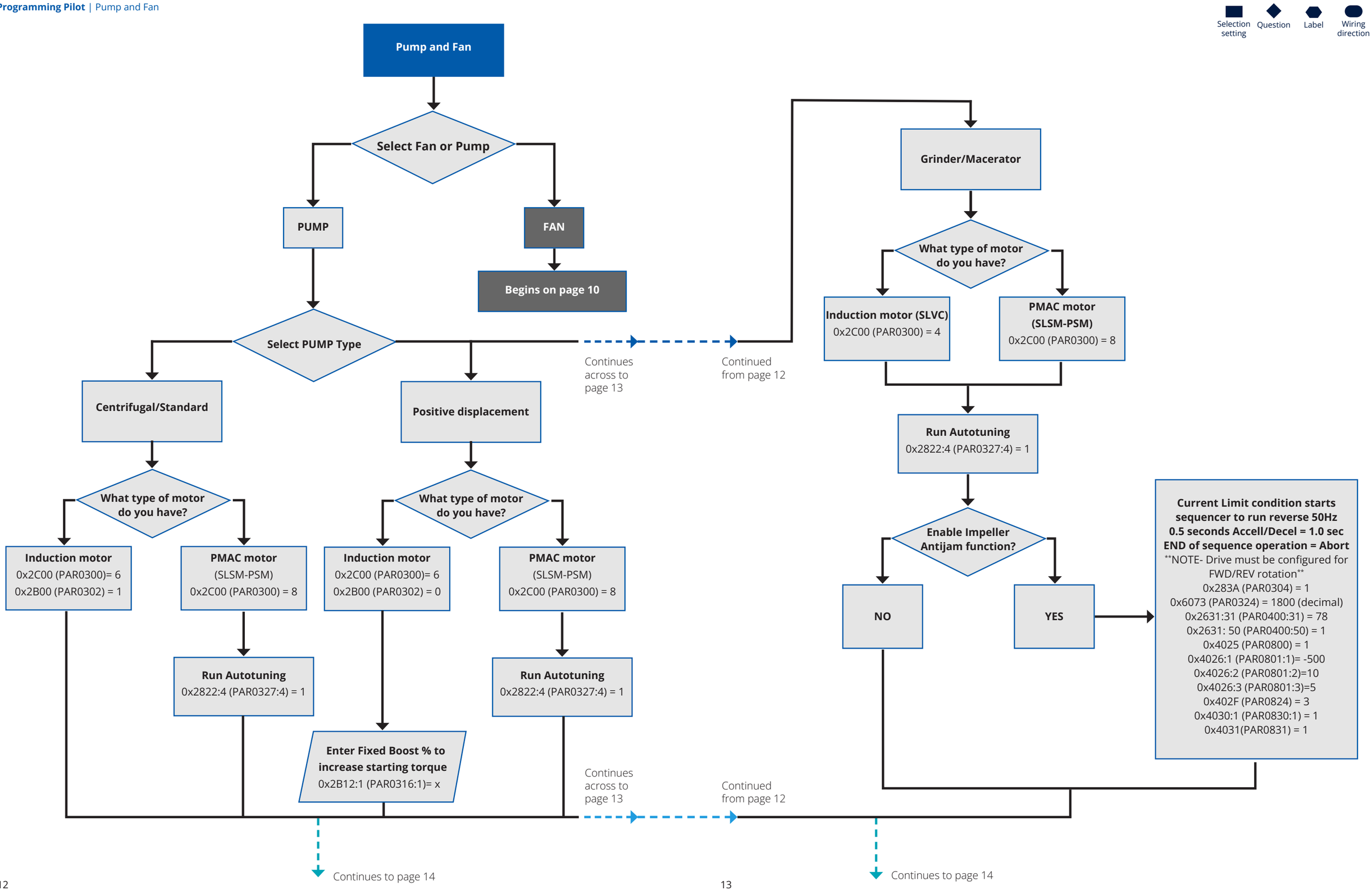
**YES**
**Loss of Load Detection configured to Fault Drive**
0x2631:43 (PAR0400:43) = 83

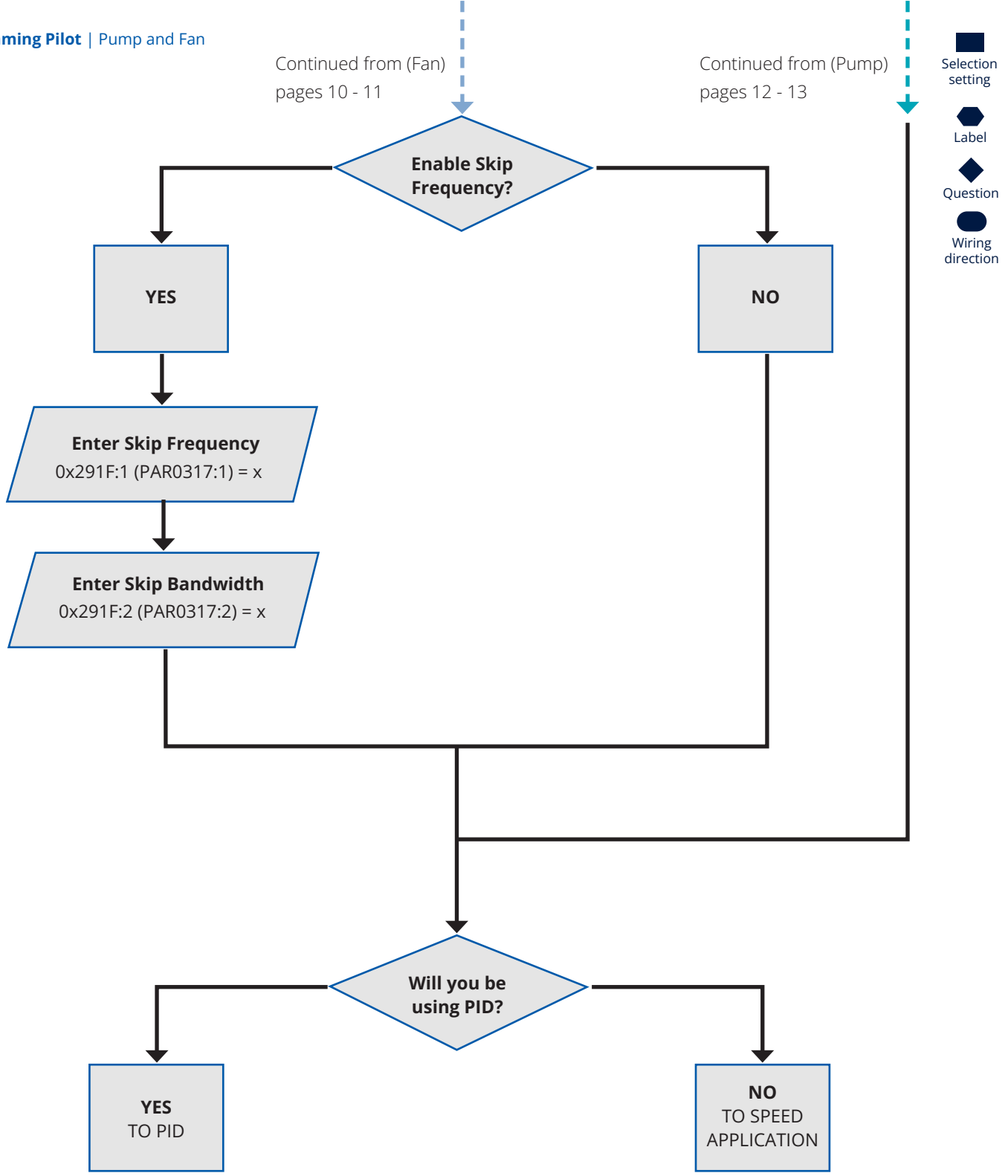
**Enter Loss of Load Threshold**
0x4006:1 (PAR0710:1) = x

