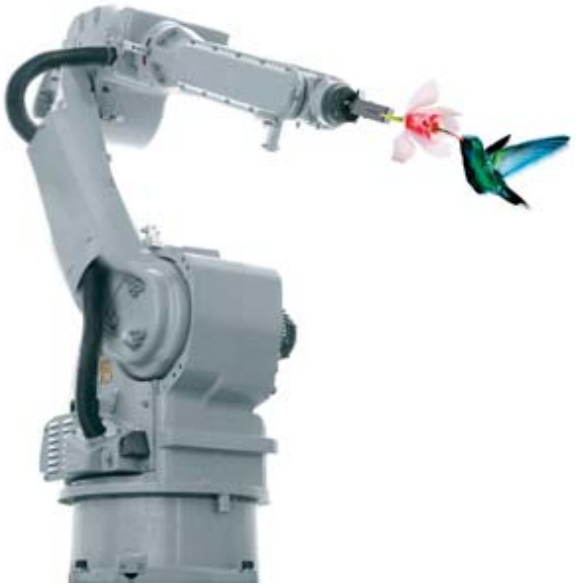
1000 Series Technical Training

Yaskawa Drives Department



Failure Analysis

Rev.: 04 (31.08.2010)

Overview and Contents

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How to use this Presentation ?

J V A

This presentation shows all property and parameters that can be found in any of the J1000, V1000, A1000 drives. To distinguish whether the property or parameter is available in all of the drives or only in A1000 for example, please note the „ticks“ in the grey bar:

In the example above the function or the parameter would be available in V1000 and A1000 but NOT in J1000.

Default settings (i.e. the standard setting from the factory) are underlined.

Availability in different control modes:

All Modes

V/f | V/f w/PG | OLV | CLV
OLV/PM | AOLV/PM | CLV/PM

V/f | V/f w/PG | OLV | CLV
OLV/PM | AOLV/PM | CLV/PM

U1: Operation Status Monitors

U1-01 ~ -03: Frequency Reference, Output Frequency, Output Current

All Modes

U1-01 Monitors frequency reference
Display units are determined by o1-03

Parameter	Name	Analogue Output Level	Unit
U1-01	Frequency Reference	10 V or 20 mA: Max frequency	0.01 Hz

U1-02 Monitors output frequency
Display units are determined by o1-03

Parameter	Name	Analogue Output Level	Unit
U1-02	Output Frequency	10 V or 20 mA: Max frequency	0.01 Hz

U1-03 Monitors output current

Parameter	Name	Analogue Output Level [1)]	Unit [2)]
U1-03	Output Current	10 V or 20 mA: Drive rated current	0.01 A

1) Conversion for MEMOBUS/Modbus: 8192 is equal to 100% of drive rated output current.
Note: With AM Gain (H4-05) set to 50% (default), signal level is 5 V / 10 mA at rated current

2) Two decimal places.
A1000: One decimal place if motor capacity bigger than 11 kW (HD 0023/ND 0031)

U1: Operation Status Monitors

U1-04: Control Method

J V A

All Modes

U1-04 Control Method

Displays actual control method

0: V/f Control	J	V	A
1: V/f Control with PG	J	V	A
2: Open Loop Vector Control	J	V	A
3: Closed Loop Vector Control	J	V	A
5: Open Loop Vector Control for PM	J	V	A
6: Advanced Open Loop Vector Control for PM	J	V	A
7: Closed Loop Vector Control for PM	J	V	A

U1: Operation Status Monitors

U1-05 ~ -07: Motor Speed, Output Voltage Reference, DC Bus Voltage

U1-05 Monitors motor speed

V/f | V/f w/PG | OLV | CLV | OLV/PM | AOLV/PM | CLV/PM

Display units are determined by o1-03

Parameter	Name	Analogue Output Level	Unit
U1-05	Motor Speed 1)	10 V or 20 mA: Max frequency	0.01 Hz

