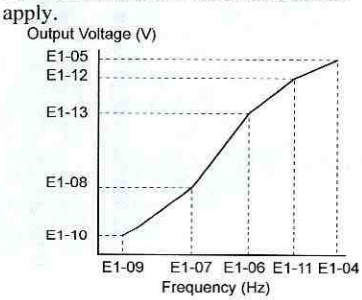
No.	Name	Description
b3-10	Speed Search Detection Compensation Gain	Sets the gain which is applied to the speed detected by Speed Estimation Speed Search before the motor is reaccelerated. Increase this setting if ov occurs when performing Speed Search after a relatively long period of baseblock.
b3-14	Bi-Directional Speed Search Selection	0: Disabled (uses the direction of the frequency reference) 1: Enabled (drive detects which way the motor is rotating)
b3-17	Speed Search Restart Current Level	Sets the Speed Search restart current level as a percentage of the drive rated current.
b3-18	Speed Search Restart Detection Time	Sets the time to detect Speed Search restart.
b3-19	Number of Speed Search Restarts	Sets the number of times the drive can attempt to restart when performing Speed Search.
b3-24	Speed Search Method Selection	**0: Current Detection** 1: Speed Estimation
b3-25	Speed Search Wait Time	Sets the time the drive must wait between each Speed Search restart attempt.
b4-01	Timer Function On-Delay Time	Sets the on-delay and off-delay times for a digital timer output (H2-□□=12). The output is triggered by a digital input programmed to H1-□□=18).
b4-02	Timer Function Off-Delay Time	
b5-01	PID Function Setting	0: Disabled **1: Enabled (PID output becomes output frequency reference, deviation D controlled)**
b5-02	Proportional Gain Setting (P)	Sets the proportional gain of the PID controller.
b5-03	Integral Time Setting (I)	Sets the integral time for the PID controller.
b5-04	Integral Limit Setting	Sets the maximum output possible from the integrator as a percentage of the maximum output frequency.
b5-05	Derivative Time (D)	Sets D control derivative time.
b5-06	PID Output Limit	Sets the maximum output possible from the entire PID controller as a percentage of the maximum output frequency.
b5-07	PID Offset Adjustment	Applies an offset to the PID controller output. Set as a percentage of the maximum output frequency.
b5-08	PID Primary Delay Time Constant	Sets a low pass filter time constant on the output of the PID controller.
b5-09	PID Output Level Selection	**0: Direct acting** 1: Inverse acting
b5-10	PID Output Gain Setting	Sets the gain applied to the PID output.
b5-11	PID Output Reverse Selection	**0: Negative PID output triggers zero limit.** 1: Rotation direction reverses with negative PID output. **Note:** When using setting 1, make sure reverse operation is permitted by b1-04.
b5-12	Feedback Loss 4 to 20 mA Detection Selection	0: Disabled 1: Alarm only **2: Fault** 3: Run at b5-13
b5-13	Feedback Loss Goto Frequency	Sets the speed at which the drive will run if a 4 to 20 mA wire break is detected on the PID Feedback and when b5-12 is set to 3 (Run at b5-13).
b5-14	Feedback Loss of Prime Level	Detects loss of prime in the pump when a wire break condition has occurred.

No.	Name	Description
b5-15	Feedback Loss Go To Frequency Time Out	When b5-12 = 3 and the Feedback signal is lost, the drive will run at the b5-13 speed for the b5-15 time, after which the drive will fault on Feedback Loss (FDBKL).
b5-16	Feedback Loss Start Delay	When an AUTO Run command is initiated, the drive will not fault on Feedback Loss (FDBKL) or use the Feedback Loss GoTo Frequency (b5-13) until the b5-16 time has expired.
b5-17	PID Accel/Decel Time	Sets the acceleration and deceleration time to PID setpoint.
b5-32	Integrator Ramp Limit	When set to a value greater than zero, the PI Integrator is forced to be within +/- this amount of the soft starter output.
b5-34	PID Output Lower Limit	Sets the minimum output possible from the PID controller as a percentage of the maximum output frequency.
b5-35	PID Input Limit	Limits the PID control input (deviation signal) as a percentage of the maximum output frequency. Acts as a bipolar limit.
b5-39	PID System Units Display Digits	0: No decimal place **1: One decimal place** 2: Two decimal places 3: Three decimal places
b5-40	Frequency Reference Monitor Content during PID	**0: Display the frequency reference (U1-01) after PID compensation has been added.** 1: Display the frequency reference (U1-01) before PID compensation has been added.
b5-47	Reverse Operation Selection 2 by PID Output	0: Zero limit when PID output is a negative value. **1: Reverse operation when PID output is a negative value**
b6-01	Dwell Reference at Start	Parameters b6-01 and b6-02 set the frequency to hold and the time to maintain that frequency at start.
b6-02	Dwell Time at Start	
b6-03	Dwell Reference at Stop	Parameters b6-03 and b6-04 set the frequency to hold and the time to maintain that frequency at stop.
b6-04	Dwell Time at Stop	
C1-01	Acceleration Time 1	Sets the time to accelerate from 0 to maximum frequency.
C1-02	Deceleration Time 1	Sets the time to decelerate from maximum frequency to 0.
C1-03	Acceleration Time 2	Sets the time to accelerate from 0 to maximum frequency.
C1-04	Deceleration Time 2	Sets the time to decelerate from maximum frequency to 0.
C1-09	Fast Stop Time	Sets the time for the Fast Stop function.
C1-10	Accel/Decel Time Setting Units	0: 0.01 s (0.00 to 600.00 s) **1: 0.1 s (0.0 to 6000.0 s)**
C1-11	Accel/Decel Time Switching Frequency	Sets the frequency to switch between accel/decel time settings.
C1-14	Accel/Decel Rate Frequency	Sets the base frequency used to calculate acceleration and deceleration times.
C2-01	S-Curve Characteristic at Accel Start	S-curve at acceleration start.
C2-02	S-Curve Characteristic at Accel End	S-curve at acceleration end.
C2-03	S-Curve Characteristic at Decel Start	S-curve at deceleration start.
C2-04	S-Curve Characteristic at Decel End	S-curve at deceleration end.
C3-01	Slip Compensation Gain	Sets the gain for the motor slip compensation function used for motor 1.
C3-02	Slip Compensation Primary Delay Time	Adjusts the slip compensation function delay time used for motor 1.

No.	Name	Description
C3-03	Slip Compensation Limit	Sets an upper limit for the slip compensation function as a percentage of motor rated slip for motor 1 (E2-02).
C3-04	Slip Compensation Selection during Regeneration	**0: Disabled** 1: Enabled above 6 Hz
C4-01	Torque Compensation Gain	Sets the gain for the automatic torque (voltage) boost function and helps to produce better starting torque. Used for motor 1.
C4-02	Torque Compensation Primary Delay Time 1	Sets the torque compensation filter time.
C6-02	Carrier Frequency Selection	1: 2.0 kHz 2: 5.0 kHz (4.0 kHz) 3: 8.0 kHz (6.0 kHz) 4: 10.0 kHz (8.0 kHz) 5: 12.5 kHz (10.0 kHz) 6: 15.0 kHz (12.0 kHz) **7: Swing PWM1 (Audible sound 1)** 8: Swing PWM2 (Audible sound 2) 9: Swing PWM3 (Audible sound 3) A: Swing PWM4 (Audible sound 4) B: Leakage Current Rejection PWM C to E: No setting possible F: User-defined (determined by C6-03 through C6-05)
C6-03	Carrier Frequency Upper Limit	Determines the upper and lower limits for the carrier frequency.
C6-04	Carrier Frequency Lower Limit	
C6-05	Carrier Frequency Proportional Gain	
d1-01 to d1-16	Frequency Reference 1 to 16	Sets the frequency reference for the drive. Setting units are determined by parameter o1-03.
d1-17	Jog Frequency Reference	Sets the Jog frequency reference. Setting units are determined by parameter o1-03.
d2-01	Frequency Reference Upper Limit	Sets the frequency reference upper limit as a percentage of the maximum output frequency.
d2-02	Frequency Reference Lower Limit	Sets the frequency reference lower limit as a percentage of the maximum output frequency.
d2-03	Master Speed Reference Lower Limit	Sets the lower limit for frequency references from analog inputs as a percentage of the maximum output frequency.
d3-01	Jump Frequency 1	Eliminates problems with resonant vibration of the motor/machine by avoiding continuous operation in predefined frequency ranges. The drive accelerates and decelerates the motor through the prohibited frequency ranges.
d3-02	Jump Frequency 2	
d3-03	Jump Frequency 3	
d3-04	Jump Frequency Width	Sets the dead-band width around each selected prohibited frequency reference point.
d4-01	Frequency Reference Hold Function Selection	**0: Disabled. Drive starts from zero when the power is switched on.** 1: Enabled. At power up, the drive starts the motor at the Hold frequency that was saved.
d4-03	Frequency Reference Bias Step (Up/Down 2)	Sets the bias added to the frequency reference when the Up 2 and Down 2 digital inputs are enabled (H1-□□ = 75, 76).
d4-05	Frequency Reference Bias Operation Mode Selection (Up/Down 2)	**0: Bias value is held if no input Up 2 or Down 2 is active.** 1: When the Up 2 reference and Down 2 reference are both on or both off, the applied bias becomes 0. The specified accel/decel times are used for acceleration or deceleration.

No.	Name	Description
d4-06	Frequency Reference Bias (Up/Down 2)	The Up/Down 2 bias value is saved in d4-06 when the frequency reference is not input by the digital operator. Set as a percentage of the maximum output frequency.
d4-07	Analog Frequency Reference Fluctuation Limit (Up/Down 2)	Limits how much the frequency reference is allowed to change while an input terminal set for Up 2 or Down 2 is enabled.
d4-08	Frequency Reference Bias Upper Limit (Up/Down 2)	Sets the upper limit for the bias and the value that can be saved in d4-06. Set as a percentage of the maximum output frequency.
d4-09	Frequency Reference Bias Lower Limit (Up/Down 2)	Sets the lower limit for the bias and the value that can be saved in d4-06. Set as a percentage of the maximum output frequency.
d4-10	Up/Down Frequency Reference Limit Selection	**0: The lower limit is determined by d2-02 or an analog input.** 1: The lower limit is determined by d2-02.
E1-01	Input Voltage Setting	This parameter must be set to the power supply voltage. **WARNING!***Electrical Shock Hazard. Drive input voltage (not motor voltage) must be set in E1-01 for the protective features of the drive to function properly. Failure to do so may result in equipment damage and/or death or personal injury.*
E1-03	V/f Pattern Selection	0: 50 Hz, Constant torque 1 1: 60 Hz, Constant torque 2 2: 60 Hz, Constant torque 3 (50 Hz base) 3: 72 Hz, Constant torque 4 (60 Hz base) 4: 50 Hz, Variable torque 1 5: 50 Hz, Variable torque 2 6: 60 Hz, Variable torque 3 7: 60 Hz, Variable torque 4 8: 50 Hz, High starting torque 1 9: 50 Hz, High starting torque 2 A: 60 Hz, High starting torque 3 B: 60 Hz, High starting torque 4 C: 90 Hz (60 Hz base) D: 120 Hz (60 Hz base) E: 180 Hz (60 Hz base) **F: Custom V/f, E1-04 through E1-13 settings define the V/f pattern**
E1-04	Maximum Output Frequency	These parameters are only applicable when E1-03 is set to F. To set linear V/f characteristics, set the same values for E1-07 and E1-09. In this case, the setting for E1-08 will be disregarded. Ensure that the four frequencies are set according to these rules: E1-09 ≤ E1-07 < E1-06 ≤ E1-11 ≤ E1-04 Setting E1-11 to 0 disables both E1-11 and E1-12 and the above conditions do not apply. 
E1-05	Maximum Voltage	
E1-06	Base Frequency	
E1-07	Middle Output Frequency	
E1-08	Middle Output Frequency Voltage	
E1-09	Minimum Output Frequency	
E1-10	Minimum Output Frequency Voltage	
E1-11	Middle Output Frequency 2	
E1-12	Middle Output Frequency Voltage 2	
E1-13	Base Voltage	
E2-01	Motor Rated Current	Sets the motor nameplate full load current in amps. Automatically set during Auto-Tuning.
E2-02	Motor Rated Slip	Sets the motor rated slip. Automatically set during Auto-Tuning.
E2-03	Motor No-Load Current	Sets the no-load current for the motor. Automatically set during Auto-Tuning.