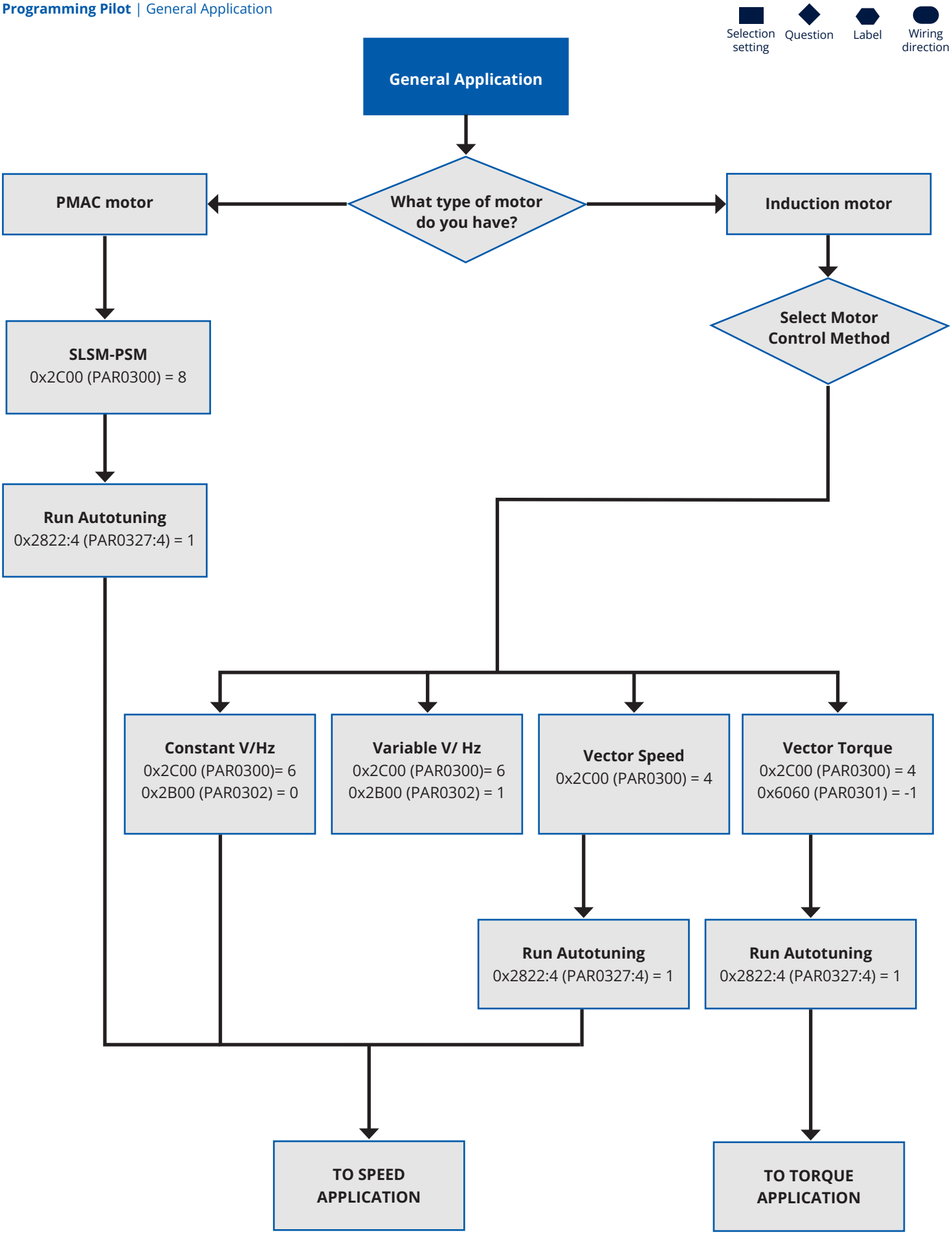
**Enter Loss of Load Delay**
0x4006:2 (PAR0710:2) = x

Continued from page 10

Continues to page 14


Selection setting
Question
Label
Wiring direction
Pump and Fan
Select Fan or Pump
PUMP
FAN
Begins on page 10
Select PUMP Type
Continues across to page 13
Continued from page 12
Centrifugal/Standard
Positive displacement
What type of motor do you have?
Induction motor
0x2C00 (PAR0300)= 6
0x2B00 (PAR0302) = 1
PMAC motor
(SLSM-PSM)
0x2C00 (PAR0300) = 8
Run Autotuning
0x2822:4 (PAR0327:4) = 1
What type of motor do you have?
Induction motor
0x2C00 (PAR0300)= 6
0x2B00 (PAR0302) = 0
PMAC motor
(SLSM-PSM)
0x2C00 (PAR0300) = 8
Run Autotuning
0x2822:4 (PAR0327:4) = 1
Enter Fixed Boost % to increase starting torque
0x2B12:1 (PAR0316:1)= x
Continues across to page 13
Continued from page 12
Grinder/Macerator
What type of motor do you have?
Induction motor (SLVC)
0x2C00 (PAR0300) = 4
PMAC motor
(SLSM-PSM)
0x2C00 (PAR0300) = 8
Run Autotuning
0x2822:4 (PAR0327:4) = 1
Enable Impeller Antijam function?
NO
YES
Current Limit condition starts sequencer to run reverse 50Hz
0.5 seconds Accell/Decel = 1.0 sec
END of sequence operation = Abort
**NOTE- Drive must be configured for FWD/REV rotation**
0x283A (PAR0304) = 1
0x6073 (PAR0324) = 1800 (decimal)
0x2631:31 (PAR0400:31) = 78
0x2631: 50 (PAR0400:50) = 1
0x4025 (PAR0800) = 1
0x4026:1 (PAR0801:1)= -500
0x4026:2 (PAR0801:2)=10
0x4026:3 (PAR0801:3)=5
0x402F (PAR0824) = 3
0x4030:1 (PAR0830:1) = 1
0x4031(PAR0831) = 1
Continues to page 14
Continues to page 14


Continued from (Fan)
pages 10 - 11
Continued from (Pump)
pages 12 - 13
Selection setting
Label
Question
Wiring direction
Enable Skip Frequency?
YES
NO
Enter Skip Frequency
0x291F:1 (PAR0317:1) = x
Enter Skip Bandwidth
0x291F:2 (PAR0317:2) = x
Will you be using PID?
YES
TO PID
NO
TO SPEED APPLICATION


Selection setting
Question
Label
Wiring direction
General Application
What type of motor do you have?
PMAC motor
Induction motor
SLSM-PSM
0x2C00 (PAR0300) = 8
Select Motor Control Method
Run Autotuning
0x2822:4 (PAR0327:4) = 1
Constant V/Hz
0x2C00 (PAR0300)= 6
0x2B00 (PAR0302) = 0
Variable V/ Hz
0x2C00 (PAR0300)= 6
0x2B00 (PAR0302) = 1
Vector Speed
0x2C00 (PAR0300) = 4
Vector Torque
0x2C00 (PAR0300) = 4
0x6060 (PAR0301) = -1
Run Autotuning
0x2822:4 (PAR0327:4) = 1
Run Autotuning
0x2822:4 (PAR0327:4) = 1
TO SPEED APPLICATION
TO TORQUE APPLICATION

Selection setting · Question · Label · Wiring direction

# Speed Application

**Select Standard Speed Reference**

**From Keypad**
0x2860:1 (PAR0201:1) = 1

**From AIN1: 0-10VDC signal**
0x2860:1 (PAR0201:1) = 2
0x2636:1 (PAR430:1) = 0

**From AIN1: 4-20 ma signal**
0x2860:1 (PAR0201:1) = 2
0x2636:1 (PAR430:1) = 4

**Enter Speed at Minimum Signal**
0x2636:2 (PAR430:2) = x

**Enter Speed at Maximum Signal**
0x2636:3 (PAR430:3) = x

***Drive configured for Momentary start stop and FWD/ REV?***

**NO**

**From MOP**
0x2860:1 (PAR0201:1) =50
0x2631:23(PAR0400:23) = 14
0x2631:24 (PAR0400:24) =15

**Wire MOP Up to DI-4**
**Wire MOP down to DI-5**

**Configure External Fault Input**

**YES**
0x2631:44 (PAR0400:44) = 15

**NO**

**Wire External fault signal to DI-5**

**External Fault Input Normally Open or Normally Closed**

**Normally Open**

**Normally Closed**
0x2632:5 (PAR0411:5) =1

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Continues to page 18



Continued from page 16

**Selectable Presets (Set Default to Preset Speed 1)**
0x2860:1 (PAR0201:1) = 11

**From Netwok**
0x2860:1 (PAR0201:1) = 5

**Enter Preset Speed 1**
0x2911:1 (PAR0450:1) = x

**GOTO NETWORK SETUP**

***Drive configured for Momentary start stop and FWD/ REV?***

**YES**
0x2631:19 (PAR0400:19) = 15

**NO**
0x2631:19 (PAR0400:19) = 14
0x2631:20 (PAR0400:20) = 15

**Enter Preset Speed 2**
0x2911:2 (PAR0450:2) = x

**Wire Preset Speed #2 select to DI-5**
**Drive Runs at Preset Speed 1 and switched to Preset Speed 2 if DI-5 is asserted**