1) Without encoder calculated speed / With encoder real speed

U1-06 Monitors output voltage reference

All Modes

Parameter	Name	Analogue Output Level	Unit
U1-06	Output Voltage Reference	▪ 200 V class drive ➔ 10 V or 20 mA: 200 Vrms ▪ 400 V class drive ➔ 10 V or 20 mA: 400 Vrms	0.1 Vac

U1-07 Displays the DC Bus voltage

All Modes

Parameter	Name	Analogue Output Level	Unit
U1-07	DC Bus Voltage	▪ 200 V class drive ➔ 10 V or 20 mA: 200 Vrms ▪ 400 V class drive ➔ 10 V or 20 mA: 400 Vrms	1 Vdc

U1: Operation Status Monitors

U1-08: Output Power
U1-09: Torque Reference

U1-08 Displays the output power
Value is calculated internally

All Modes

Parameter	Name	Analogue Output Level [1)]	Unit
U1-08	Output Power	10 V or 20 mA: Drive rated power	0.01 kW

1) Two decimal places if drive is set to maximum output power up to 11 kW.
One decimal places above 11kW.
Electrical Power: V/f, V/f w. PG, OLV for PM, AOLV for PM
Mechanical power: OLV, CLV, CLV for PM

U1-09 Monitors internal torque reference

V/f | V/f w/PG | OLV | CLV | OLV/PM | AOLV/PM | CLV/PM

Parameter	Name	Analogue Output Level	Unit
U1-09	Torque Reference	10 V or 20 mA: Motor rated torque	0.1%

U1: Operation Status Monitors

U1-10: Input Terminal Status

All Modes

U1-10 Input Terminal Status

	S8	...	S1
U1-10 =	0 0 0 0 0 0 0 0		

- Digital Input 1 (terminal S1 enabled)
- Digital Input 2 (terminal S2 enabled)
- Digital Input 3 (terminal S3 enabled)
- Digital Input 4 (terminal S4 enabled)
- Digital Input 5 (terminal S5 enabled)
- Digital Input 6 (terminal S6 enabled)

U1: Operation Status Monitors

U1-11: Output Terminal Status

All Modes

U1-11 Output Terminal Status

Multi-Function Digital Output (Fault, terminal MA/MB-MC)

Multi-Function Digital Output 1 (Terminal 1) enabled

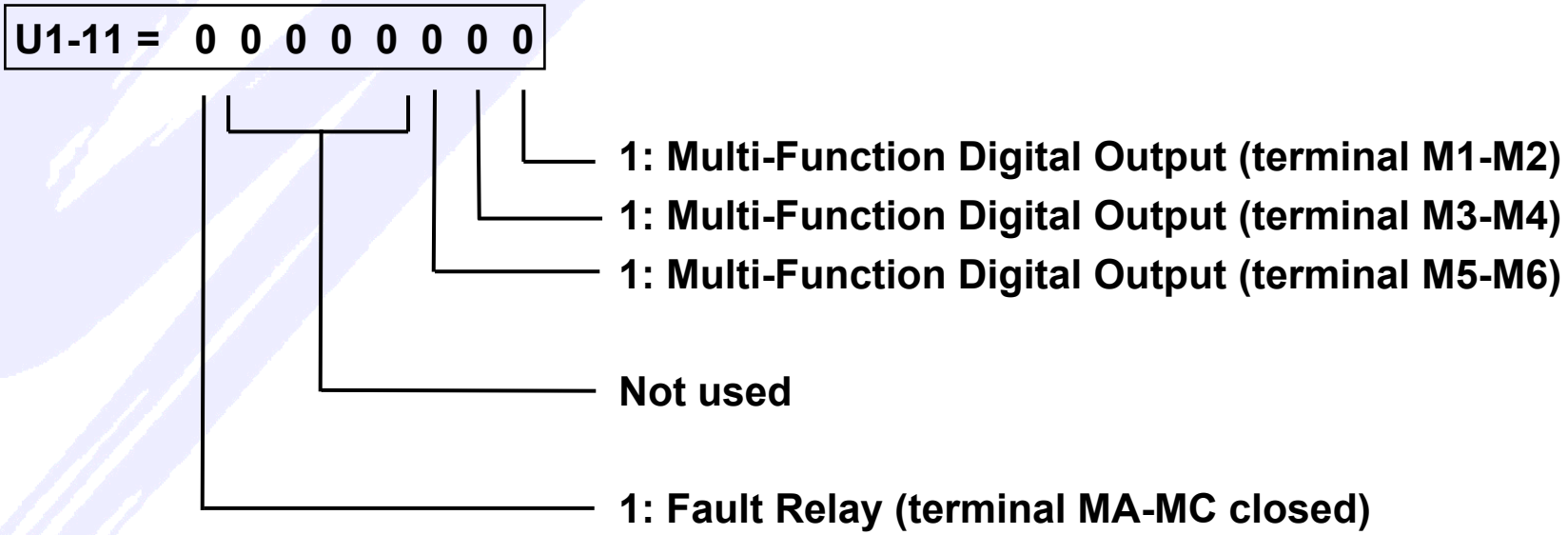
Multi-Function Digital Output 2 (Terminal 2) enabled