No.	Name	Description
E2-04	Number of Motor Poles	Sets the number of motor poles. Automatically set during Auto-Tuning.
E2-05	Motor Line-to-Line Resistance	Sets the phase-to-phase motor resistance. Automatically set during Auto-Tuning.
E2-06	Motor Leakage Inductance	Sets the voltage drop due to motor leakage inductance as a percentage of motor rated voltage. Automatically set during Auto-Tuning.
E2-10	Motor Iron Loss for Torque Compensation	Sets the motor iron loss.
E2-11	Motor Rated Power	Sets the motor rated power in kilowatts (1 HP = 0.746 kW). Automatically set during Auto-Tuning.
H1-01 to H1-07	Multi-Function Digital Input Terminal S1 to S7 Function Selection	Selects the function of terminals S1 to S7.
H1-21	External Fault 1 Delay Time	Sets the amount of time delay applied to the EF1 fault. (20 ≤ H1-01 ≤ 2F)
H1-22	External Fault 2 Delay Time	Sets the amount of time delay applied to the EF2 fault. (20 ≤ H1-02 ≤ 2F)
H1-23	External Fault 3 Delay Time	Sets the amount of time delay applied to the EF3 fault. (20 ≤ H1-03 ≤ 2F)
H1-24	External Fault 4 Delay Time	Sets the amount of time delay applied to the EF4 fault. (20 ≤ H1-04 ≤ 2F)
H1-25	External Fault 5 Delay Time	Sets the amount of time delay applied to the EF5 fault. (20 ≤ H1-05 ≤ 2F)
H1-26	External Fault 6 Delay Time	Sets the amount of time delay applied to the EF6 fault. (20 ≤ H1-06 ≤ 2F)
H1-27	External Fault 7 Delay Time	Sets the amount of time delay applied to the EF7 fault. (20 ≤ H1-07 ≤ 2F)
H2-01	Terminal MA, MB, and MC function selection (relay)	Sets the function for terminals MA/MB/MC.
H2-02	Terminal P1 function selection (open-collector)	Sets the function for the terminal P1.
H2-03	Terminal P2 function selection (open-collector)	Sets the function for terminal P2.
H2-06	Power Consumption Output Unit Selection	**0: 0.1 kWh units** 1: 1 kWh units 2: 10 kWh units 3: 100 kWh units 4: 1000 kWh units
H3-01	Terminal A1 Signal Level Selection	**0: 0 to 10 V** 1: -10 to 10 V
H3-02	Terminal A1 Function Selection	Sets the function of terminal A1.
H3-03	Terminal A1 Gain Setting	Sets the level of the input value selected in H3-02 when 10 V is input at terminal A1.
H3-04	Terminal A1 Bias Setting	Sets the level of the input value selected in H3-02 when 0 V is input at terminal A1.
H3-09	Terminal A2 Signal Level Selection	0: 0 to 10 V 1: -10 to 10 V **2: 4 to 20 mA** 3: 0 to 20 mA **Note:** Use DIP Switch S1-2 to set input terminal A2 for a current or voltage input signal.
H3-10	Terminal A2 Function Selection	Sets the function of terminal A2.
H3-11	Terminal A2 Gain Setting	Sets the level of the input value selected in H3-10 when 10 V (20 mA) is input at terminal A2.
H3-12	Terminal A2 Bias Setting	Sets the level of the input value selected in H3-10 when 0 V (0 or 4 mA) is input at terminal A2.
H3-13	Analog Input Filter Time Constant	Sets a primary delay filter time constant for terminals A1 and A2. Used for noise filtering.
H3-14	Analog Input Terminal Enable Selection	1: Terminal A1 only 2: Terminal A2 only **7: All terminals enabled**
H3-16	Terminal A1 Offset	Adds an offset when the analog signal to terminal A1 is at 0 V.
H3-17	Terminal A2 Offset	Adds an offset when the analog signal to terminal A2 is at 0 V.
H4-01	Multi-Function Analog Output Terminal AM Monitor Selection	Selects the data to be output through multi-function analog output terminal AM. Set the desired monitor parameter to the digits available in U□-□□. For example, enter "103" for U1-03.
H4-02	Multi-Function Analog Output Terminal AM Gain	Sets the signal level at terminal AM that is equal to 100% of the selected monitor value.
H4-03	Multi-Function Analog Output Terminal AM Bias	Sets the signal level at terminal AM that is equal to 0% of the selected monitor value.
H5-01	Drive Node Address	Selects drive station node number (address) for MEMOBUS/Modbus terminals R+, R-, S+, S-. Cycle power for the setting to take effect.
H5-02	Communication Speed Selection	0: 1200 bps 1: 2400 bps 2: 4800 bps **3: 9600 bps** 4: 19200 bps 5: 38400 bps 6: 57600 bps 7: 76800 bps 8: 115200 bps Cycle power for the setting to take effect.
H5-03	Communication Parity Selection	**0: No parity** 1: Even parity 2: Odd parity Cycle power for the setting to take effect.
H5-04	Stopping Method After Communication Error (CE)	0: Ramp to stop 1: Coast to stop 2: Fast Stop **3: Alarm only**
H5-05	Communication Fault Detection Selection	0: Disabled **1: Enabled. If communication is lost for more than two seconds, a CE fault will occur.**
H5-06	Drive Transmit Wait Time	Set the wait time between receiving and sending data.
H5-07	RTS Control Selection	0: Disabled. RTS is always on. **1: Enabled. RTS turns on only when sending.**
H5-09	CE Detection Time	Sets the time required to detect a communications error.
H5-10	Unit Selection for MEMOBUS/Modbus Register 0025H	**0: 0.1 V units** 1: 1 V units
H5-11	Communications ENTER Function Selection	**0: Drive requires an Enter command before accepting any changes to parameter settings.** 1: Parameter changes are activated immediately without the Enter command.
H5-12	Run Command Method Selection	**0: FWD/Stop, REV/Stop** 1: Run/Stop, FWD/REV

i.9 Parameter Table

No.	Name	Description
H6-01	Pulse Train Input Terminal RP Function Selection	**0: Frequency reference** 1: PID feedback value 2: PID setpoint value
H6-02	Pulse Train Input Scaling	Sets the terminal RP input signal frequency that is equal to 100% of the value selected in H6-01.
H6-03	Pulse Train Input Gain	Sets the level of the value selected in H6-01 when a frequency with the value set in H6-02 is input.
H6-04	Pulse Train Input Bias	Sets the level of the value selected in H6-01 when 0 Hz is input.
H6-05	Pulse Train Input Filter Time	Sets the pulse train input filter time constant.
H6-06	Pulse Train Monitor Terminal MP Selection	Select the pulse train monitor output function (value of the □-□□ part of U□-□□). Example: Select "501" for monitor U5-01. Select "0" when not using this parameter or when using in the through mode.
H6-07	Pulse Train Monitor Scaling	Sets the terminal MP output signal frequency when the monitor value is 100%. For example, to have the pulse train monitor output equal the output frequency, set H6-06 to 102 and H6-07 to 0.
H6-08	Pulse Train Input Minimum Frequency	Sets the minimum frequency for the pulse train input to be detected. Enabled when H6-01 = 0, 1, or 2.
L1-01	Motor Overload Protection Selection	0: Disabled **1: General purpose motor (standard fan cooled)** 2: Drive dedicated motor with a speed range of 1:10 3: Vector motor with a speed range of 1:100 6: General purpose motor (50 Hz)
L1-02	Motor Overload Protection Time	Sets the motor thermal overload protection (oL1) time.
L1-03	Motor Overheat Alarm Operation Selection (PTC input)	0: Ramp to stop 1: Coast to stop 2: Fast Stop (decelerate to stop using the deceleration time in C1-09) **3: Alarm only ("oH3" will flash)**
L1-04	Motor Overheat Fault Operation Selection (PTC input)	0: Ramp to stop **1: Coast to stop** 2: Fast Stop (decelerate to stop using the deceleration time in C1-09)
L1-05	Motor Temperature Input Filter Time (PTC input)	Adjusts the filter for the motor temperature analog input (H3-02 or H3-10 = E).
L1-13	Continuous Electrothermal Operation Selection	0: Disabled **1: Enabled** 2: Enabled (RTC)
L1-22	Leakage Current Filter Time Constant 1	Sets the time constant for reducing the sensitivity level when detecting leakage current. Set in seconds and used when operating at constant speed.
L1-23	Leakage Current Filter Time Constant 2	Sets the time constant for reducing the sensitivity level when detecting leakage current. Set in seconds and used during acceleration and deceleration operation.
L2-01	Momentary Power Loss Operation Selection	0: Disabled. Drive trips on Uv1 fault when power is lost. 1: Recover within the time set in L2-02. Uv1 will be detected if power loss is longer than L2-02. **2: Recover as long as CPU has power. Uv1 is not detected.**
L2-02	Momentary Power Loss Ride-Thru Time	Sets the Power Loss Ride-Thru time. Enabled only when L2-01 = 1 or 3.

No.	Name	Description
L2-03	Momentary Power Loss Minimum Baseblock Time	Sets the minimum wait time for residual motor voltage decay before the drive output reenergizes after performing Power Loss Ride-Thru.
L2-04	Momentary Power Loss Voltage Recovery Ramp Time	Sets the time for the output voltage to return to the preset V/f pattern during Speed Search.
L2-05	Undervoltage Detection Level (Uv1)	Sets the DC bus undervoltage trip level.
L2-06	KEB Deceleration Time	Sets the time required to decelerate from the speed when KEB was activated to zero speed.
L2-07	KEB Acceleration Time	Sets the time to accelerate to the frequency reference when momentary power loss is over. If set to 0.0, the active acceleration time is used.
L2-08	Frequency Gain at KEB Start	Sets the percentage of output frequency reduction at the beginning of deceleration when the KEB Ride-Thru function is started.
L2-11	DC Bus Voltage Setpoint during KEB	Sets the desired value of the DC bus voltage during KEB Ride-Thru.
L3-01	Stall Prevention Selection during Acceleration	0: Disabled. **1: General purpose. Acceleration is paused as long as the current is above the L3-02 setting.** 2: Intelligent. Accelerate in the shortest possible time without exceeding the L3-02 level.
L3-02	Stall Prevention Level during Acceleration	Used when L3-01 = 1 or 2. 100% is equal to the drive rated current.
L3-03	Stall Prevention Limit during Acceleration	Sets Stall Prevention lower limit during acceleration when operating in the constant power range. Set as a percentage of drive rated current.
L3-04	Stall Prevention Selection during Deceleration	**0: Disabled. Deceleration at the active deceleration rate. An ov fault may occur.** 1: General purpose. Deceleration is paused when the DC bus voltage exceeds the Stall Prevention level. 2: Intelligent. Decelerate as fast as possible while avoiding ov faults. 3: Stall Prevention with braking resistor. Stall Prevention during deceleration is enabled in coordination with dynamic braking. 4: Overexcitation Deceleration. Decelerates while increasing the motor flux. 7: Overexcitation Deceleration 3. Applies more braking power than normal overexcitation deceleration. Yaskawa recommends extra caution due to the heavy load on the motor.
L3-05	Stall Prevention Selection during Run	**0: Disabled. Drive runs at a set frequency. A heavy load may cause speed loss.** 1: Decel time 1. Uses the deceleration time set to C1-02 while Stall Prevention is performed. 2: Decel time 2. Uses the deceleration time set to C1-04 while Stall Prevention is performed.
L3-06	Stall Prevention Level during Run	Enabled when L3-05 is set to 1 or 2. 100% is equal to the drive rated current.
L3-11	Overvoltage Suppression Function Selection	**0: Disabled** 1: Enabled
L3-17	Target DC Bus Voltage for Overvoltage Suppression and Stall Prevention	Sets the desired value for the DC bus voltage during overvoltage suppression and Stall Prevention during deceleration.