**Enter Preset Speed 2**
0x2911:2 (PAR0450:2) = x

**Enter Preset Speed 4**
0x2911:4 (PAR0450:4) = x

**Enter Preset Speed 6**
0x2911:6 (PAR0450:6) = x

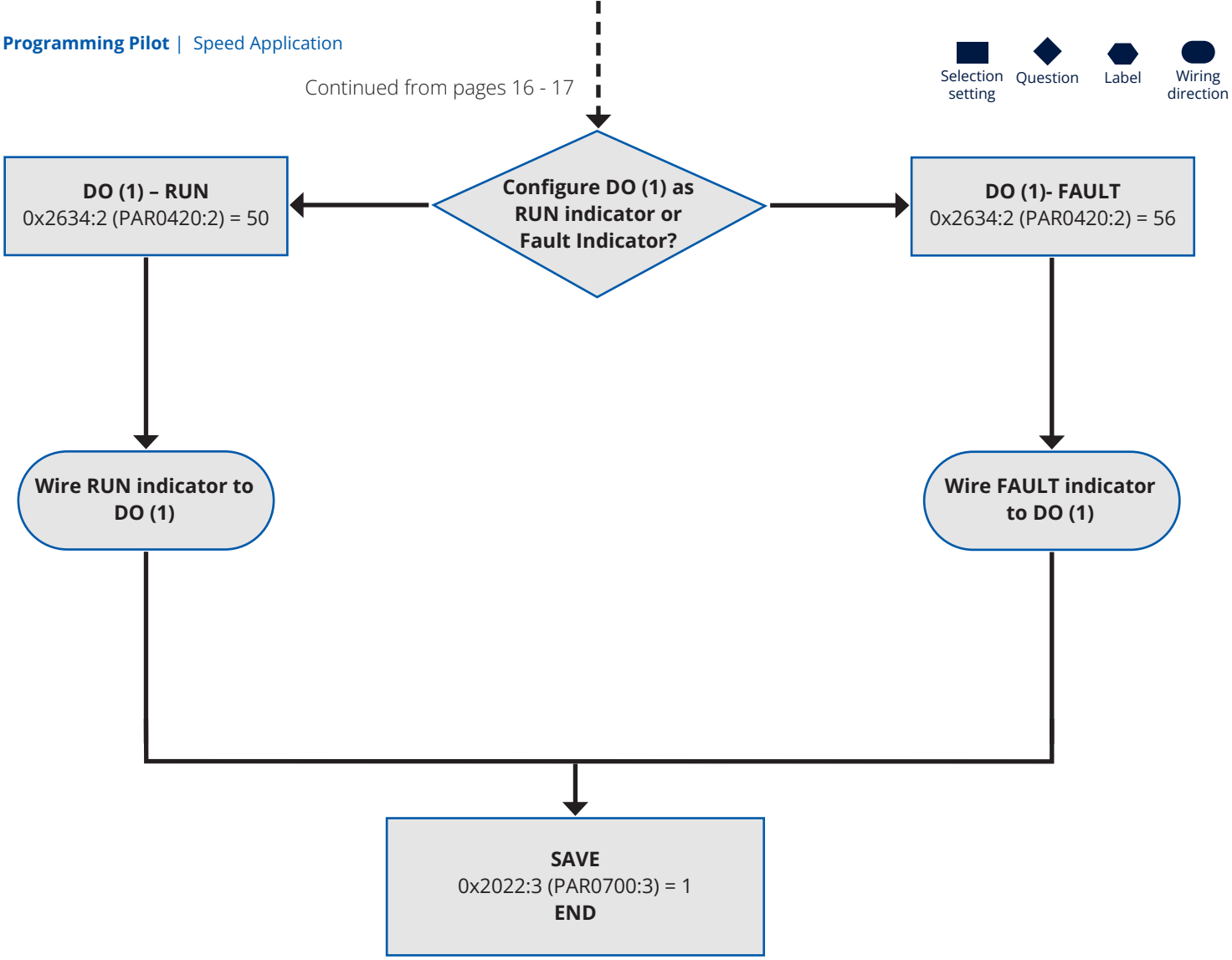
**Wire Preset Speed #2 select to DI-4**
**Wire Preset Speed #4 select to DI-5**
**Drive runs at Preset Speed 1 if neither DI-4 orDI-5 are asserted and runs at Preset speed #6 if BOTH DI-4 AND DI-5 are asserted**

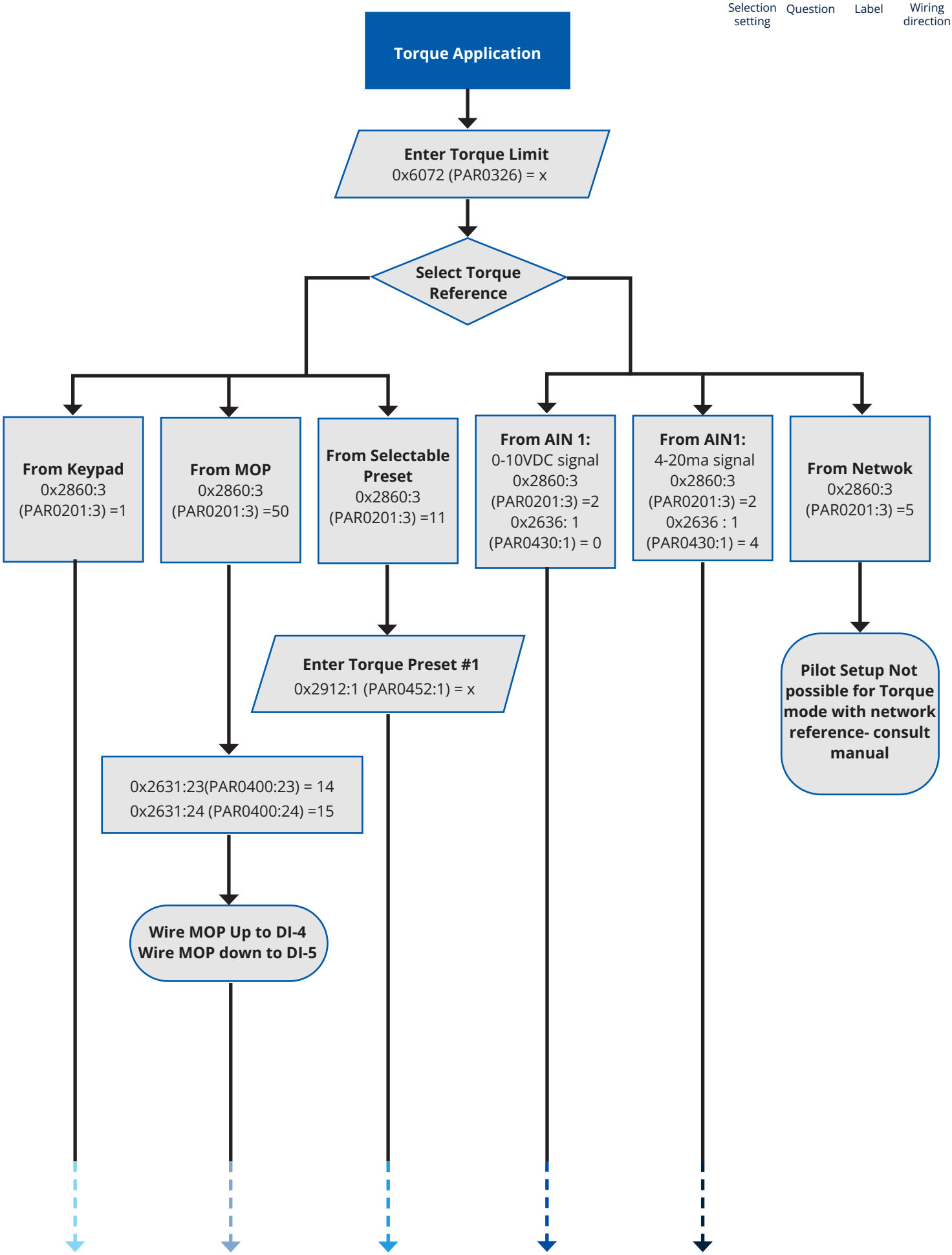
Continues across to page 17

Continued from page 16

Continues to page 18

Continued from pages 16 - 17








Continues to page 20

Continued from page 19

Selection setting
Question
Label
Wiring direction

**Drive configured for Momentary start stop and FWD/ REV?**

**YES**
0x2631:19 (PAR0400:19) = 15

**Enter Torque Preset #2**
0x2912:2 (PAR0452:2) = x

**Wire Preset Torque #2 select to DI-5**
**Drive Runs at Preset Torque #1**
**and switched to Preset Torque #2**
**if DI-5 is asserted**