U1: Operation Status Monitors

U1-11: Output Terminal Status

All Modes

U1-11 Output Terminal Status



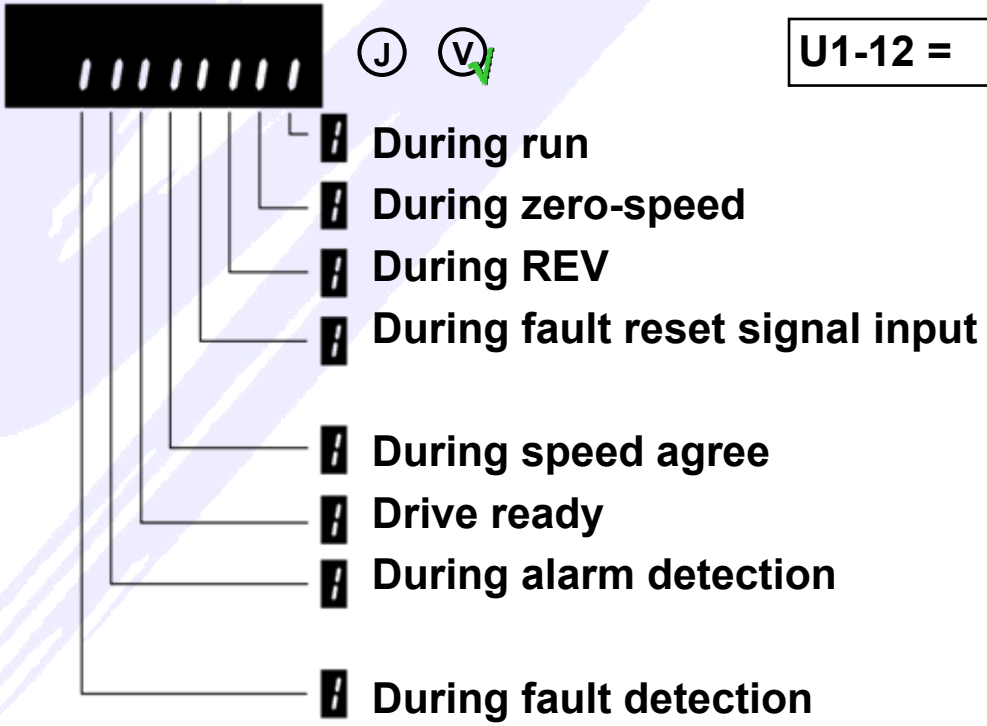
U1: Operation Status Monitors

U1-12: Drive Status

J V A

All Modes

U1-12 Drive Operation Status



U1-12 = 0 0 0 0 0 0 0 0 A

U1: Operation Status Monitors

U1-13 ~ U1-15: Terminal A1 ~ A3 Input Level
U1-16: Output Frequency after Soft Starter

All Modes

U1-13 Terminal A1 Input Level

U1-14 Terminal A2 Input Level (J) (V) (A)

U1-15 Terminal A3 Input Level (J) (V) (A)

Parameter	Name	Analogue Output Level	Unit
U1-13 ~ 15	Terminal A1 ~ A3 Input Level	10 V or 20 mA: 100%	0.1%

U1-16 Output Frequency after Soft Starter (Ramp times) (J) (V) (A)

Displays output frequency with ramp time and S-curves.