No.	Name	Description
L3-20	DC Bus Voltage Adjustment Gain	Sets the proportional gain for KEB Ride-Thru, Stall Prevention, and overvoltage suppression.
L3-21	Accel/Decel Rate Calculation Gain	Sets the proportional gain used to calculate the deceleration rate during KEB Ride-Thru, ov suppression function, and Stall Prevention during deceleration (L3-04 = 2).
L3-23	Automatic Reduction Selection for Stall Prevention during Run	**0: Sets the Stall Prevention level set in L3-06 that is used throughout the entire frequency range.** 1: Automatic Stall Prevention level reduction in the constant output range. The lower limit value is 40% of L3-06.
L3-24	Motor Acceleration Time for Inertia Calculations	Sets the time needed to accelerate the uncoupled motor at rated torque from stop to the maximum frequency.
L3-25	Load Inertia Ratio	Sets the ratio between the motor and machine inertia.
L4-01	Speed Agreement Detection Level	L4-01 sets the frequency detection level for digital output functions H2-□□ = 2, 3, 4, 5.
L4-02	Speed Agreement Detection Width	L4-02 sets the hysteresis or allowable margin for speed detection.
L4-03	Speed Agreement Detection Level (+/-)	L4-03 sets the frequency detection level for digital output functions H2-□□ = 13, 14, 15, 16.
L4-04	Speed Agreement Detection Width (+/-)	L4-04 sets the hysteresis or allowable margin for speed detection.
L4-05	Frequency Reference Loss Detection Selection	**0: Stop. Drive stops when the frequency reference is lost.** 1: Run. Drive runs at a reduced speed when the frequency reference is lost.
L4-06	Frequency Reference at Reference Loss	Sets the percentage of the frequency reference that the drive should run with when the frequency reference is lost.
L4-07	Speed Agreement Detection Selection	**0: No detection during baseblock.** 1: Detection always enabled.
L5-01	Number of Auto Restart Attempts	Sets the number of times the drive may attempt to restart after the following faults occur: GF, LF, oC, oH1, ov, PF, rH, rr, oL1, oL2, oL3, oL4, STo, Uv1.
L5-02	Auto Restart Fault Output Operation Selection	**0: Fault output not active.** 1: Fault output active during restart attempt.
L5-04	Fault Reset Interval Time	Sets the amount of time to wait between performing fault restarts.
L5-40	Low Feedback Fault Retry Selection	**0: No retry** 1: Retry
L5-41	High Feedback Fault Retry Selection	**0: No retry** 1: Retry
L5-42	Feedback Loss Fault Retry Selection	**0: No retry** 1: Retry
L5-50	Setpoint Not Met Retry Selection	**0: No retry** 1: Retry
L5-51	Loss of Prime Fault Retry Selection	**0: No retry** 1: Retry
L5-52	Pump Over Cycle Fault Retry Selection	**0: No retry** 1: Retry
L5-53	Volute-TStat Retry Selection	**0: No retry** 1: Retry **Note:** The drive will restart only after the Volute-Tstat digital input deactivates and the L5-04 timer expires.

No.	Name	Description
L6-01	Torque Detection Selection 1	**0: Disabled** 1: oL3 detection only active during speed agree, operation continues after detection 2: oL3 detection always active during run, operation continues after detection 3: oL3 detection only active during speed agree, output shuts down on an oL3 fault 4: oL3 detection always active during run, output shuts down on an oL3 fault 5: UL3 detection only active during speed agree, operation continues after detection 6: UL3 detection always active during run, operation continues after detection 7: UL3 detection only active during speed agree, output shuts down on an oL3 fault 8: UL3 detection always active during run, output shuts down on an oL3 fault 9: UL6 Alarm at Speed Agree 10: UL6 Alarm during Run 11: UL6 Fault at Speed Agree 12: UL6 Fault during Run
L6-02	Torque Detection Level 1	Sets the overtorque and undertorque detection level.
L6-03	Torque Detection Time 1	Sets the time an overtorque or undertorque condition must exist to trigger torque detection 1.
L6-04	Torque Detection Selection 2	**0: Disabled** 1: oL4 detection only active during speed agree, operation continues after detection 2: oL4 detection always active during run, operation continues after detection 3: oL4 detection only active during speed agree, output shuts down on an oL4 fault 4: oL4 detection always active during run, output shuts down on an oL4 fault 5: UL4 detection only active during speed agree, operation continues after detection 6: UL4 detection always active during run, operation continues after detection 7: UL4 detection only active during speed agree, output shuts down on an oL4 fault 8: UL4 detection always active during run, output shuts down on an oL4 fault
L6-05	Torque Detection Level 2	Sets the overtorque and undertorque detection level.
L6-06	Torque Detection Time 2	Sets the time an overtorque or undertorque condition must exist to trigger torque detection 2.
L6-13	Motor Underload Protection Selection	**0: Base frequency enable** 1: Max frequency enable
L6-14	Motor Underload Protection Level at Minimum Frequency	Sets the UL6 detection level at minimum frequency by percentage of drive rated current.
L8-01	Internal Dynamic Braking Resistor Protection Selection (ERF type)	**0: Resistor overheat protection disabled** 1: Resistor overheat protection enabled
L8-02	Overheat Alarm Level	An overheat alarm occurs when heatsink temperature exceeds the L8-02 level.
L8-03	Overheat Pre-Alarm Operation Selection	0: Ramp to stop. A fault is triggered. 1: Coast to stop. A fault is triggered. 2: Fast Stop. Decelerate to stop using the deceleration time in C1-09. A fault is triggered. **3: Continue operation. An alarm is triggered.** 4: Continue operation at reduced speed as set in L8-19.
L8-05	Input Phase Loss Protection Selection	0: Disabled **1: Enabled**

i.9 Parameter Table

No.	Name	Description
L8-07	Output Phase Loss Protection Selection	0: Disabled **1: Enabled (triggered by a single phase loss)** 2: Enabled (triggered when two phases are lost)
L8-09	Output Ground Fault Detection Selection	**0: Disabled** 1: Enabled
L8-10	Heatsink Cooling Fan Operation Selection	**0: During run only. Fan operates only during run for L8-11 seconds after stop.** 1: Fan always on. Cooling fan operates whenever the drive is powered up.
L8-11	Heatsink Cooling Fan Off Delay Time	Sets a delay time to shut off the cooling fan after the Run command is removed when L8-10 = 0.
L8-12	Ambient Temperature Setting	Enter the ambient temperature. This value adjusts the oL2 detection level.
L8-15	oL2 Characteristics Selection at Low Speeds	0: No oL2 level reduction below 6 Hz. **1: oL2 level is reduced linearly below 6 Hz. It is halved at 0 Hz.**
L8-18	Software Current Limit Selection	**0: Disabled** 1: Enabled
L8-19	Frequency Reduction Rate during Overheat Pre-Alarm	Specifies the frequency reference reduction gain at overheat pre-alarm when L8-03 = 4.
L8-35	Installation Method Selection	0: IP00/Open-Chassis enclosure 1: Side-by-Side mounting 2: IP20/NEMA 1, UL Type 1 enclosure 3: Finless model drive or external heatsink installation
L8-38	Carrier Frequency Reduction	0: Disabled **1: Enabled below 6 Hz** 2: Enabled for the entire speed range
L8-40	Carrier Frequency Reduction Off Delay Time	Sets the time that the drive continues running with reduced carrier frequency after the carrier reduction condition is gone. Setting 0.00 s disables the carrier frequency reduction time.
L8-41	High Current Alarm Selection	**0: Disabled** 1: Enabled. An alarm is triggered at output currents above 150% of drive rated current.
n1-01	Hunting Prevention Selection	0: Disabled **1: Enabled**
n1-02	Hunting Prevention Gain Setting	If the motor vibrates while lightly loaded, increase the gain by 0.1 until vibration ceases. If the motor stalls, decrease the gain by 0.1 until the stalling ceases.
n1-03	Hunting Prevention Time Constant	Sets the time constant used for Hunting Prevention.
n1-05	Hunting Prevention Gain while in Reverse	Sets the gain used for Hunting Prevention. If set to 0, the gain set to n1-02 is used for operation in reverse.
n3-13	Overexcitation Deceleration Gain	Applies a gain to the V/f pattern during deceleration (L3-04 = 4). Returns to normal values after ramp to stop or at re-acceleration.
n3-21	High-Slip Suppression Current Level	Sets output current level at which the drive will start reducing the overexcitation gain in order to prevent a too high motor slip during Overexcitation Deceleration. Set as a percentage of the drive rated current.
n3-23	Overexcitation Operation Selection	**0: Enabled in both directions** 1: Enabled only when rotating forward 2: Enabled only when in reverse
o1-01	Drive Mode Unit Monitor Selection	Selects the content of the last monitor that is shown when scrolling through Drive Mode display. Enter the last three digits of the monitor parameter number to be displayed: U□-□□.

No.	Name	Description
o1-02	User Monitor Selection after Power Up	**1: Frequency reference (U1-01)** 2: Direction 3: Output frequency (U1-02) 4: Output current (U1-03) 5: User-selected monitor (set by o1-01)
o1-03	Digital Operator Display Selection	**0: 0.01 Hz** 1: 0.01% (100% = E1-04) 2: r/min (calculated using the number of motor poles setting in E2-04) 3: User-selected units (set by o1-09, o1-10 and o1-11)
o1-05	LCD Contrast Control	Sets the brightness of the optional LCD operator.
o1-06	User Monitor Selection Mode	0: 3 Monitor Sequential (displays the next two sequential monitors) **1: 3 Monitor Selectable (set by o1-07 and o1-08)**
o1-07	Second Line Monitor Selection	Selects the monitor that is shown in the second line. Enter the last three digits of the monitor parameter number to be displayed: U□-□□. For example, set "403" to display monitor parameter U4-03. **Note:** Parameter is effective only when o1-06 is set to 1.
o1-08	Third Line Monitor Selection	Selects the monitor that is shown in the third line. Enter the last three digits of the monitor parameter number to be displayed: U□-□□. For example, set "403" to display monitor parameter U4-03. **Note:** Parameter is effective only when o1-06 is set to 1.
o1-09	Frequency Reference Display Units	Sets unit display for the frequency reference parameters and frequency related monitors when o1-03 = 3. 0: WC (Inch of water) 1: PSI (Pounds per square inch) 2: GPM (Gallons per minute) 3: F (Degrees Fahrenheit) 4: CFM (Cubic feet per minute) 5: CMH (Cubic meters per hour) 6: LPH (Liters per hour) 7: LPS (Liters per second) 8: Bar (Bar) 9: Pa (Pascal) 10: C (Degrees Celsius) 11: Mtr (Meters) 12: Ft (Feet) 13: LPM (Liters per minute) 14: CMM (Cubic meters per minute) 15: "Hg (inches of mercury) **25: None**
o1-10	User-Set Display Units Maximum Value	These settings define the display values when o1-03 is set to 3. o1-10 sets the display value that is equal to the maximum output frequency. o1-11 sets the position of the decimal position.
o1-11	User-Set Display Units Decimal Display	
o1-12	Home Help Text	0: Disabled **1: Enabled**
o2-02	STOP Key Function Selection	0: Disabled. STOP key is disabled in REMOTE operation. **1: Enabled. STOP key is always enabled.**
o2-03	User Parameter Default Value	**0: No change.** 1: Set defaults. Saves parameter settings as default values for a User Initialization. 2: Clear all. Clears the default settings that have been saved for a User Initialization.
o2-04	Drive Model Selection	Enter the drive model. Setting required only if installing a new control board.

No.	Name	Description
o2-05	Frequency Reference Setting Method Selection	**0: ENTER key must be pressed to enter a frequency reference.** 1: ENTER key is not required. The frequency reference can be adjusted using the up and down arrow keys only.
o2-06	Operation Selection when Digital Operator is Disconnected	**0: The drive continues operating if the digital operator is disconnected.** 1: An oPr fault is triggered and the motor coasts to stop.
o2-07	Motor Direction at Power Up when Using Operator	This parameter requires assigning drive operation to the digital operator. **0: Forward** 1: Reverse
o2-30	Monitor Position Save	Saves the monitor position and Home Screen quick monitor selection. **0: Disabled** 1: Enabled
o3-01	Copy Function Selection	**0: No action** 1: Read parameters from the drive, saving them onto the digital operator. 2: Copy parameters from the digital operator, writing them to the drive. 3: Verify parameter settings on the drive to check if they match the data saved on the operator.
o3-02	Copy Allowed Selection	**0: Read operation prohibited** 1: Read operation allowed
o4-01	Cumulative Operation Time Setting	Sets the value for the cumulative operation time of the drive in units of 10 h.
o4-02	Cumulative Operation Time Selection	0: Logs power-on time **1: Logs operation time when the drive output is active (output operation time).**
o4-03	Cooling Fan Operation Time Setting	Sets the value of the fan operation time monitor U4-03 in units of 10 h.
o4-05	Capacitor Maintenance Setting	Sets the value of the Maintenance Monitor for the capacitors. See U4-05 to check when the capacitors may need to be replaced.
o4-07	DC Bus Pre-Charge Relay Maintenance Setting	Sets the value of the Maintenance Monitor for the soft charge bypass relay. See U4-06 to check when the bypass relay may need to be replaced.
o4-09	IGBT Maintenance Setting	Sets the value of the Maintenance Monitor for the IGBTs. See U4-07 for IGBT replacement times.
o4-11	U2, U3 Initialization	**0: U2-□□ and U3-□□ monitor data is not reset when the drive is initialized (A1-03).** 1: U2-□□ and U3-□□ monitor data is reset when the drive is initialized (A1-03).
o4-12	kWh Monitor Initialization	**0: U4-10 and U4-11 monitor data is not reset when the drive is initialized (A1-03).** 1: U4-10 and U4-11 monitor data is reset when the drive is initialized (A1-03).
o4-13	Number of Run Commands Counter Initialization	**0: Number of Run commands counter is not reset when the drive is initialized (A1-03).** 1: Number of Run commands counter is reset when the drive is initialized (A1-03).
o4-17	Set/Reset Real-Time Clock	**0: - -** 1: Set 2: Reset
o4-20	Time Display Format	**0: 12-hour** 1: 24-hour
P1-01	Pump Mode	**0: Drive only** 3: MEMOBUS network

