

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.

No.	Name	Description
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

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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

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No.	Name	Description	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)	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)
L8-09	Output Ground Fault Detection Selection	0: Disabled 1: Enabled	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)
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.	o1-05	LCD Contrast Control	Sets the brightness of the optional LCD operator.
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.	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)
L8-12	Ambient Temperature Setting	Enter the ambient temperature. This value adjusts the oL2 detection level.	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.
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.	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.
L8-18	Software Current Limit Selection	0: Disabled 1: Enabled	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
L8-19	Frequency Reduction Rate during Overheat Pre-Alarm	Specifies the frequency reference reduction gain at overheat pre-alarm when L8-03 = 4.	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.
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	o1-11	User-Set Display Units Decimal Display	o1-11 sets the position of the decimal position.
L8-38	Carrier Frequency Reduction	0: Disabled 1: Enabled below 6 Hz 2: Enabled for the entire speed range	o1-12	Home Help Text	0: Disabled 1: Enabled
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.	o2-02	STOP Key Function Selection	0: Disabled. STOP key is disabled in REMOTE operation. 1: Enabled. STOP key is always enabled.
L8-41	High Current Alarm Selection	0: Disabled 1: Enabled. An alarm is triggered at output currents above 150% of drive rated current.	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.
n1-01	Hunting Prevention Selection	0: Disabled 1: Enabled	o2-04	Drive Model Selection	Enter the drive model. Setting required only if installing a new control board.
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
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

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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 Alarm 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

i.9 Parameter Table

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
<ul style="list-style-type: none"> • Hydrochloric acid (10%) • Sulfuric acid (10%) • Nitric acid (10%) • Ammonia water • Sodium chloride 	<ul style="list-style-type: none"> • 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 (in ³)
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.

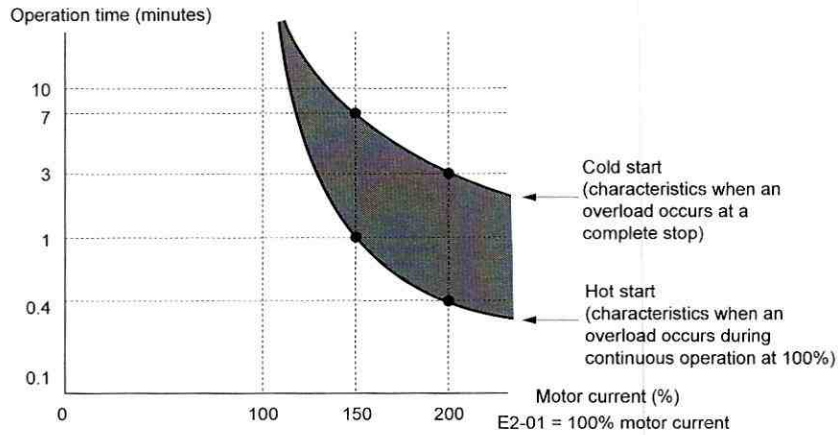


Figure i.43 Motor Overload Protection Time

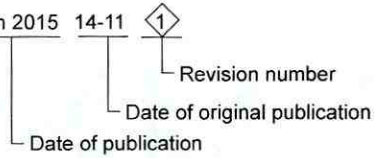
Revision History

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

Example:

MANUAL NO. TOEP YAIQPM 02B

Published in USA March 2015 14-11 1



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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