Display units determined by o1-03.

Parameter	Name	Analogue Output Level	Unit
U1-16	Output Frequency after Soft Starter	10 V or 20 mA: Max. frequency	0.01 Hz

U1: Operation Status Monitors

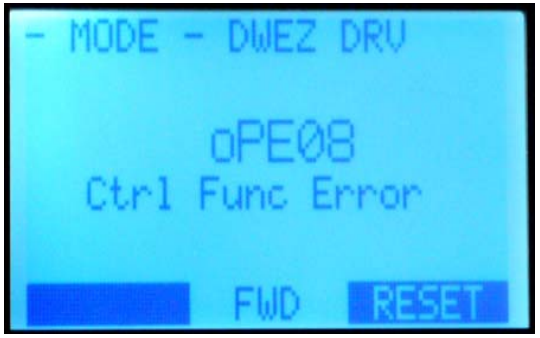
U1-17: DI-A3 Input Status (Digital Input Option Board)
U1-18: oPE Fault Parameter

J V A

All Modes

U1-17 Displays the reference value input from DI-A3 option board J V A
BCD and units or binary mode determined by F3-01.
Format Set (1 bit) + sign (1 bit) + value (16 bit)

Parameter	Name	Analogue Output Level	Unit
U1-17	DI-A3 Input Status	No signal output available	3FFFF



U1-18 Displays parameter number that caused the oPE☐☐ or Err (EEPROM write error) error J V A

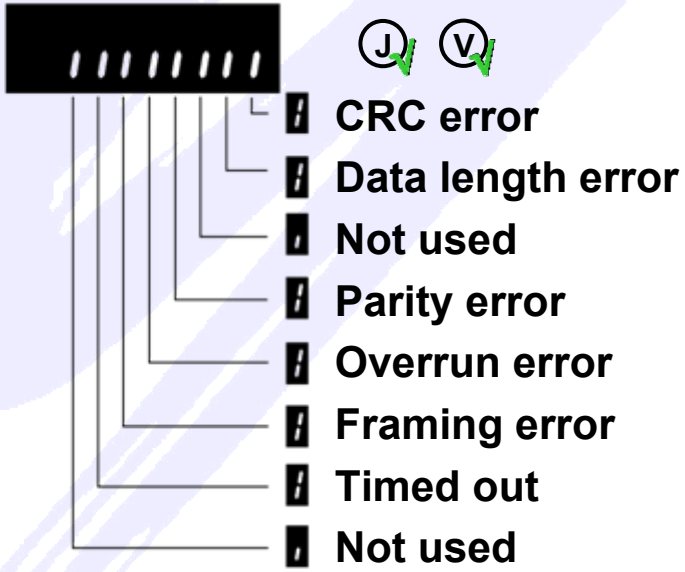
Parameter	Name	Analogue Output Level	Unit
U1-18 1)	oPE Fault Parameter	No signal output available	Xn-nn

1) Press ENTER while oPE Error is shown on operator to jump directly to this monitor

U1-19: MEMOBUS/Modbus Error Code

All Modes

U1-19 MEMOBUS/Modbus Error Code



U1-19 = 0 0 0 0 0 0 0 0

U1: Operation Status Monitors

U1-21 ~ U1-23: AI-A3 Analogue Input Option Board Monitor
U1-24: Input Pulse Monitor