No.	Name	Description
P1-02	System Units	0: No unit **1: PSI: Pounds per square inch** 2: Pa: Pascals 3: Bar: Bar 4: "WC: Inch of water 5: "Hg: Inch of Mercury 6: ft: feet 7: m: meters 8: °F: Degrees Fahrenheit 9: °C: Degrees Celsius 10: Percent
P1-03	Feedback Device Scaling	Sets the scaling of feedback device in user-set units.
P1-04	Start / Draw Down Level	The system starts when the feedback level drops below the start level for the time set in P1-05. This level also specifies the wake-up level when the drive is in Sleep Mode. **Note:** When PID operates in reverse mode, the system will start when the feedback has risen above the start level for the time set to P1-05.
P1-05	Start Level Delay Time	The system starts when the feedback level drops below the start level for the time set in this parameter.
P1-06	Minimum Pump Speed	Minimum frequency at which the drive will run. Applies to both HAND and AUTO Modes. **Note:** For minimum pump frequency, the drive will use the highest setting from among P1-06, P4-12 (Thrust Bearing Frequency), or d2-02 (Reference Lower Limit).
P1-07	Minimum Pump Speed Units	**0: Hz** 1: RPM **Note:** Changing this parameter will reset the P1-06 default value.
P1-08	Low Feedback Level	Sets the lower detection level for the PID feedback.
P1-09	Low Feedback Level Fault Delay Time	Sets the amount of delay time from when the low feedback is detected until the drive faults on an "LFB Low Feedback" fault. **Note:** This parameter is effective only when P1-10 is set to 0 (Fault).
P1-10	Low Feedback Selection	**0: Fault** 1: Alarm 2: Digital out only
P1-11	High Feedback Level	Sets the upper detection level for the PID feedback. **Note:** When P1-03 is set to 3, parameter P9-18 uses the value set here to calculate quick de-stage feedback level.
P1-12	High Feedback Level Fault Delay Time	Sets the amount of delay time from when the high feedback is detected until the drive faults on a "HFB High Feedback" fault. **Note:** This parameter is effective only when P1-13 is set to 0 (Fault (and digital out)).
P1-13	High Feedback Selection	**0: Fault** 1: Alarm 2: Digital out only
P1-14	Hysteresis Level	Sets the hysteresis level used for low and high level feedback detection.
P1-15	Maximum Setpoint Difference	Sets the level that the difference between the setpoint and the feedback must exceed for the time set in P1-16 to trigger the drive response set in P1-17.
P1-16	Not Maintaining Setpoint Time	Sets the delay time before a "Setpoint Not Met" condition occurs. The pump protection criteria set in P1-15 must be met before the timer will start.
P1-17	Not Maintaining Setpoint Selection	**0: Fault** 1: Alarm 2: Digital out only

No.	Name	Description
P1-18	Prime Loss Detection Method	**0: Current (A)** 1: Power (kW) 2: Torque (%)
P1-19	Prime Loss Level	Detects loss of prime in the pump when in Auto or Sleep Boost Mode.
P1-20	Loss of Prime Time	Sets the delay time before a "Loss of Prime" condition occurs. The pump protection criteria set in P1-18 and P1-19 must be met before the timer will start.
P1-21	Loss of Prime Frequency	Sets the frequency level above which the "Loss of Prime" detection is enabled when set to a value other than 0.
P1-22	Loss of Prime Selection	**0: Fault** 1: Alarm 2: Digital out only
P1-23	Loss of Prime Maximum Restart Time after Fault	Sets the time in minutes that the drive will wait before attempting another restart when the restart fails or is not attempted due to a continuing fault condition.
P1-30	Low Water Digital Input Configuration	**0: Normally open** 1: Normally closed
P1-31	High Water Digital Input Configuration	**0: Normally open** 1: Normally closed
P2-01	Sleep Level Type	**0: Output frequency** 1: Output current 2: Feedback 3: Output speed (RPM) **Note:** Feedback depends on PID direction operation.
P2-02	Sleep Level	Sleep activates when the selected level type (P2-01 setting) reaches the programmed sleep level for the time set in P2-03.
P2-03	Sleep Delay Time	Sets the delay time before the drive enters Sleep Mode when the sleep level set in P2-02 is reached.
P2-04	Sleep Activate Level	Sets the level above which the output frequency must rise to activate the sleep function when P2-01, Sleep Level Type, is set to 0 (Output Frequency / Speed).
P2-05	Sleep Boost Level	Sets the amount of boost applied to the setpoint before going to sleep. Setting this parameter to 0.0 disables the function.
P2-06	Sleep Boost Hold Time	Sets the amount of time that the boosted pressure will be maintained before the drive goes to sleep.
P2-07	Sleep Boost Maximum Time	Sets the amount of time that the system (feedback) has to reach the boosted setpoint. The drive will go to sleep when the amount of time set in this parameter has been exceeded.
P2-08	Delta Sleep Feedback Drop Level	If the PID Error (setpoint minus feedback) exceeds the level programmed in this parameter within the time window set in P2-09 and the output frequency is greater than the level set in P1-06, the sleep operation deactivates and the drive returns to normal operation.
P2-09	Feedback Detection Drop Time	Defines the time window in which the software monitors the feedback to detect a flow/no-flow condition.
P2-10	Sleep Mode: Cycling Protection	Sets the maximum number of cycles that are allowed within the time specified in P2-11 before tripping the PoC "Pump Over Cycle" fault.
P2-11	Sleep Mode: Maximum Cycling Protection Time	Sets the maximum time allowed between cycles. When no cycling occurs within the programmed time, the drive will decrease the internal cycle register.

No.	Name	Description
P2-12	Over Cycling Mode	**0: Disabled** 1: Alarm 2: Fault 3: Auto SP Compensation
P2-13	Setpoint Compensation	Allows for the software to automatically compensate the setpoint in the event of excessive cycling.
P2-14	Maximum Setpoint Compensation	Sets the maximum allowed setpoint compensation for over-cycling function.
P2-23	Anti-No-Flow Bandwidth	Sets the amount of PI error bandwidth used to detect the Anti-No-Flow condition.
P2-24	Anti-No-Flow Detection Time	Sets the time delay before the drive starts the increased deceleration rate after Anti-No-Flow is detected.
P2-25	Anti-No-Flow Release Level	Sets the amount below the setpoint which the feedback must drop to disengage the Anti-No-Flow and return to normal PI operation.
P4-01	Pre-Charge Level	Runs the drive at the frequency set in P4-02.
P4-02	Pre-Charge Frequency	Sets the frequency reference used when the Pre-Charge function is active.
P4-03	Pre-Charge Time	Sets the time at which the drive will spend at the Pre-Charge Frequency 1 during pre-charge. Maximum pre-charge time is P4-03 + P4-07.
P4-05	Pre-Charge Loss of Prime Level	Detects loss of prime in the pump during Pre-charge 1. When the measured quantity determined by P1-18 drops below this level for the time set in P1-20 and the output frequency is at the level set in P4-02, a "Loss of Prime" condition occurs. The drive responds to the "Loss of Prime" condition depending on the setting of P1-22, Loss of Prime Selection.
P4-06	Pre-Charge Frequency 2	Sets the frequency reference used when the Pre-Charge function 2 is active. Setting this parameter to 0.0 disables the function.
P4-07	Pre-Charge Time 2	Sets the time at which the drive will spend at the Pre-Charge frequency 2 during pre-charge. Maximum pre-charge time is P4-03 + P4-07.
P4-08	Pre-Charge Loss of Prime Level 2	Detects loss of prime in the pump. When the measured quantity determined by P1-18 drops below this level for the time set in P1-20 and the output frequency is at the level set in P4-06, a "Loss of Prime" condition occurs. The drive responds to the "Loss of Prime" condition depending on the setting of P1-22, Loss of Prime Selection.
P4-10	AUTO Mode Operator Run Power Down Storage	**0: Disabled** 1: Enabled **WARNING!** *Sudden Movement Hazard. If the drive is powered down while running, it will automatically initiate an internal Run command upon power-up.*
P4-11	Thrust Bearing Acceleration Time	Sets the time at which the drive output frequency will ramp up to the reference frequency set in P4-12.
P4-12	Thrust Bearing Frequency	The drive will accelerate to this frequency in the time set to P4-11. The drive will decelerate from the frequency in the time set to P4-13.

No.	Name	Description
P4-13	Thrust Bearing Deceleration Time	Sets the amount of time it takes to bring the drive from the Thrust Frequency set in P4-12 to stop when Thrust Mode is active. When the Run command is removed while the drive is operating in Thrust Mode above the Thrust Frequency, the time set in this parameter is used when the frequency reference is at or below the thrust frequency.
P4-17	Utility Start Delay	Sets the amount of time that the drive will delay starting if a Run command is present at power-up. When P1-01, Pump Mode, is set to 3 (MEMOBUS network), the drive is unavailable to the network (Pump Off Network) when the function is active. Setting this parameter to 0.0 disables the function.
P4-21	Low City Input Select	0: Normally open (closed indicates the Low City Pressure condition) **1: Normally closed (open indicates the Low City Pressure condition)**
P4-22	Low City On-Delay Time	Sets the amount of time a Low City Pressure condition needs to be present before the drive will stop.
P4-23	Low City Off-Delay Time	Sets the amount of time a Low City Pressure condition needs to be absent before the drive will restart.
P4-24	Low City Alarm Text	**0: Low city pressure** 1: Low suction pressure 2: Low water in tank
P4-25	Remote Drive Disable Selection	0: Normally open (closed indicates the Remote Drive Disable condition) **1: Normally closed (open indicates the Remote Drive Disable condition)**
P4-26	Remote Drive Disable On-Delay	Sets the amount of time a Remote Drive Disable condition must be present before the drive will stop.
P4-27	Remote Drive Disable Off-Delay	Sets the amount of time a Remote Drive Disable condition must be absent before the drive will run.
P4-29	Lube Pump Message Text	**0: Lube Pump** 1: Digital Out Delay
P4-30	Lube Pump Active During Run	**0: Disabled** 1: Active During Run
P4-31	Lube Pump / Digital Output Delay Timer	Sets the amount of time to delay the drive output and to energize the digital output (H2-□□ = 8B) before the drive is allowed to run.
P4-32	Pre-charge Level 2	For normal PI operation during Pre-charge 2, if the PI Feedback signal rises above the P4-32 level, Pre-charge 2 is cancelled and the drive resumes normal operation.
P5-01	HAND Mode Ref Source	Sets the HAND Mode reference. 0: Analog input **1: P5-02 (HAND reference)**
P5-02	HAND Reference 1	Sets the frequency reference used when HAND Mode is active and P5-01 is set to 1.
P5-03	HAND/AUTO During Run Selection	**0: Disabled** 1: Enabled
P5-04	HAND Key Function Selection	0: Disabled **1: Enabled**
P5-05	HAND Reference 2	Sets the frequency reference used when HAND Mode 2 is active.
P5-06	HAND Ref. 1 Loss of Prime Level	Detects loss of prime in the pump when in HAND Mode.
P5-07	HAND Ref. 2 Loss of Prime Level	Detects loss of prime in the pump when in HAND Mode 2.