**NO**
0x2631:19 (PAR0400:19) = 14
0x2631:20 (PAR0400:20) = 15

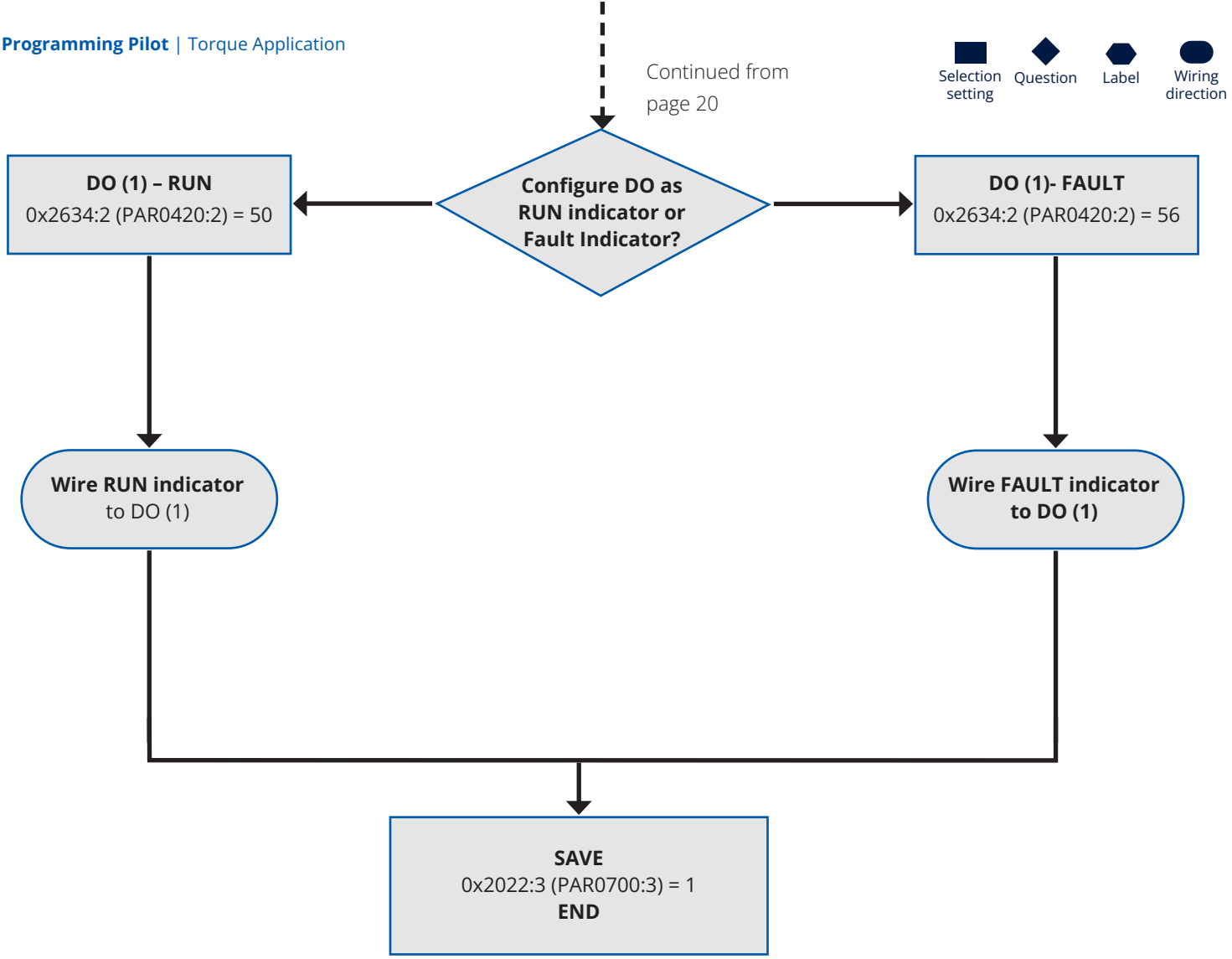
**Enter Torque Preset #2**
0x2912:2 (PAR0452:2) = x

**Enter Torque Preset #4**
0x2912:4 (PAR0452:4) = x

**Enter Torque Preset #6**
0x2912:6 (PAR0452:6) = x

**Wire Preset Torque #2 select to DI-4**
**Wire Torque Preset #4 select to DI-5**
**Drive runs at Preset Torque #1 if**
**neither DI-4 orDI-5 are asserted**
**and runs at Torque Preset #6 if**
**BOTH DI-4 AND DI-5 are asserted**

Continues to page 21


Continued from page 20
Selection setting
Question
Label
Wiring direction
Configure DO as RUN indicator or Fault Indicator?
DO (1) – RUN
0x2634:2 (PAR0420:2) = 50
DO (1)- FAULT
0x2634:2 (PAR0420:2) = 56
Wire RUN indicator to DO (1)
Wire FAULT indicator to DO (1)
SAVE
0x2022:3 (PAR0700:3) = 1
END

Selection setting · Question · Label · Wiring direction

**PID**

0x4020:2(PAR0600:2) = 2
0x2631:48(PAR0400:48) = 1

**Wire Feedback Signal to AIN2**

**Normal Acting or Reverse Acting PID**

Continues across to page 23

Continued from page 22

**Normal Acting PID**
i.e. Direct Pressure Control
0x4020:1 (PAR0600:1) = 1

**Reverse Acting PID**
i.e. Cooling
0x4020:1 (PAR0600:1) = 2

**PID Setpoint**

**From MOP**
0x2860:2
(PAR0201:2)=50
0x2631:23
(PAR0400:23) = 14
0x2631:24
(PAR0400:24) =15

**Wire MOP Up to DI-4**

**Wire MOP down to DI-5**

**From Selectable Preset**
0x2860:2
(PAR0201:2)=11
0x2631:19
(PAR0400:19) = 14
0x2631:20
(PAR0400:20) = 15

**Enter PID Preset #1**
0x4022:1 (PAR0451:1)= x

**Enter PID Preset #2**
0x4022:2 (PAR0451:2)= x

**Enter PID Preset #4**
0x4022:4 (PAR0451:4)= x

**Enter PID Preset #6**
0x4022:6 (PAR0451:6)= x

**Wire Preset #2 select to DI-4**
**Wire Preset #4 select to DI-5**
**Drive runs at Preset #1 if neither DI-4 or DI-5 are asserted and runs at Preset #6 if BOTH DI-4 AND DI-5 are asserted**