All Modes

U1-21 Monitors AI-A3 Terminal V1 Input Voltage

U1-22 Monitors AI-A3 Terminal V2 Input Voltage

U1-23 Monitors AI-A3 Terminal V3 Input Voltage

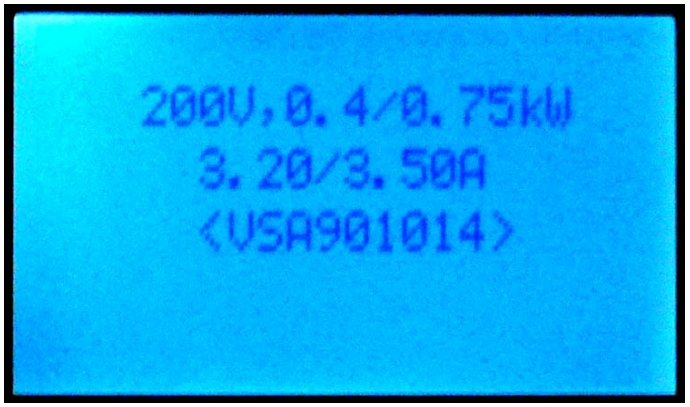
Parameter	Name	Analogue Output Level	Unit
U1-21 ~ 23	AI-A3 Terminal V1 ~ V3 Input Voltage Monitor	10 V or 20 mA: 100%	0.1%

U1-24 Displays the frequency to pulse train input terminal RP

Parameter	Name	Analogue Output Level	Unit
U1-24	Pulse Train Input RP	Determined by H6-02	1 Hz

U1: Operation Status Monitors

U1-25: Software Number (Flash)
U1-26: Software No. (ROM)



All Modes

U1-25 Displays the FLASH ID

Parameter	Name	Analogue Output Level	Unit
U1-25	Software Number (Flash)	No signal output available	-

U1-26 Displays the ROM ID

Parameter	Name	Analogue Output Level	Unit
U1-26	Software No. (ROM)	No signal output available	-

Failure Analysis

Type of Faults, Alarms and Errors

Type	Drive Response
Faults	▪ Severe malfunction of drive or environment ▪ Output current will be switched off and motor coasts to stop • Digital Operator displays code J V or plain text A • ALM LED remains lit • Fault Output Terminals MA-MC will close, MB-MC will open • Drive will remain inoperable until the fault has been cleared • Limited automatic clear/restart for some of the faults possible
Minor Faults and Alarms	▪ Unusual, or specific user set condition detected • Digital Operator displays code J V or plain text A • ALM LED flashes • Multi-function outputs closes when configured by user • Drive continues to run if user did not select a stopping method • To reset the Minor Fault or Alarm, remove whatever is causing it

Failure Analysis

Type of Faults, Alarms and Errors

Type	Drive Response
Operational Errors (oPE)	▪ Parameter settings conflict or mismatch of hardware settings • Digital Operator displays code J V or plain text A • Multi-function outputs do not operate • Drive will not operate until error has been reset • Correct the settings to clear the error
Tuning Errors (Er-nn)	▪ Tuning Errors while performing Auto-Tuning ▪ Motor coasts to stop • Digital Operator displays code J V or plain text A • Multi-function outputs do not operate • Remove the cause of the error and repeat Auto-Tuning process
Copy Function Errors	▪ Copy, Read or Verify Error in communication with Digital Operator or USB Copy Unit • Digital Operator displays code J V or plain text A • Multi-function outputs do not operate

Technical Training – Failure Analysis

Failure Analysis

Digital Operator – Display, LEDs and Keys

LCD Operator vs. LED Operator

A1000 – Detachable Standard
V1000 – Remote Option

A1000 – Optional
J1000[1], V1000 – Remote Option

1) SI-232/J required

Failure Analysis

Alarm Detection and Minor Fault Detection: Alarm Codes, Causes and Possible Solutions – Examples