No.	Name	Description
P5-09	HAND References Set via Motor Operated Pot Selection	**0: Disabled** 1: Enabled
P7-01	Anti-Jam Operation Selection	**0: Disabled** 1: Enabled
P7-02	Anti-Jam Cycle Count	Sets the maximum number of cycles that will be attempted before triggering and Anti-Jam fault.
P7-03	Anti-Jam Detection Current Level	Sets the current level at start that will trigger the anti-jam function. Set as a percentage of the motor rated current.
P7-04	Anti-Jam Detection Time at Start	Sets the length of time that current must rise above the level set in P7-03 to trigger the anti-jam function.
P7-05	Anti-Jam During Run Current	Sets the current level during run that will trigger the anti-jam function. Set as a percentage of motor rated current. Setting this parameter to 0 will disable anti-jam during run.
P7-06	Anti-Jam During Run Time	Sets the length of time that the current must rise above the level set in P7-05 to trigger the anti-jam function. Restricted to simplex only.
P7-07	Anti-Jam Frequency Reference	Sets the maximum speed allowed when the anti-jam function is active.
P7-08	Anti-Jam Release Time	Sets the length of time that the current must fall below the level set in P7-03 to resume normal operation.
P9-01	Lead Drive Selection	0: Next available **1: Lowest runtime** 2: Stop history
P9-02	Feedback Source	**0: Analog only** 1: Ana->Net, No Alrm 2: Ana->Net, Alarm 3: Network only
P9-03	Alternation Time	Specifies the time for a drive to request alternation. Setting this parameter to 0 disables the function.
P9-04	Alternation Mode	**0: FIFO auto** 1: FIFO forced 2: LIFO 3: FIFO @sleep
P9-05	Lag Drive Mode	**0: Fixed speed. The drive runs at the P9-06 setting after the time set in P9-07 expires.** 2: Turn off. The drive stops running when it switches to a lag drive after the time set in P9-07 expires. 3: Follow Lead Speed. The drive will follow the speed of the current lead drive, applying P9-30 gain and P9-31 bias.
P9-06	Lag Fixed Speed	Sets the speed at which the drive will run when the drive changes from a lead to a lag and the time set in P9-07 has expired.
P9-07	Lag Fixed Speed Delay	Specifies how long speed is latched before performing the function specified in P9-05 when the drive changes from a lead to a lag.
P9-08	Add Pump Mode	0: Output frequency 1: Feedback **2: Feedback + Fout**

No.	Name	Description
P9-09	Add Frequency Level	When P9-08 is set to 0, this parameter sets the level above which the output frequency needs to rise for the time set in P9-11 before the lead drive will send a request for a new lead drive via the iQPump MEMOBUS network. When P9-08 is set to 2 and the delta feedback (setpoint minus feedback) has exceeded the level set in P9-10 for the time set in P9-11, this parameter sets the level above which the output frequency needs to rise before the lead drive will send a request for a new lead drive via the iQPump MEMOBUS network.
P9-10	Add Delta Level	When P9-08 is set to 1, this parameter sets the level above which the delta feedback (setpoint minus feedback) must rise for the time set in P9-11 before the lead drive will send a request for a new lead drive via the iQPump MEMOBUS network. When P9-08 is set to 2 and the output frequency has exceeded the level set in P9-09 for the time set in P9-11, this parameter sets the level above which the delta feedback (setpoint minus feedback) needs to rise before the lead drive will send a request for a new lead drive via the iQPump MEMOBUS network.
P9-11	Add Delay Time	Sets the delay time before a new lead drive is added to the system.
P9-12	Remove Pump Mode	**0: Output frequency** 1: Feedback 2: Feedback + Fout
P9-13	Remove Frequency Level	When P9-12 is set to 0, this parameter sets the level below which the output frequency must fall for the time set in P9-15 before the lead drive will send a request to be removed from the system via the iQPump MEMOBUS network. When P9-12 is set to 2 and the delta feedback (feedback minus setpoint) has exceeded the level set in P9-14 for the time set in P9-15, this parameter sets the level below which the output frequency must fall before the lead drive will request to be removed from the system via the iQPump MEMOBUS network.
P9-14	Remove Delta Level	When P9-12 is set to 1, this parameter sets the level above which the delta feedback (feedback minus setpoint) must rise for the time set in P9-15 before the lead drive will request to be removed from the system via the iQPump MEMOBUS network. When P9-12 is set to 2 and the output frequency has exceeded the level set in P9-13 for the time set in P9-15, this parameter sets the level above which the delta feedback (feedback minus setpoint) frequency must rise before the lead drive will request to be removed from the system via the iQPump MEMOBUS network.
P9-15	Remove Delay Time	Sets the delay time before the lead drive is removed from the system.
P9-16	Stabilization Time	Sets the time used to stabilize the system when a pump is staged or de-staged. Lead/lag control and pump protection are suspended during this time.
P9-17	Setpoint Modifier	Sets the value by which the system setpoint is incremented depending on the number of pumps that are running. Pump 1: Setpoint Pump 2: Setpoint + ((X-1) (P9-17))

No.	Name	Description
P9-18	High Feedback Quick De-Stage	Sets the feedback level that will trigger a quick de-stage. Set as a percentage of the P1-11 value. The quick de-stage ignores parameters P9-12 to P9-15 and uses an internal 2 second delay. Setting this parameter to 0.0 disables the feature.
P9-19	Alternation Unit	Sets the units used in P9-03. **0: Hours (H)** 1: Minutes (min)
P9-20	Allow Network Run	**0: Always** 1: First/alternation 2: First only 3: Alternation only
P9-21	Run Priority	Sets the lead drive selection priority overriding the P9-01 selection. Lower value = Higher priority. If multiple drives have the lowest P9-21 value, then P9-01 determines which drive becomes the lead.
P9-22	System Fault Retry	Sets the number of times that the iQPump MEMOBUS network will allow automatic restarts of system faults. The drive uses L5-04, Fault Reset Interval Time, to determine when to attempt a system fault restart. Set this parameter to the same value for all drives on the network.
P9-23	Maximum Number of Running Pumps	Sets the maximum number of pumps that can run on the system.
P9-24	Lead Swap at Sleep	Sets the length of time for which the lead drive will be in Sleep Mode before this drive will request a swap when there is another drive available with a lower P9-21 setting. Setting this parameter to 0 will disable the function.
P9-25	Highest Node Address	Sets the highest possible node address in the MEMOBUS network. For optimal network performance, set the serial communication address H5-01 beginning with 01h consecutively up to the last drive and then set this parameter to that H5-01 address.
P9-26	Master Time-out	Sets the minimum amount of time that the slave drives will wait for a message from the master before performing the action set in P9-27.
P9-27	Network Recovery	**0: Automatic. The drive will attempt to assume master functionality.** 1: Slave/Resume. The drive will continue running when the master is lost and will wait for a master to come online. 2: Slave/Stop. The drive will stop running when the master is lost and will wait for a master to come online. 3: Fault MSL. Fault the drive with an MSL (Master Lost).
P9-28	NETSCAN Alarm Time	Sets the amount of time that the slave drives will wait for a message from the master before displaying a NETSCAN alarm.
P9-29	Net Start Delay	Sets the amount of time that the network will wait before selecting and starting the lead drive after the first drive on the network has been put on AUTO Mode.
P9-30	Lag Drive Speed Follower Gain	Sets the gain to be applied to the speed of the current lead drive when P9-05 is set to 3. The bias to be applied is set in P9-31.
P9-31	Lag Drive Speed Follower Bias	Sets the bias to be applied to the speed of the current lead drive when P9-05 is set to 3. The gain to be applied is set in P9-30.

No.	Name	Description
P9-32	Lag Follower Deceleration Time	Sets the deceleration time when the P9-33 timer is running and the drive is running as Lag Drive Speed Follower (P9-05 is set to 3).
P9-33	Lag Follower Deceleration Time Active Time	Sets the time during which the deceleration time set in P9-32 is effective. The drive will use the standard deceleration rate when it expires. Setting this parameter to 0.0 disables the function.
P9-34	Low Feedback Quick De-Stage	Sets the low feedback level that will trigger a quick de-stage. The quick de-stage ignores parameters P9-12 and P9-15 and only uses an internal 2 second delay. Setting this parameter to 0.0 disables the function.
P9-99	Network Compatibility Selection	0: A-Ver: 30034 1: B-Ver: 30035/36 **2: iQ SmartNetwork**
Q1-01	PID Controller Setpoint 1	Sets the PID Setpoint when b1-01 is set to 0.
Q1-02	PID Controller Setpoint 2	Sets the PID Setpoint when the "Multi Setpoint 1" or "Alternate Multi Setpoint 1" multi-function digital input is closed.
Q1-03	PID Controller Setpoint 3	Sets the PID Setpoint when the "Multi Setpoint 2" or "Alternate Multi Setpoint 2" digital input is closed.
Q1-04	PID Controller Setpoint 4	Sets the PID Setpoint when the "Multi Setpoint 1" and "Multi Setpoint 2" or "Alternate Multi Setpoint 3" multi-function digital inputs are closed.

No.	Name	Description
Q1-09	PID Setpoint Set via Motor Operated Pot	Selects whether parameters Q1-01 to Q1-04 are changed via MOP from the home screen. **0: Disabled** 1: Enabled
Q3-01	Output Current Limit Select	**0: Disabled** 1: Enabled
Q3-02	Current Limit	Sets the current limit. Value is internally limited to 300% of the drive rated current.
Q3-10	Ripple Regulator Selection	0: Disabled **1: Enabled** 2: Enabled w/ Line Reactor
Q3-11	Ripple Regulator Setpoint	Set as a percentage of the maximum amount of ripple allowed before triggering an input phase loss fault.
S6-01	Emergency Override Speed	Sets the speed command used in emergency override mode when S6-02 = 0.
S6-02	Emergency Override Reference Selection	**0: Use S6-01 Reference** 1: Use Frequency Reference
T1-01	Auto-Tuning Mode Selection	**2: Stationary Auto-Tuning for Line-to-Line Resistance**
T1-02	Motor Rated Power	Sets the motor rated power as specified on the motor nameplate.
T1-04	Motor Rated Current	Sets the motor rated current as specified on the motor nameplate.

i.10 Standards Compliance

◆ UL Standards Compliance

The UL/cUL mark applies to products in the United States and Canada and indicates that UL has performed product testing and evaluation and determined that their stringent standards for product safety have been met. For a product to receive UL certification, all components inside that product must also receive UL certification.

Figure i.42 UL/cUL Mark

This drive is tested in accordance with UL standard UL508C and complies with UL requirements. The following conditions must be met to maintain compliance when using this drive in combination with other equipment:

■ Installation Area

Do not install the drive to an area greater than pollution degree 2 (UL standard).

■ Ambient Temperature

IP20/NEMA 1, UL Type 1 enclosure: -10 °C to +40 °C (14 °F to 104 °F)

IP66/NEMA 4X, UL Type 4X enclosure: -10 °C to +40 °C (14 °F to 104 °F)

◆ IP66/NEMA 4X, UL Type 4X Conditions of Acceptability

Adhere to the installation conditions specified in this manual to take full advantage of the IP66/NEMA 4X, UL Type 4X design of this drive.

■ Resistance Against Chemicals and Solvents

Table i.27 lists the information on chemical and solvent tolerability of the drive. The drive enclosure meets these requirements:

- UL50E: Enclosures for Electrical Equipment, Environmental Considerations **NEMA 4X, UL Type 4X**
- International Standard IEC 60529 Degrees of protection provided by enclosures (IP Code) **IP66**

Refer to the appropriate enclosure specification for more details on the enclosures resistance to chemicals and solvents.

Table i.27 Chemical and Solvent Tolerability

Reagent	Solvent
• Hydrochloric acid (10%) • Sulfuric acid (10%) • Nitric acid (10%) • Ammonia water • Sodium chloride	• Methanol • Ethanol

NOTICE: *Do not allow a stream of chemicals or solvents to be sprayed directly onto the drive enclosure. Failure to do so can damage the drive.*

NOTICE: *Prevent moisture and other solvents from entering the drive enclosure when removing the front cover. Failing to do so can damage the drive or considerably shorten its expected performance life.*

■ Main Circuit Terminal Wiring

Yaskawa recommends using closed-loop crimp terminals on all drive models. UL/cUL approval requires the use of UL Listed closed-loop crimp terminals when wiring the drive main circuit terminals. Use only the tools recommended by the terminal manufacturer for crimping. The wire gauges listed below are Yaskawa recommendations. Refer to local codes for proper wire gauge selections.

Wire Gauges and Tightening Torques

Refer to Wire Gauges and Tightening Torques on page 55 for details.

■ Factory Recommended Branch Circuit Protection for UL Compliance

Yaskawa recommends installing one of the following types of branch circuit protection to maintain compliance with UL508C. Semiconductor protective type fuses are preferred.

Branch circuit protection shall be provided by any of the following according to *Table i.28*.

- Non-time Delay Class J, T, or CC fuses.
- Time Delay Class J, T, CC, or RK5 fuses.
- Semiconductor fuses.
- Molded Case Circuit Breakers (MCCB).

Table i.28 Factory Recommended Drive Branch Circuit Protection

Drive Model	Non-time Delay Fuse Rating (A) <1>	Time Delay Fuses		Bussmann Semiconductor Fuse Part Number (Fuse Ampere) <4>	MCCB <5>	
		Class J, T, or CC Fuse Rating (A) <2>	Class RK5 Fuse Rating (A) <3>		Rating (A)	Minimum Enclosure Volume (in³)
200 V Class Single-Phase Drives						
BV0006	40	20	30	FWH-80B (80)	30	1152
BV0010	40	35	45	FWH-100B (100)	50	1152
BV0012	50	40	50	FWH-125B (125)	60	1152
BV0018	80	60	70	FWH-175B (175)	80	1152
200 V Class Three-Phase Drives						
2V0006	20	10	15	FWH-25A14F (25)	15	1152
2V0010	25	15	20	FWH-70B (70)	25	1152
2V0012	25	20	30	FWH-70B (70)	30	1152
2V0020	40	40	50	FWH-90B (90)	60	1152
2V0030	–	60	80	FWH-100B (100)	90	1152
2V0040	–	90	110	FWH-200B (200)	125	1152
2V0056	–	110	150	FWH-200B (200)	150	2560
2V0069	–	125	175	FWH-200B (200)	200	2560
400 V Class Three-Phase Drives						
4V0002	6	3.5	3	FWH-40B (40)	15	1152
4V0004	15 <6>	7	8	FWH-50B (50)	15	1152
4V0005	20 <7>	10	10	FWH-70B (70)	15	1152
4V0007	25 <8>	12	15	FWH-70B (70)	20	1152
4V0009	25	15	20	FWH-90B (90)	20	1152
4V0011	30	20	30	FWH-90B (90)	35	1152
4V0018	–	35	45	FWH-80B (80)	50	1152
4V0023	–	40	50	FWH-100B (100)	60	1152
4V0031	–	60	80	FWH-125B (125)	90	1152
4V0038	–	70	90	FWH-200B (200)	110	1152

<1> Maximum 300% of drive input current rating for any Class J, T, or CC fuse except for models 4V0004, 4V0005, and 4V0007.