**From AIN1: 0-10VDC signal**
0x2860:2
(PAR0201:2)=2
0x2636:1
(PAR0430:1)=0

From **From AIN1: 4-20Mma signal**
0x2860:2
(PAR0201:2)=2
0x2636:1
(PAR0430:1)=4

**Setpoint is 0-100 % of input range**

**From Keypad**
0x2860:2
(PAR0201:2)=1

**Manual overide speed function required?**

**YES**
**Standard Speed Reference = Preset 1**
0x2860:1 (PAR0201:1) = 11
0x2631:45 (PAR0400:45) =13

**Enter Manual Override Speed (Preset 1)**
0x2911:1 (PAR0450:1) = x

**Wire Manual Override to DI-3**
**Manual Override speed will occur whenever DI-3 is asserted**

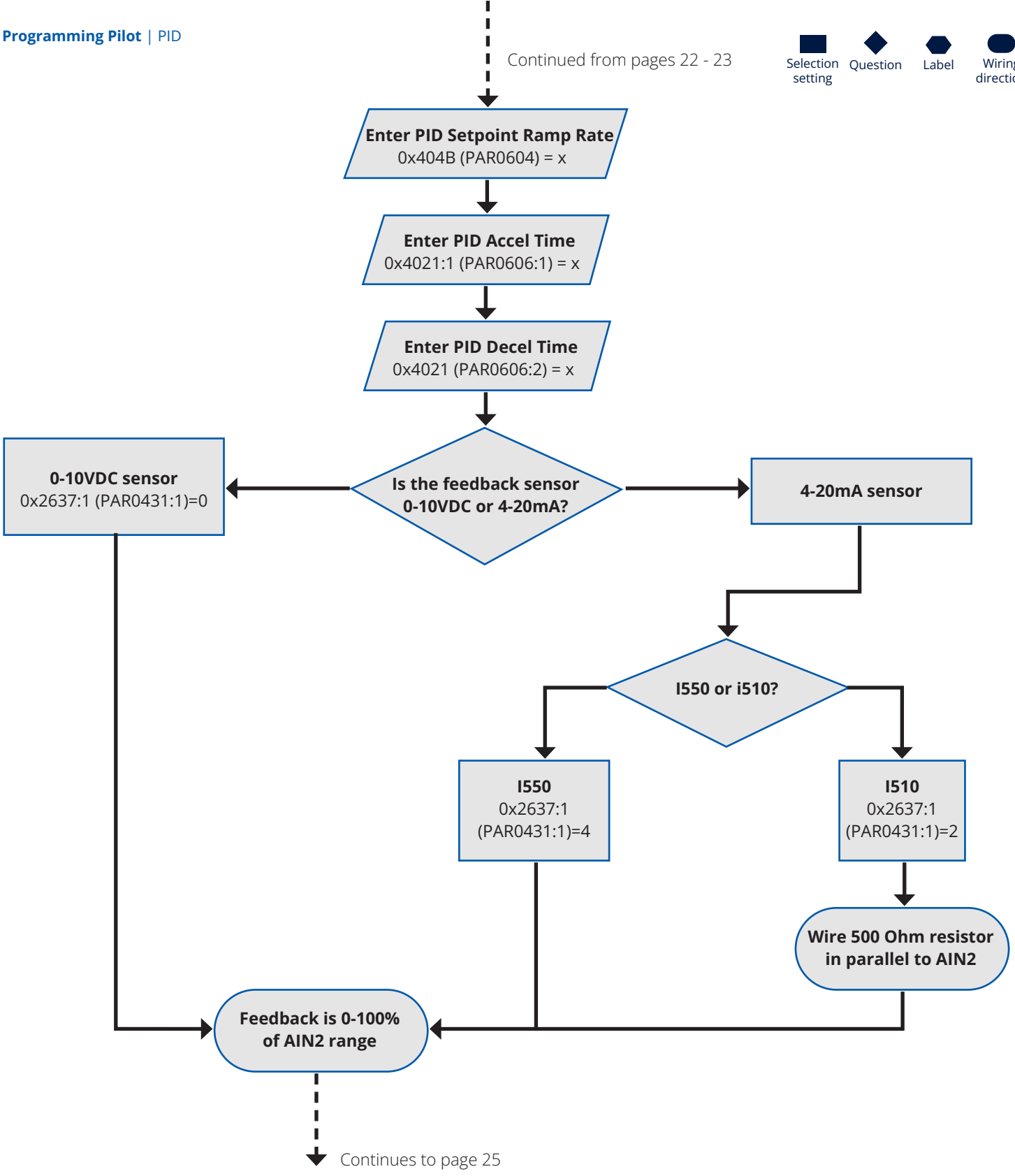
**NO**

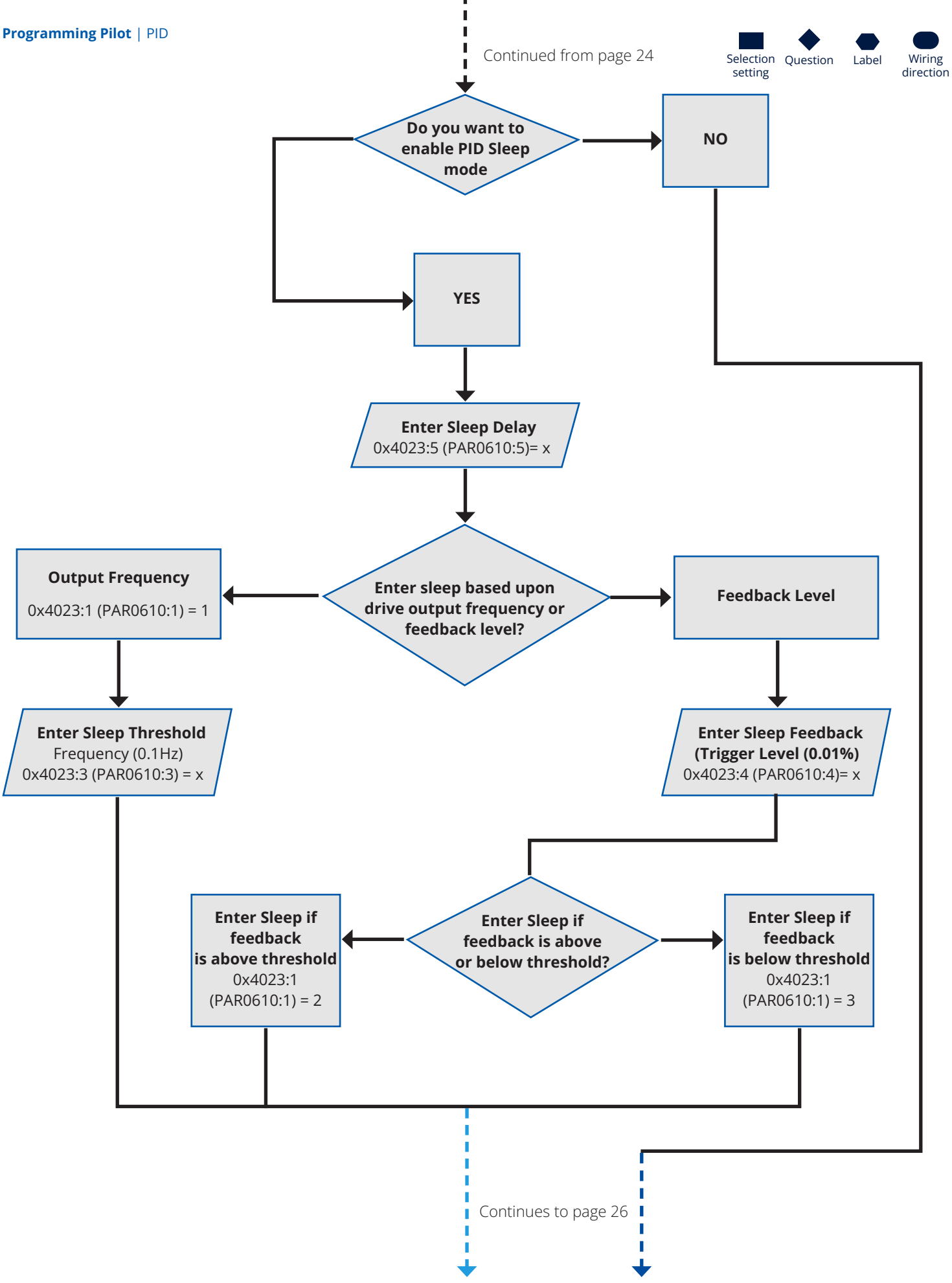
Continues across to page 23