LED	LCD	Name/Possible Causes/Solutions
bb	bb	**Baseblock** ● Drive output interrupted as indicated by an external baseblock signal ▪ External baseblock signal entered via one of the multi-functional input terminals (S1 ~ S8) - Check external sequence and baseblock signal input timing
boL	boL	**Braking Transistor Overload Fault** ● Incorporated braking transistor overloaded ▪ Wrong brake resistor installed - Select the optimal braking resistor
LT-1	LT-1	**Cooling Fan Maintenance Time** ● Expected maintenance period of cooling fan reached. Fan may need to be replaced (With H2-□□ = 2F, corresponding alarm output will be triggered) ▪ Cooling fan has reached 90% of its expected performance life - Replace cooling fan and reset Maintenance Monitor by o4-03

U2: Fault Trace

Overview

U2-□□ parameters

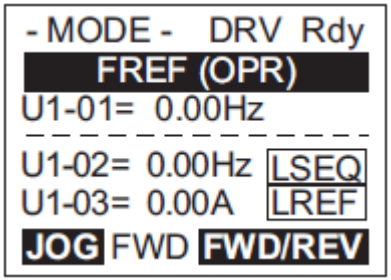
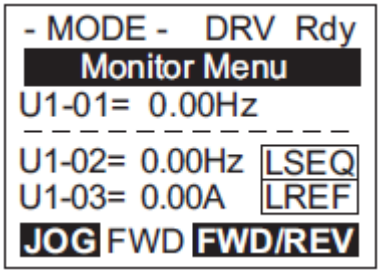
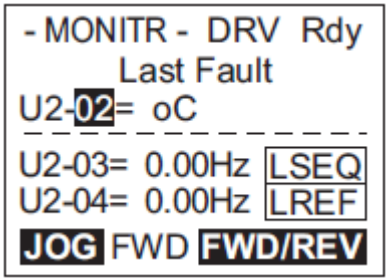
- **Are monitor parameters**
- **Store and hold status information when a fault occurs**
- **Help to find out why a fault did occur**
- **Are not reset when the drive is initialized**

Note: To reset U2 and U3 parameter o4-11 (U2, U3 Initialization) must be set to a value of 1 before initialisation.

➔ **F7 resets U2-□□ parameters without any query with mains power on. 1000 series keeps this valuable Fault Trace information as long as not reset manually by o4-11.**

U2: Fault Trace

Diagnosing and Resetting Faults: Viewing Fault Trace Data After Fault

	Step	Display/Result
1	• If drive input power is off: - Switch power on after check if this is safe. • If drive has still power after the fault: - Read fault code on the display and refer to section ‘Fault Displays, Causes and possible solutions‘ in the manual	
2	Select Monitor Menu	
3	Read ‘Last Fault’	

U2: Fault Trace

Diagnosing and Resetting Faults: Viewing Fault Trace Data After Fault

	Step	Display/Result
4 ~ ..	**Parameters U2-03 through U2-20 provide more information sampled by the drive when the fault occurred** **Please note:** **Parameters to be monitored differ depending on the control mode**	- MONITR - DRV Rdy Frequency Ref U2-03= 0.00Hz U2-04= 0.00Hz LSEQ U2-05= 0.00A LREF JOG FWD FWD/REV  - MONITR - DRV Rdy Heatsink Temp U2-20= XX °C U2-01= —— LSEQ U2-02= —— LREF JOG FWD FWD/REV

U2: Fault Trace

U2-01: Current Fault
U2-02: Previous Fault

U2-01 Displays the current fault (As long as not reset)

All Modes

Parameter	Name	Analogue Output Level	Unit
U2-01	Current Fault	No signal output available	-

All Modes

U2-02 Displays the previous fault (Last Fault)

Parameter	Name	Analogue Output Level	Unit
U2-02	Previous Fault	No signal output available	-

Note: U2-01 and U2-02 are the same as long as fault is not reset.
After reset U2-01 will show no fault, if there is no fault any more.