<2> Maximum 175% of drive input current rating for any Class J, T, or CC fuse.

<3> Maximum 225% of drive input current rating for any Class RK5 fuse.

<4> When using semiconductor fuses, Bussmann FWH are required for UL compliance.

<5> Maximum MCCB Rating is 15 A or 200% of drive input current rating, whichever is larger. MCCB voltage rating must be 600 Vac or greater. Additionally, when using MCCBs for protection, the drive must be installed in a ventilated enclosure with minimum volume according the "Minimum Enclosure Volume" column.

<6> Model 4V0004 requires Mersen (Ferraz) part number A6T15 for compliance.

<7> Model 4V0005 requires Mersen (Ferraz) part number A6T20 for compliance.

<8> Model 4V0007 requires Mersen (Ferraz) part number A6T25 for compliance.

■ Low Voltage Wiring for Control Circuit Terminals

Wire low voltage wires with NEC Class 1 circuit conductors. Refer to national state or local codes for wiring. The external power supply shall be a UL-Listed Class 2 power source or equivalent.

Table i.29 Control Circuit Terminal Power Supply

Input / Output	Terminal Signal	Power Supply Specifications
Multi-function photocoupler output	P1, P2, PC	Requires class 2 power supply
Multi-function digital inputs	S1, S2, S3, S4, S5, S6, S7, SC	Use the internal power supply of the drive. Use class 2 for external power supply.
Multi-function analog inputs	A1, A2, AC	Use the internal power supply of the drive. Use class 2 for external power supply.
Pulse train input	RP	Use the internal LVLC power supply of the drive. Use class 2 for external power supply.
Pulse train output	MP	Use the internal LVLC power supply of the drive. Use class 2 for external power supply.

■ Drive Short-Circuit Rating

This drive has undergone the UL short-circuit test, which certifies that during a short circuit in the power supply the current flow will not rise above 31,000 amps maximum at 240 V for 200 V class drives and 480 V for 400 V class drives.

- The MCCB and breaker protection and fuse ratings shall be equal to or greater than the short-circuit tolerance of the power supply being used.
- Suitable for use on a circuit capable of delivering not more than 31,000 RMS symmetrical amperes for 240 V in 200 V class drives (up to 480 V for 400 V class drives) motor overload protection.

◆ Drive Motor Overload Protection

Set parameter E2-01 (motor rated current) to the appropriate value to enable motor overload protection. The internal motor overload protection is UL Listed and in accordance with the NEC and CEC.

■ E2-01: Motor Rated Current

Setting Range: Model Dependent

Default Setting: Model Dependent

Parameter E2-01 (motor rated current) protects the motor if parameter L1-01 is not set to 0 (default is 1, standard induction motor protection enabled).

If Auto-Tuning has been performed successfully, the motor data that was entered in T1-04 is automatically written into parameter E2-01. If Auto-Tuning has not been performed, manually enter the correct motor rated current in parameter E2-01.

■ L1-01: Motor Overload Protection Selection

The drive has an electronic overload protection function (oL1) based on time, output current and output frequency, which protects the motor from overheating. The electronic thermal overload function is UL-recognized, so it does not require an external thermal overload relay for single motor operation.

This parameter selects the motor overload curve used according to the type of motor applied.

Table i.30 Overload Protection Settings

Setting	Description
0	Disabled
1	Standard Fan-Cooled Motor (Default)
2	Drive Duty Motor with a Speed Range of 1:10
3	Vector Motor with a Speed Range of 1:100
6	Standard Fan-Cooled Motor (50 Hz)

Disable the electronic overload protection (L1-01 = 0: Disabled) and wire each motor with its own motor thermal overload when connecting the drive to more than one motor for simultaneous operation.

Enable the motor overload protection (L1-01 = "1", "2", or "3") when connecting the drive to a single motor unless there is another means of preventing motor thermal overload. The electronic thermal overload function causes an oL1 fault, which shuts off the output of the drive and prevents additional overheating of the motor. The motor temperature is continually calculated as long as the drive is powered up.

■ L1-02: Motor Overload Protection Time

Setting Range: 0.1 to 5.0 Minutes

Factory Default: 1.0 Minutes

The L1-02 parameter sets the allowed operation time before the oL1 fault occurs when the drive is running at 60 Hz and 150% of the full load amp rating (E2-01) of the motor. Adjusting the value of L1-02 can shift the set of oL1 curves up the Y-axis of the diagram below but will not change the shape of the curves.

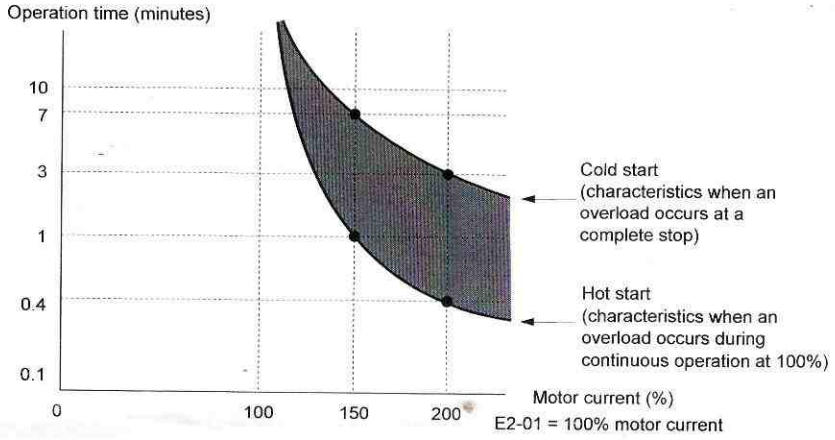
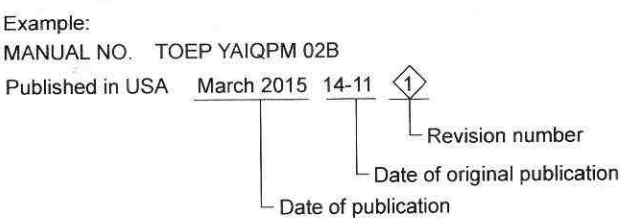


Figure i.43 Motor Overload Protection Time

Revision History

The revision dates and the numbers of the revised manuals appear on the bottom of the back cover.



Date of Publication	Revision Number	Section	Revised Content
September 2015	<2>	All	Revision: NEMA/UL nomenclature to conform with UL standards
		Preface	Revision: Quick Start Procedure
		Troubleshooting	Addition: LED and LCD operator codes
March 2015	<1>	Standards Compliance	Addition: Factory Recommended Branch Circuit Protection for UL Compliance
November 2014	–	–	First Edition. This manual supports drive software version PRG: 0100.

iQpump Micro AC Drive

Compact Intelligent Pump Controller

Quick Start Guide

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YASKAWA

YASKAWA AMERICA, INC.

TOEPYAIQPM02

MANUAL NO. TOEP YAIQPM 02C
Published in USA September 2015 14-11 2

Test Report

Serial	Number	:	1W2313832420033
Model	Number	:	CIMR-PW2V0020FAA
C/C	Number	:	CIMR-PW2V0020FAA
SW	Number	:	0100

Test Program	Specification	Result
1. Construction Inspection	Visual check	Passed
2. Insulation Resistance Measurement	500V Megger over 5Mohm	Passed
3. Withstanding Voltage Test	1850V AC 1 sec	Passed
4. Motor Control Functions Test	I/O test, forward, reverse motor control test	Passed
5. Protective Functions Test	Over-current, over-voltage	Passed

Date of test	Approved by Quality Department Inverter Plant
06-Jan-23	

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YASKAWA

iQpump Micro AC Drive

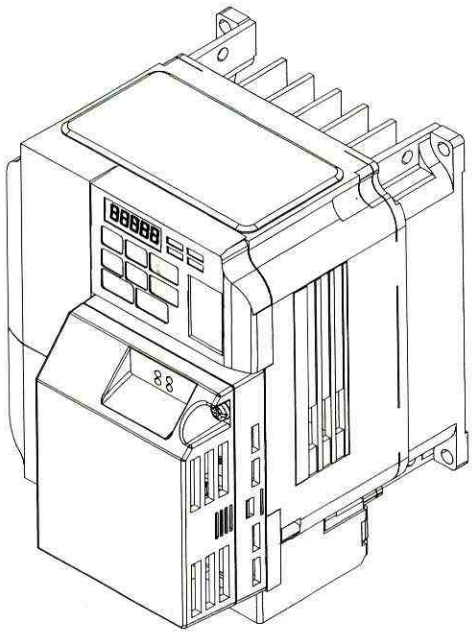
Compact Intelligent Pump Controller

Quick Start Guide

Type: CIMR-PW☐☐☐☐

Models: 200 V Class, Single-Phase Input: 1 to 5 HP ND
200 V Class, Three-Phase Input: 1.5 to 25 HP ND
400 V Class, Three-Phase Input: 1 to 25 HP ND

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.



◆ Quick Start Procedure

This procedure is a supplement to other documentation supplied with this equipment and guides the user in properly wiring the iQpump and motor. It also shows the configuration for a simplex pump application.

WARNING! *Read and adhere to all safety messages contained in this manual prior to performing this procedure. When installing the system be sure to follow good wiring practices and all applicable codes. Ensure that the mounting of the various components are secure and that the environment, such as extreme dampness, poor ventilation etc. will not cause system degradation. Please read this cheat sheet and other documentation provided with the iQpump thoroughly before attempting any installation.*

The setup procedure begins on the next page.

Contents

iQpump Micro
Quick Start Procedure

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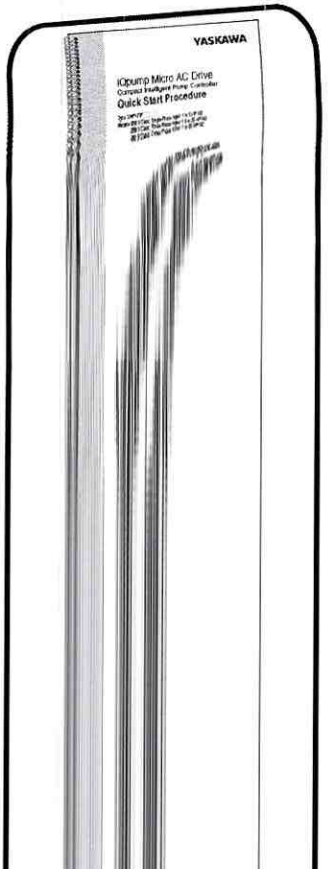
STEP 1

☐ Unpack the iQpump Micro

1

Remove all contents
prior to discarding packaging !



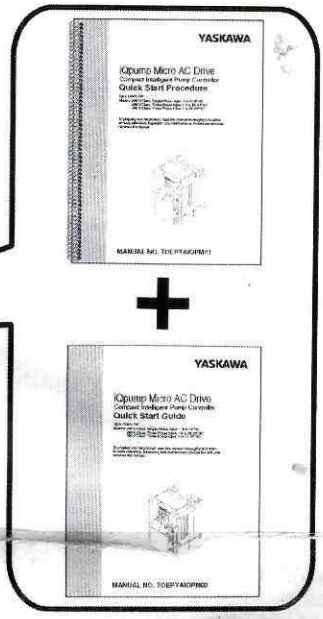
iQpump Micro
Quick Start Procedure

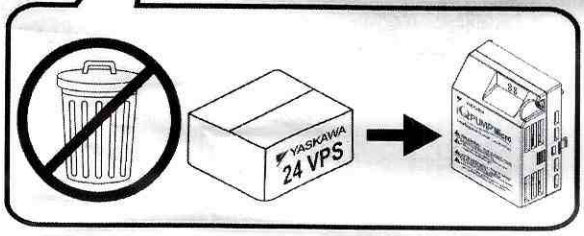
YASKAWA

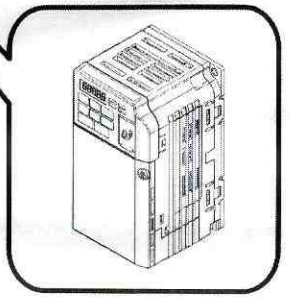
STEP 1

☐ **Unpack the iQpump Micro**

1 **Remove all contents prior to discarding packaging !**

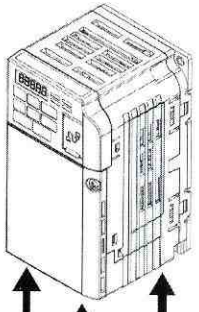






NOTICE: Connect LINE, MOTOR, and CONTROL circuit wiring <u>BEFORE</u> installing 24V power supply.