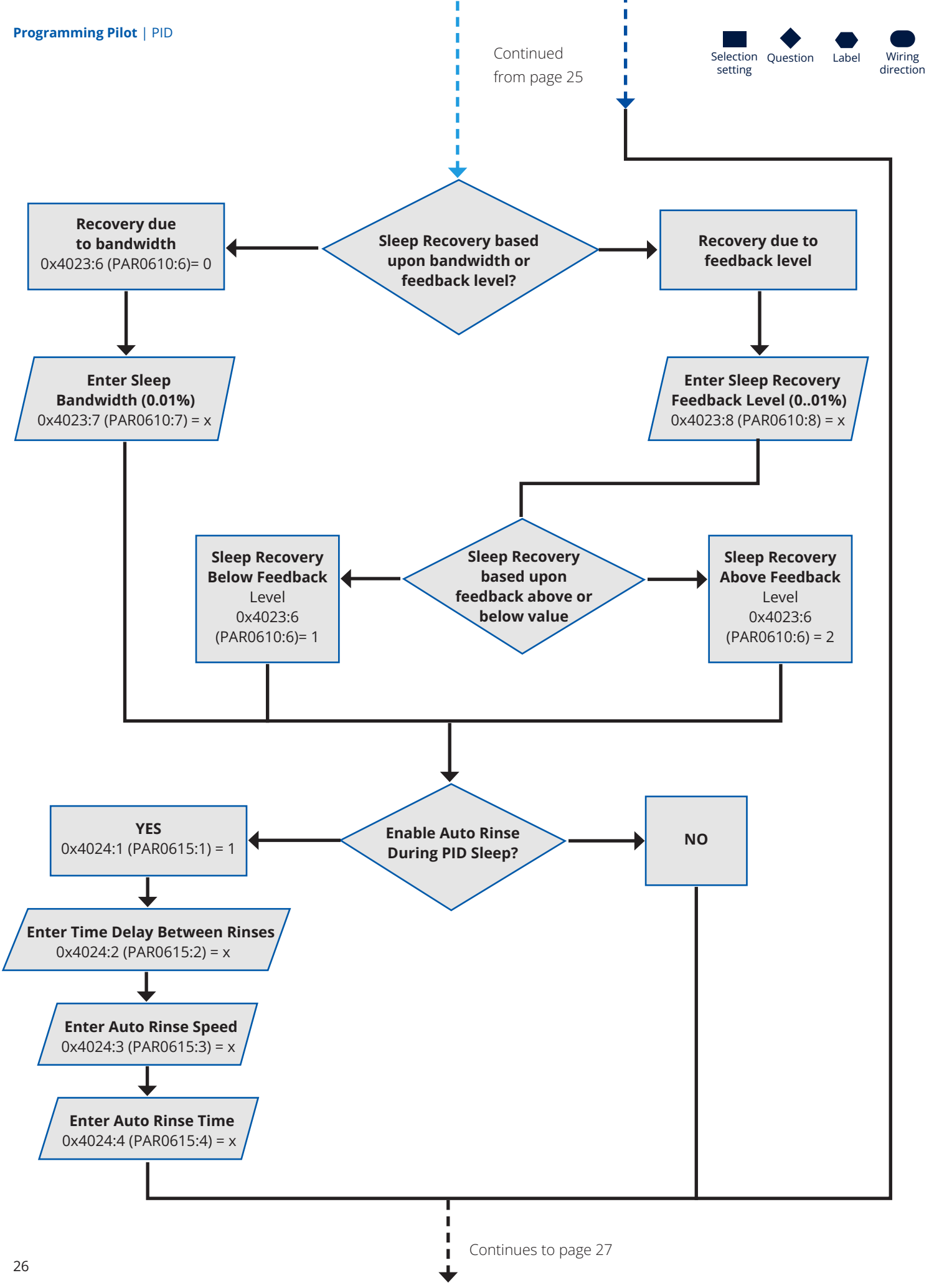
Continued from page 22

Continues to page 24

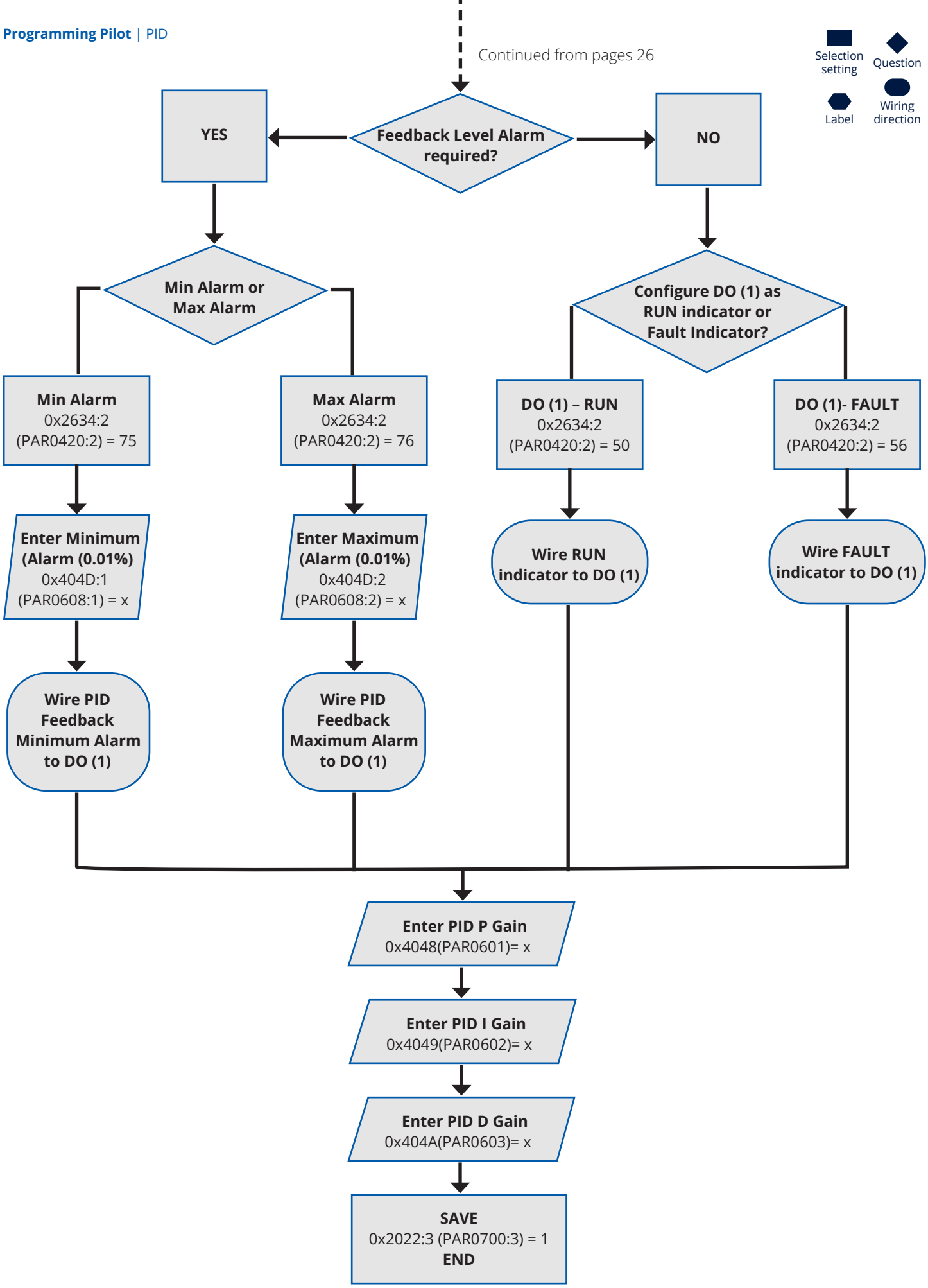
Continues to page 24

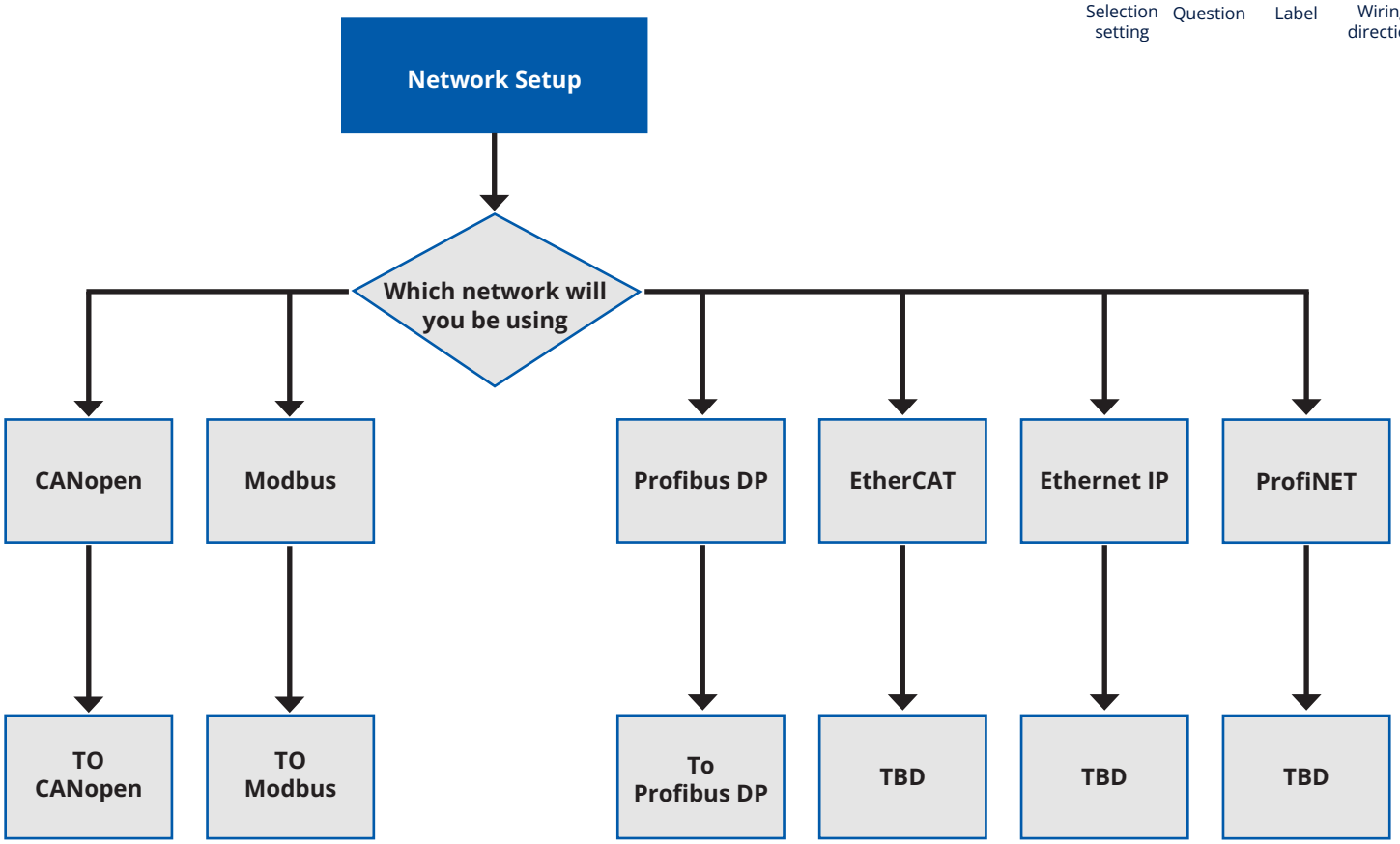

Continued from pages 22 - 23
Selection setting
Question
Label
Wiring direction
Enter PID Setpoint Ramp Rate
0x404B (PAR0604) = x
Enter PID Accel Time
0x4021:1 (PAR0606:1) = x
Enter PID Decel Time
0x4021 (PAR0606:2) = x
Is the feedback sensor 0-10VDC or 4-20mA?
0-10VDC sensor
0x2637:1 (PAR0431:1)=0
4-20mA sensor
I550 or i510?
I550
0x2637:1 (PAR0431:1)=4
I510
0x2637:1 (PAR0431:1)=2
Wire 500 Ohm resistor in parallel to AIN2
Feedback is 0-100% of AIN2 range
Continues to page 25