U2: Fault Trace

U2-03 ~ -13 & -15: ‘Snapshot’ of some U1 Operation Status Monitors at Previous Fault

J V A

U2-01 ~ -13 & -15 ‘Snapshot’ reference table to U1 Operation Status Monitors

All Modes

Parameter	Name	Snapshot of …
U2-03	Frequency Reference at Previous Fault	U1-05
U2-04	Output Frequency at Previous Fault	U1-02
U2-05	Output Current at Previous Fault	U1-03
U2-06	Motor Speed at Previous Fault	U1-05
U2-07	Output Voltage at Previous Fault	U1-06
U2-08	DC Bus Voltage at Previous Fault	U1-07
U2-09	Output Power at Previous Fault	U1-08
U2-10	Torque Reference at Previous Fault	U1-09
U2-11	Input Terminal Status at Previous Fault	U1-10
U2-12	Output Terminal Status at Previous Fault	U1-11
U2-13	Drive Operation Status at Previous Fault	U1-12
U2-15	Soft Starter Speed Reference (output) at Previous Fault	U1-16

V/f V/f w/PG OLV CLV
OLV/PM AOLV/PM CLV/PM

V/f V/f w/PG OLV CLV
OLV/PM AOLV/PM CLV/PM

U2: Fault Trace

U2-14 & U2-16 ~ -20: ‘Snapshot’ of some U4 Maintenance Monitors and U6 Operation Status Monitors at Previous Fault

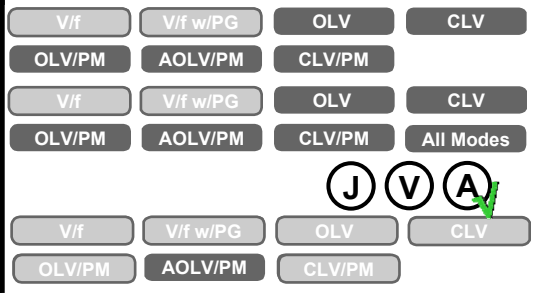
U2-14 & -20 ‘Snapshot’ reference table to U4 Maintenance Monitors

All Modes

Parameter	Name	Snapshot of …
U2-14	Cumulative Operation Time at Previous Fault	U4-01
U2-20	Heatsink Temperature at Previous Fault	U4-08

U2-16 ~ -19 ‘Snapshot’ reference table to U6 Operation Status Monitors

Parameter	Name	Snapshot of …
U2-16	Motor q-Axis Current at Previous Fault	U6-01
U2-17	Motor d-Axis Current at Previous Fault	U6-02
U2-19	Rotor Deviation at Previous Fault	U6-10



Technical Training – Failure Analysis

U3: Fault History

U3-01 ~ U3-10: First to 10th Most Recent Fault

J V A

All Modes

U3-01 First most recent fault (Newest of this list)
U3-02 Second most recent fault
U3-03 Third most recent fault
U3-04 Fourth most recent fault
U3-05 Fifth most recent fault
U3-06 Sixth most recent fault
U3-07 Seventh most recent fault
U3-08 Eighth most recent fault
U3-09 Ninth most recent fault
U3-10 Tenth most recent fault (Oldest)

Parameter	Name	Analogue Output Level	Unit
U3-01 ~ 10	First to 10th Most Recent Fault	No signal output available	-

Note: The Most Recent Fault History works as first in/first out memory

U3: Fault History

U3-11 ~ U3-20: Cumulative Operation Time at 1st to 10th Most Recent Fault

J V A

All Modes

U3-11 Cumulative Operation Time at first most recent fault
U3-12 Cumulative Operation Time at second most recent fault
U3-13 Cumulative Operation Time at third most recent fault
U3-14 Cumulative Operation Time at fourth most recent fault
U3-15 Cumulative Operation Time at fifth most recent fault
U3-16 Cumulative Operation Time at sixth most recent fault
U3-17 Cumulative Operation Time at seventh most recent fault
U3-18 Cumulative Operation Time at eighth most recent fault
U3-19 Cumulative Operation Time at ninth most recent fault
U3-20 Cumulative Operation Time at tenth most recent fault