2

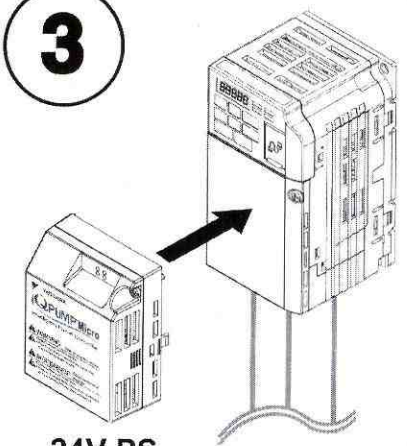


LINE

MOTOR

CONTROL

3



24V PS

YASKAWA

STEP 2

☐ Identify the Model for Installation

Safety Symbols in this Document

WARNING!
Read and understand users manual before using this equipment. Failure to follow users instructions may result in serious injury or death.

WARNING!
Hazardous Voltage. Contact may cause electric shock or burn. Turn-off and lock-out system and facility power before servicing.

WARNING!
Stay Clear- Equipment starts automatically. Clear all personnel from equipment, install shields or guards, locate and verify emergency SHUT-OFF is functional. Failure to comply may result in serious injury to personnel.

WARNING!
Improper Operation Sequence. DO NOT RUN THE MOTOR. Failure to comply may result in serious injury to personnel.

WARNING!
Do not operate equipment with covers or guards removed. Install or replace cover and/or guards before operation. Failure to comply may result in serious injury to personnel.

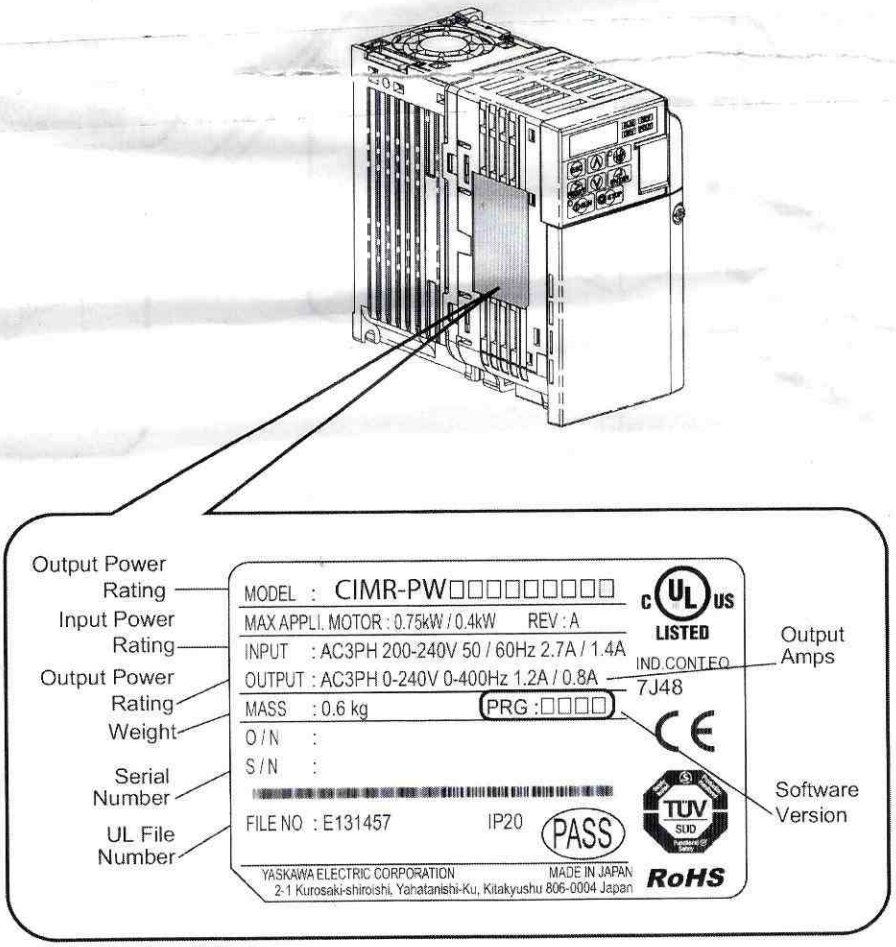
This Quick Start Procedure serves as general guide to help install, configure and perform test run operation. Refer to the iQpump Micro User Manual No. TOEP YAIQPM 03 for complete instructions to configure this product for each specific installation site.

2.1 Verify the correct model and ratings.

Follow this procedure for each iQpumpMicro and motor combination.

a. Locate the nameplate and your order information.
b. Verify the Model No: (E) matches the line item(s) on your order, to confirm receipt of the correct model.
c. Locate the nameplate of motor that will be connected.
d. Confirm the motor nameplate Amperage, Voltage, and Frequency (Hz) are within the Output specifications (B) shown on the iQpump Micro nameplate.

2.2 Verify main power source is adequate by reviewing the Input specifications (A) shown on the iQpump Micro nameplate.



STEP 3

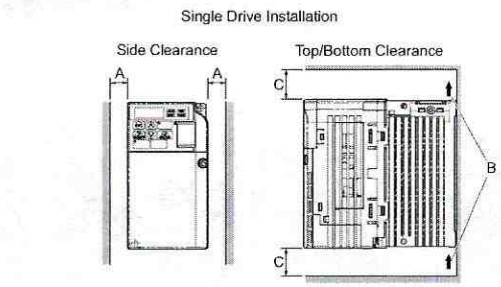
☐ Perform Mechanical Installation

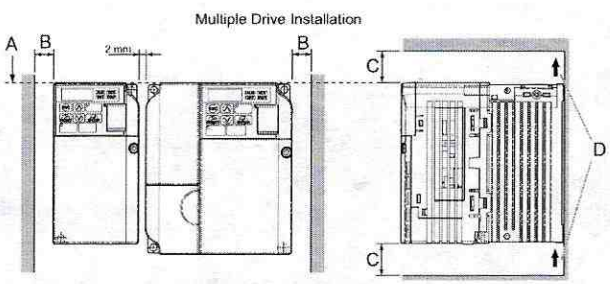
3.1 Verify installation environment.

Mechanical installation and mounting footprint vary by model. Refer to the iQpump Micro User Manual No. TOEP YAIQPM 03, Chapter 2: Mechanical Installation for details. Ensure the installation conditions are suitable to prolong and optimize performance life.

Environment	Conditions
Installation Area	Indoors
Ambient Temperature	-10 to + 40 °C (+14 to +104 °F) NEMA 1, UL Type 1 Enclosure
Humidity	95% RH or less and free of condensation
Storage Temperature	-20 °C to +60 °C (-4 °F to +104 °F)
Surrounding Area	Install the drive in an area free from: • oil mist and dust • metal shavings, oil, water, or other foreign materials • radioactive materials • combustible materials (e.g., wood) • harmful gases and liquids • excessive vibration • chlorides • direct sunlight.
Altitude	Up to 1000 meters without derating. Up to 3000 meters with output current and voltage derating
Orientation	Install the unit vertically to maintain maximum cooling effects.

3.2 Maintain installation clearances.





Ensure the back panel is placed against a closed flat surface for proper cooling.

NOTICE: Abnormal Operation. Avoid placing peripheral devices, transformers, or other electronics near the bypass as the noise created can lead to abnormal operation. Take proper steps to shield the bypass from electrical interference if such devices must be used in close proximity to the Bypass.

NOTICE: Equipment Damage. Prevent foreign matter such as metal shavings and wire clippings from falling into the bypass during installation. Failure to comply could result in damage to the bypass. Place a temporary cover over the top of the drive during installation. Remove the temporary cover before bypass start-up, as the cover will reduce ventilation and cause the bypass to overheat.

Install Type	Minimum Spacing			
	A	B	C	D
Single drive	30 mm (1.18 in)	• Airflow direction	100 mm (3.93 in)	-
Multiple drive installation	Align the tops of the units	30 mm (1.18 in)	100 mm (3.93 in)	Airflow direction

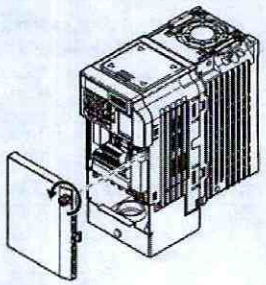
STEP 4

☐ Motor, Line Power and Start/Stop Circuit

4.1 Remove the front cover

NOTICE: Improper removal of the the drive's protective covers and conduit bracket (NEMA 1, UL Type 1) can cause damage to the drive. Adhere to iQpump User Manual, Section 3, Protective Covers to avoid drive damage.

NEMA 1, UL Type 1 Enclosure



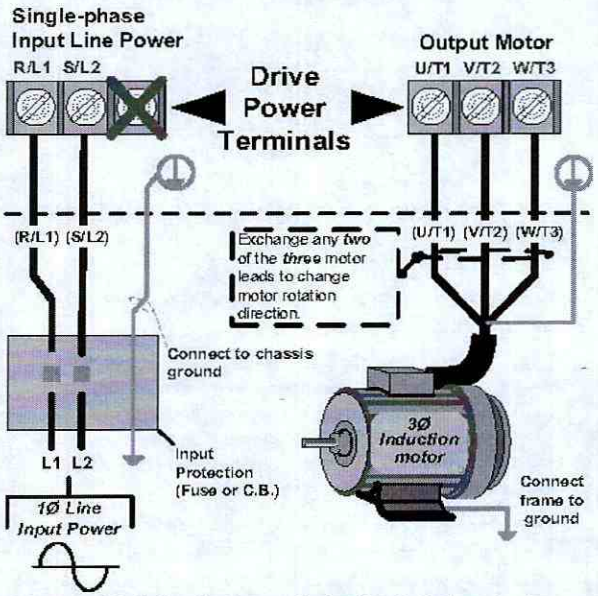
4.2 Connect main input power and motor wiring to the drive.

Refer to **Figure 1** for single-phase input power drive models.
Refer to **Figure 2** for three-phase input power drive models.

Follow accepted wiring practices and applicable electric codes. Ensure all equipment is properly grounded.

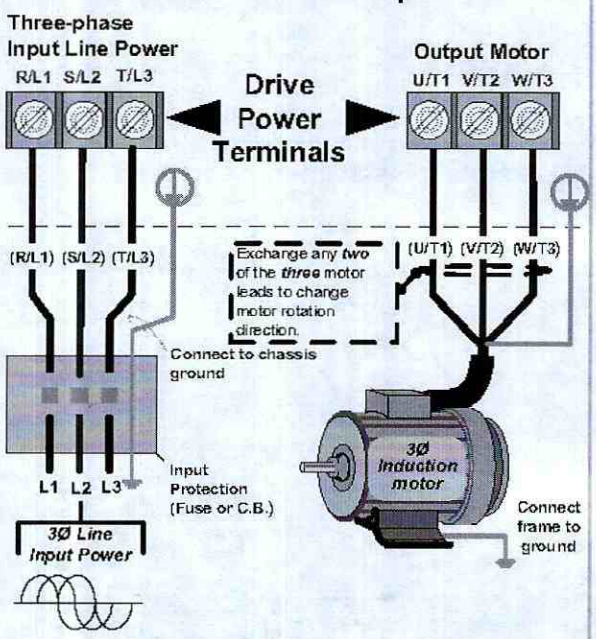
WARNING! Fire Hazard. Do not connect terminals B1, B2 (-), +1, +2 terminals to earth ground. Only connect ground wiring to designated ground terminals.

Figure 1: Line and Motor Electrical Connections - Single-Phase Input Power



Sizing note: Verify the drive is properly sized for single phase input power. The drive input line voltage must be equal to or greater than motor rated voltage for best performance.