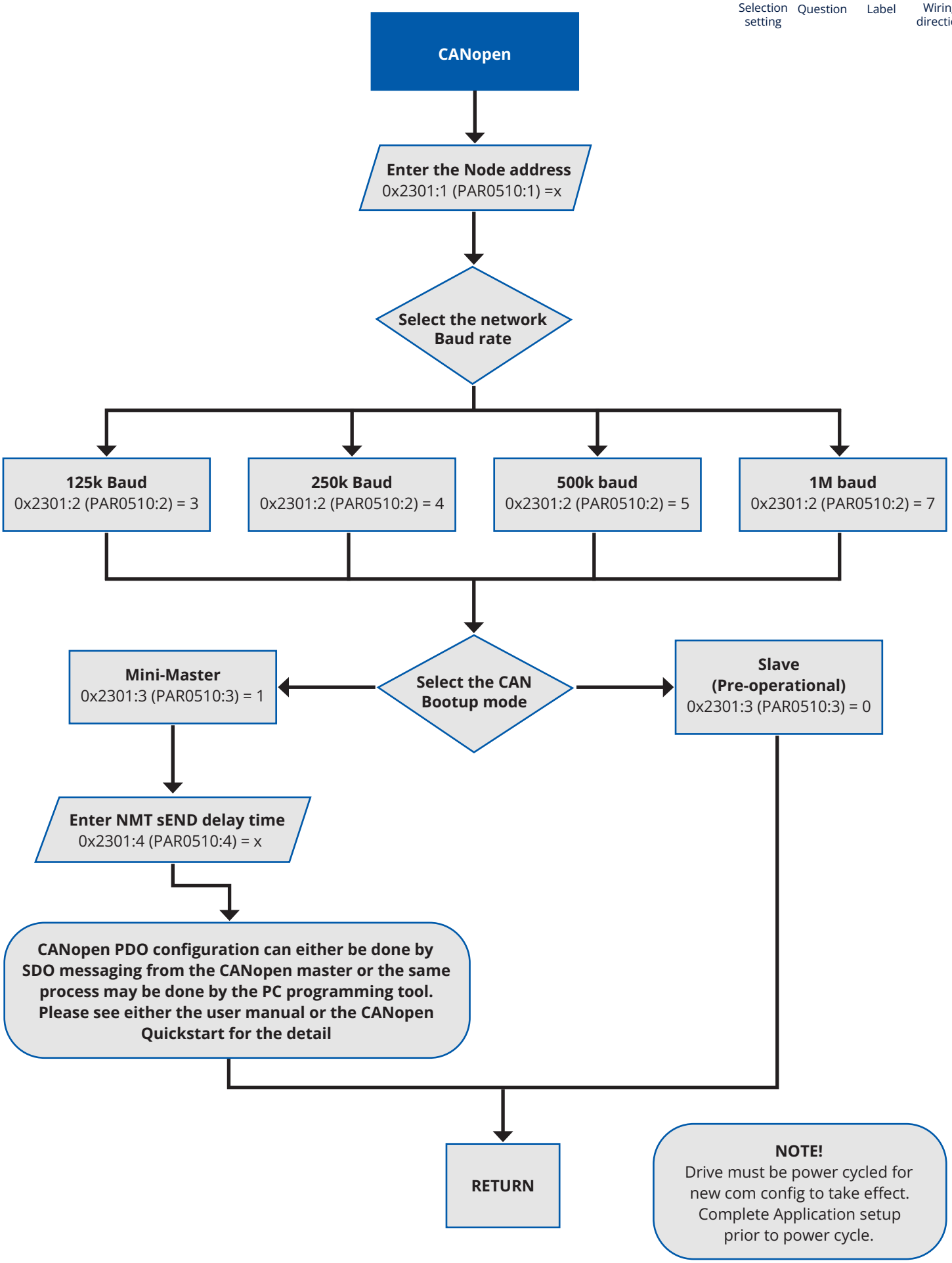

Continued from page 24
Selection setting
Question
Label
Wiring direction
Do you want to enable PID Sleep mode
NO
YES
Enter Sleep Delay
0x4023:5 (PAR0610:5)= x
Enter sleep based upon drive output frequency or feedback level?
Output Frequency
0x4023:1 (PAR0610:1) = 1
Feedback Level
Enter Sleep Threshold
Frequency (0.1Hz)
0x4023:3 (PAR0610:3) = x
Enter Sleep Feedback (Trigger Level (0.01%)
0x4023:4 (PAR0610:4)= x
Enter Sleep if feedback is above or below threshold?
Enter Sleep if feedback is above threshold
0x4023:1
(PAR0610:1) = 2
Enter Sleep if feedback is below threshold
0x4023:1
(PAR0610:1) = 3
Continues to page 26