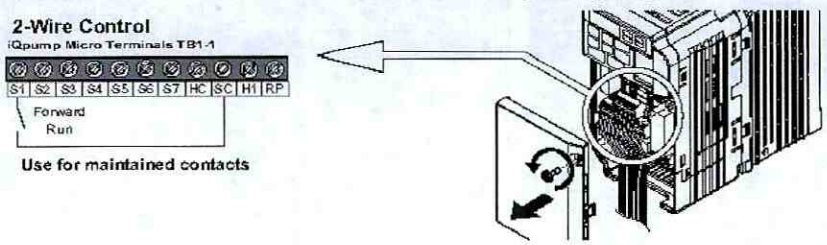
Figure 2: Line and Motor Electrical Connections - Three-Phase Input Power



4.3 Select start / stop control method, (parameter b1-02).

Remove the drive terminal cover to access the control terminals. The drive will START and STOP from the keypad from the factory. If this is the preferred start/stop method then continue to the feedback signal connection section. Refer to the wiring diagram below to START/STOP the drive using an external switch or contact

2-Wire Start/Stop Wiring Diagrams

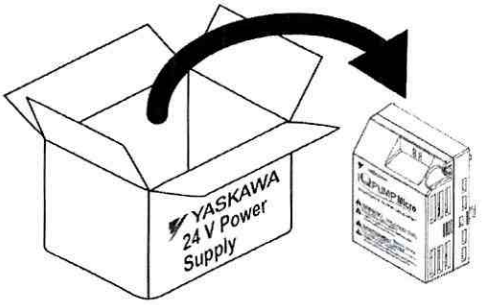


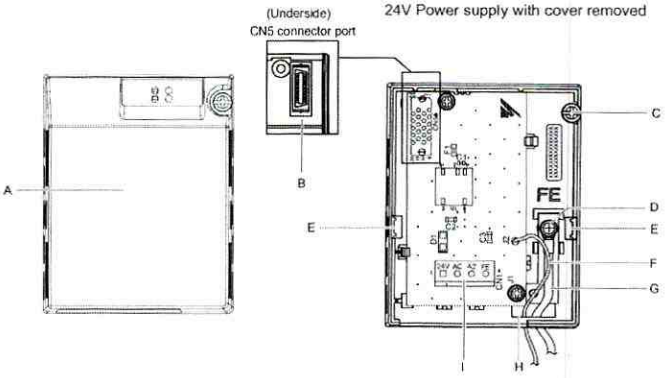
STEP 5

☐ Install the 24 V Transducer Power Supply

5.1 24V Power Supply Components

Unpack the 24 V Power Supply





A – 24V Power Supply cover
B – CN5 Connector to drive
C – Screw hole (attaches 24V Power Supply cover)
D – Functional Earth cable connection (FE)
E – Mounting tabs
F – J2/A2 (white) conductor wire
G – Ground wire <1>
H – Through-slot for J2/A2 wire and ground wire
I – CN1 Terminal Block-Customer Connections

Figure 1.1 24V Power Supply Components

<1> One of the four ground wires packaged with the 24V Power Supply must be connected during installation.

IP20/NEMA 1, UL Type 1 Dimensions with 24V Power Supply

The installed 24 V power supply option adds 27 mm (1.06 in.) to the total depth of the drive. Height and width dimensions are unaffected.

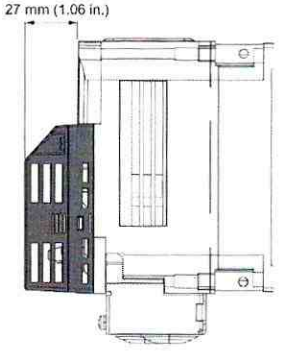


Figure 1.2 24 V Power Supply Dimensions

STEP 5

☐ Install the 24 V Transducer Power Supply (continued)

5.2 Prior to Installing the 24V Power Supply

Prior to installing the 24V Power Supply, wire the drive, make necessary connections to the drive terminals, and verify that the drive functions normally without the 24V Power Supply installed. Refer to the product manual packaged with the drive for information on wiring and connecting the drive.

The installation procedure differs slightly depending on enclosure type. The enclosure type is identified within the drive model number.

5.3 Locate the drive model number using ***Figure 1.3***.

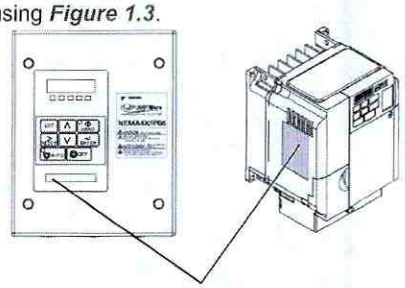


Figure 1.3 Model Number Location

5.4 Identify the drive enclosure type. Use ***Figure 1.4*** to find the digit within the model number that identifies the enclosure type.

Note: Installing the 24V Power Supply on an IP20/NEMA 1, UL Type 1 enclosure drive voids NEMA 1, UL Type 1 protection while maintaining IP20 conformity.

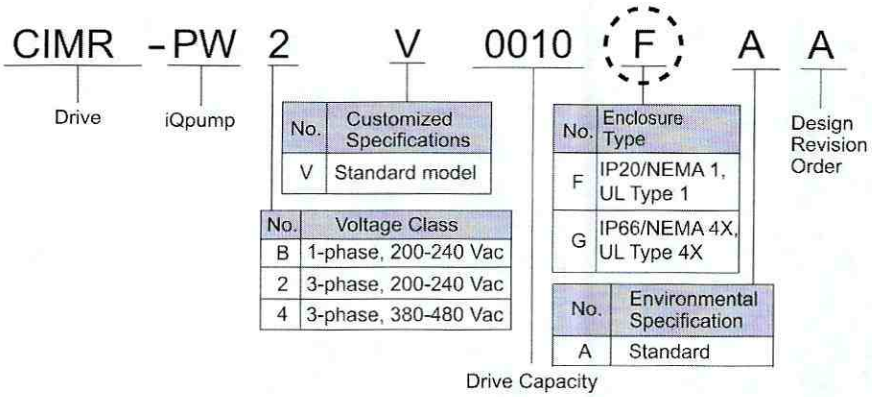


Figure 1.4 Drive Enclosure Type Identification

5.5 Select proper installation tools according to enclosure type and model.

Note: Tools required to prepare the 24V Power Supply cables for wiring are not listed in this manual.

Table 1.1 Tool and Material Requirements (Customer Supplied)

Model Number Enclosure Type Digit	Drive Enclosure Type	Drive Capacity	Tools		Materials
			Screwdriver	Socket Wrench	Wire Tie with Adhesive Mount
F	IP20/NEMA 1, UL Type 1	All	Phillips screwdriver M3 metric #1, #2 U.S. standard size Note: Screw sizes vary by drive capacity. Select a screwdriver appropriate for the drive capacity.	Not applicable	All models
G	IP66/NEMA 4X, UL Type 4X	2V0030 to 2V0069 4V0018 to 4V0038		10 mm socket wrench	Not applicable
		Other capacities		8 mm socket wrench	

STEP 5

☐ Install the 24 V Transducer Power Supply (continued)

5.6 Installation Procedure

5.7 Shut off power to the drive. Wait at least five minutes after confirming the DC bus voltage is safe.

On **IP20/NEMA 1, UL Type 1** models, loosen the screw that fastens the front cover in place and remove the front cover. This drive front cover will be replaced by the 24V Power Supply cover. Cover removal varies depending on drive size.

On **IP66/NEMA 4X, UL Type 4X** models, loosen the 4 bolts that attach the enclosure front cover in place, gently move the front cover away from the enclosure, press firmly on the digital operator cable connector release tab to disconnect the cable from port CN1 on the drive, then remove the front cover. Refer to ***Table 1.3*** for installation bolt size.

Table 1.2 Remove the Drive or Enclosure Front Cover

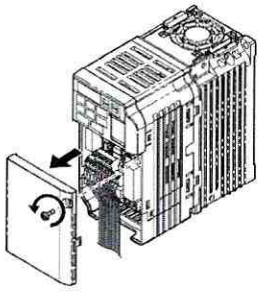
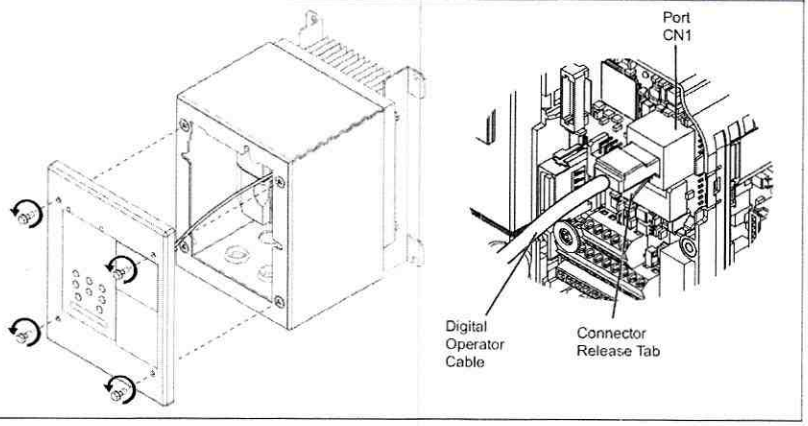
IP20/NEMA 1, UL Type 1	IP66/NEMA 4X, UL Type 4X
	

Table 1.3 IP66/NEMA 4X, UL Type 4X Enclosure Front Cover Installation Bolt Size

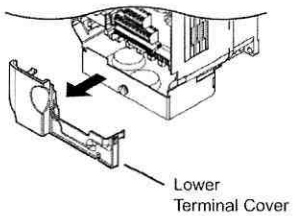
Voltage Class	Drive Model	Installation Bolt Size
Single-Phase 200 V Class	BV0001G to BV0012G	M5
Three-Phase 200 V Class	2V0001G to 2V0020G	M5
	2V0030G to 2V0069G	M6
Three-Phase 400 V Class	4V0001G to 4V0011G	M5
	4V0018G to 4V0038G	M6

5.8 On **IP20/NEMA 1, UL Type 1** enclosure models, loosen the screw on the front of the bottom cover and remove it from the drive. All models except 2V0006F require removing a plastic lower terminal cover prior to removing the bottom cover.

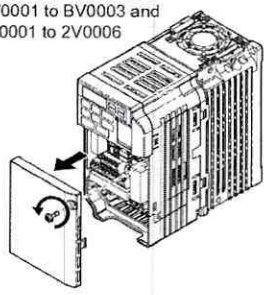
On **IP66/NEMA 4X, UL Type 4X**enclosure models, remove the lower terminal cover (if provided) from the drive.

The lower terminal cover is not present on certain models.

Models **With** Lower Terminal Cover



Models **Without** Lower Terminal Cover: BV0001 to BV0003 and 2V0001 to 2V0006



STEP 5

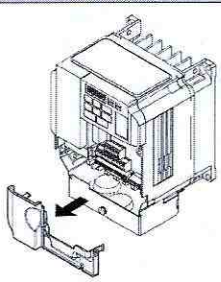
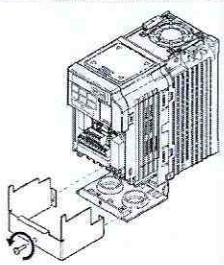
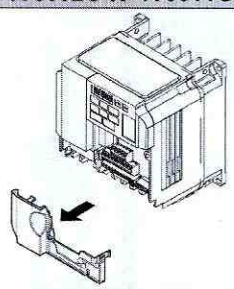
☐ Install the 24 V Transducer Power Supply (continued)

Note: The lower terminal cover is required for secure mounting of the 24V Power Supply on the models shown in ***Table 1.4***. Contact your Yaskawa representative for ordering if you have a model listed in ***Table 1.4*** and the lower terminal cover is not present on your drive.

Table 1.4 Lower Terminal Cover Part Number by Model

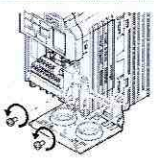
Drive Model	Terminal Cover Part Number
BV0006☐ and BV0010☐ 2V0010☐ and 2V0012☐ 4V0002☐ to 4V0009☐	CVST31300
BV0012☐ 2V0020☐ 4V0011☐	CVST31301
Other models	Not required

Table 1.5 Remove the Bottom Cover and Lower Terminal Cover

IP20/NEMA 1, UL Type 1		IP66/NEMA 4X, UL Type 4X
Lower Terminal Cover on All Models Except Models: BV0001 to BV0003 2V0001 to 2V0006	**Bottom Cover on All Models**	**Terminal Cover on Models BV0006G to BV0010G 2V0010G to 2V0020G 4V0002G to 4V0011G**
		

5.9 On IP20/NEMA 1, UL Type 1 enclosure models, loosen the screws attaching the NEMA 1, UL Type 1 conduit bracket to the drive to allow the bracket to swing out to provide easier access to the ground screw. Do not remove the screws.

Table 1.6 Loosen Conduit Bracket Screws

IP20/NEMA 1, UL Type 1	IP66/NEMA 4X, UL Type 4X
	Not applicable.

5.10 Remove the 24V Power Supply cover.

Table 1.7 Remove 24V Power Supply Cover

IP20/NEMA 1, UL Type 1 and IP66/NEMA 4X, UL Type 4X