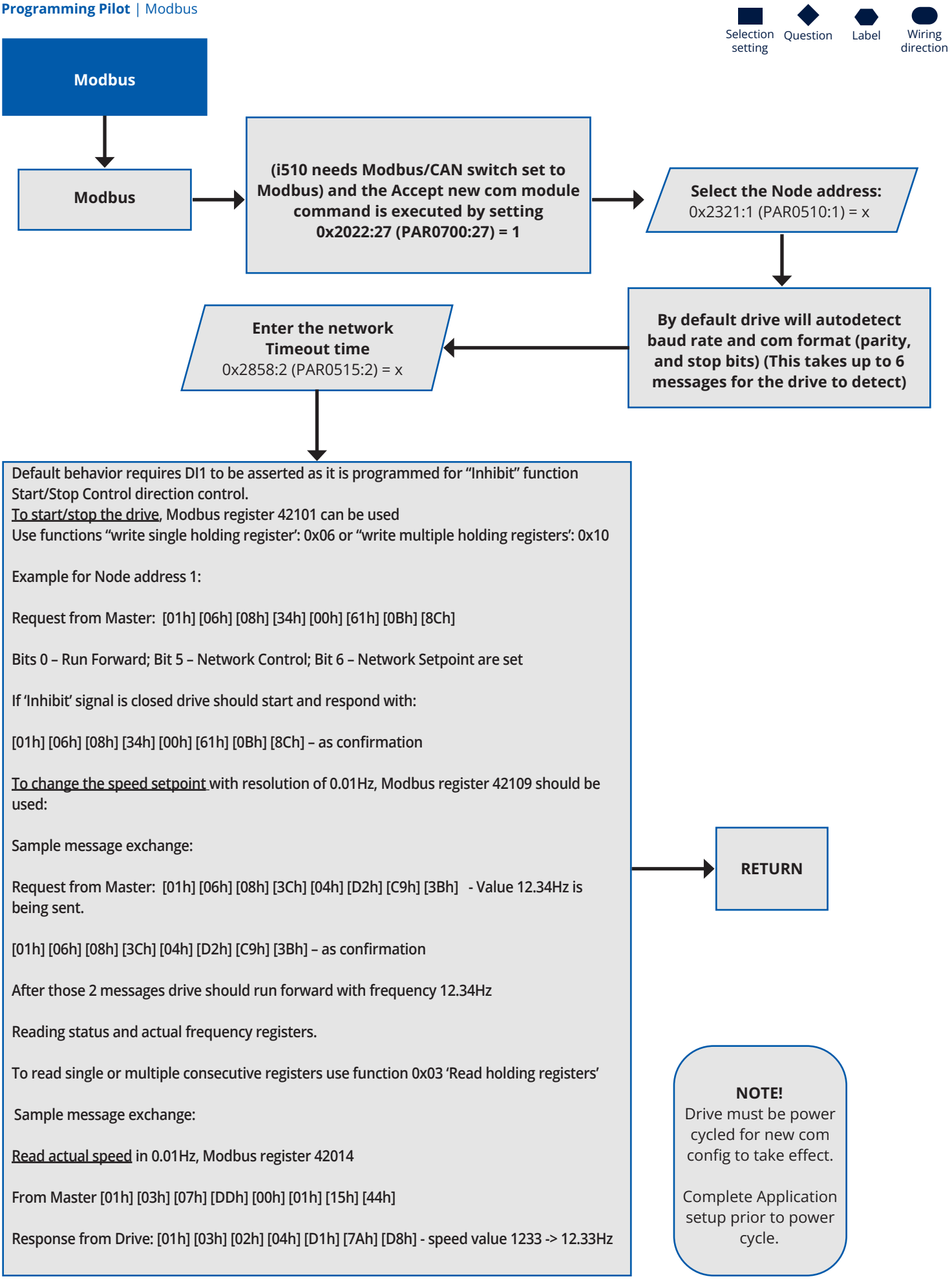

Continued from page 25
Selection setting
Question
Label
Wiring direction
Sleep Recovery based upon bandwidth or feedback level?
Recovery due to bandwidth
0x4023:6 (PAR0610:6)= 0
Recovery due to feedback level
Enter Sleep Bandwidth (0.01%)
0x4023:7 (PAR0610:7) = x
Enter Sleep Recovery Feedback Level (0..01%)
0x4023:8 (PAR0610:8) = x
Sleep Recovery based upon feedback above or below value
Sleep Recovery Below Feedback Level
0x4023:6
(PAR0610:6)= 1
Sleep Recovery Above Feedback Level
0x4023:6
(PAR0610:6) = 2
Enable Auto Rinse During PID Sleep?
YES
0x4024:1 (PAR0615:1) = 1
NO
Enter Time Delay Between Rinses
0x4024:2 (PAR0615:2) = x
Enter Auto Rinse Speed
0x4024:3 (PAR0615:3) = x
Enter Auto Rinse Time
0x4024:4 (PAR0615:4) = x
Continues to page 27

Continued from pages 26




Selection setting
Question
Label
Wiring direction
Network Setup
Which network will you be using
CANopen
Modbus
Profibus DP
EtherCAT
Ethernet IP
ProfiNET
TO CANopen
TO Modbus
To Profibus DP
TBD
TBD
TBD

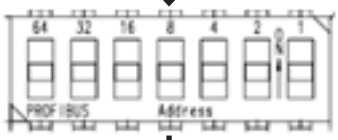

Selection setting
Question
Label
Wiring direction
CANopen
Enter the Node address
0x2301:1 (PAR0510:1) =x
Select the network Baud rate
125k Baud
0x2301:2 (PAR0510:2) = 3
250k Baud
0x2301:2 (PAR0510:2) = 4
500k baud
0x2301:2 (PAR0510:2) = 5
1M baud
0x2301:2 (PAR0510:2) = 7
Select the CAN Bootup mode
Mini-Master
0x2301:3 (PAR0510:3) = 1
Slave (Pre-operational)
0x2301:3 (PAR0510:3) = 0
Enter NMT sEND delay time
0x2301:4 (PAR0510:4) = x
CANopen PDO configuration can either be done by SDO messaging from the CANopen master or the same process may be done by the PC programming tool. Please see either the user manual or the CANopen Quickstart for the detail
RETURN
NOTE!
Drive must be power cycled for new com config to take effect. Complete Application setup prior to power cycle.


Selection setting
Question
Label
Wiring direction
Modbus
Modbus
(i510 needs Modbus/CAN switch set to Modbus) and the Accept new com module command is executed by setting 0x2022:27 (PAR0700:27) = 1
Select the Node address: 0x2321:1 (PAR0510:1) = x
By default drive will autodetect baud rate and com format (parity, and stop bits) (This takes up to 6 messages for the drive to detect)
Enter the network Timeout time 0x2858:2 (PAR0515:2) = x
Default behavior requires DI1 to be asserted as it is programmed for "Inhibit" function Start/Stop Control direction control.
To start/stop the drive, Modbus register 42101 can be used
Use functions "write single holding register': 0x06 or "write multiple holding registers': 0x10
Example for Node address 1:
Request from Master: [01h] [06h] [08h] [34h] [00h] [61h] [0Bh] [8Ch]
Bits 0 – Run Forward; Bit 5 – Network Control; Bit 6 – Network Setpoint are set
If 'Inhibit' signal is closed drive should start and respond with:
[01h] [06h] [08h] [34h] [00h] [61h] [0Bh] [8Ch] – as confirmation
To change the speed setpoint with resolution of 0.01Hz, Modbus register 42109 should be used:
Sample message exchange:
Request from Master: [01h] [06h] [08h] [3Ch] [04h] [D2h] [C9h] [3Bh] - Value 12.34Hz is being sent.
[01h] [06h] [08h] [3Ch] [04h] [D2h] [C9h] [3Bh] – as confirmation
After those 2 messages drive should run forward with frequency 12.34Hz
Reading status and actual frequency registers.
To read single or multiple consecutive registers use function 0x03 'Read holding registers'
Sample message exchange:
Read actual speed in 0.01Hz, Modbus register 42014
From Master [01h] [03h] [07h] [DDh] [00h] [01h] [15h] [44h]
Response from Drive: [01h] [03h] [02h] [04h] [D1h] [7Ah] [D8h] - speed value 1233 -> 12.33Hz
RETURN
NOTE!
Drive must be power cycled for new com config to take effect.
Complete Application setup prior to power cycle.

Selection setting | Question | Label | Wiring direction

**Profibus DP**

**Use the dip switches on the unit to set the Profibus Node address**




**See Profibus Quickstart or user manual**

**RETURN**

**NOTE!**
Drive must be power cycled for new com config to take effect. Complete Application setup prior to power cycle.

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