Parameter	Name	Analogue Output Level	Unit
U3-11 ~ 20	Operation Time at 1st to 10th Most Recent Fault	No signal output available	-

Note: The Operation Time History works as first in/first out memory

Technical Training – Failure Analysis

U4: Maintenance Monitors

Overview

All Modes

Maintenance monitors show:

- **Runtime data of drive and cooling fans**
- **Number of Run commands issued**
- **Maintenance data and replacement information for various drive components**
- **kWh data**
- **Highest peak current that has occurred and output frequency at the time the peak current occurred**
- **Motor overload status information**
- **Detailed information about the present Run command and frequency reference source selection**

U4: Maintenance Monitors

U4-01: Cumulative Operation Time

All Modes

U4-01 Cumulative Operation Time

Displays cumulative operation time of the drive

- **Reset with parameter o4-01**
- **Select with o4-02 if time shall be measured while Mains Power is applied, or only while Run Command is active**
- **Maximum number displayed is 99999, after which the value is reset to 0**

Parameter	Name	Analogue Output Level	Unit
U4-01	Cumulative Operation Time	No signal output available	1 h

U4: Maintenance Monitors

U4-02: Number of Run Commands

All Modes

U4-02 Number of Run Commands

Displays the number of times the Run command is entered

- **Reset with parameter o4-13**
- **Select with o4-02 if time shall be measured while Mains Power is applied, or only while Run Command is active**
- **Maximum number displayed is 65535, after which the value is reset to 0.**

Parameter	Name	Analogue Output Level	Unit
U4-02	Number of Run Commands	No signal output available	1 Time

U4-03: Cooling Fan Operation Time

All Modes

U4-03 Cooling Fan Operation Time

Displays the cumulative operation time of the cooling fan

- **Reset with parameter o4-03**
- **Select with o4-02 if time shall be measured while Mains Power is applied, or only while Run Command is active**
- **Maximum number displayed is 99999, after which the value is reset to 0.**

Parameter	Name	Analogue Output Level	Unit
U4-03	Cooling Fan Operation Time	No signal output available	1 h

U4: Maintenance Monitors

U4-04 ~ U4-07: Percentages of Expected Performance Life

All Modes

U4-04 Cooling Fan Maintenance
- Reset with parameter o4-03

U4-05 Capacitor Maintenance
- Reset with parameter o4-05

U4-06 Soft Charge Bypass Relay Maintenance
- Reset with parameter o4-07

U4-07 IGBT Maintenance
- Reset with parameter o4-09

All of this counters record usage time as a percentage of expected performance life

Parameter	Name	Analogue Output Level	Unit
U4-04 ~ 07	… Maintenance	No signal output available	1%

U4-08: Heatsink Temperature
U4-09: LED Check

U4-08 Heatsink Temperature

All Modes

Displays the heatsink temperature

Parameter	Name	Analogue Output Level	Unit
U4-08	Heatsink Temperature	10 V or 20 mA: 100°C	1°C

U4-09 LED Check

Lights all LED and LED segments to verify that the display is working properly

Parameter	Name	Analogue Output Level	Unit
U4-09	LED Check	No signal output available	-

U4: Maintenance Monitors

U4-10: kWh, Lower 4 Digits
U4-11: kWh, Upper 4 Digits

J V A

All Modes

U4-10 kWh, Lower 4 Digits

Displays the Lower 4 Digits of the cumulative drive output power

Parameter	Name	Analogue Output Level	Unit
U4-10	kWh, Lower 4 Digits including 1 Decimal	No signal output available	1 kWh

U4-11 kWh, Upper 4 Digits

Displays the Upper 5 Digits of the cumulative drive output power

Parameter	Name	Analogue Output Level	Unit
U4-11	kWh, Upper 5 Digits	No signal output available	1 MWh

Note:

U4-11	U4-10	
12345	678.9	kWh
MWh	kWh	

U4: Maintenance Monitors

U4-13: Peak Hold Current
U4-14: Peak Hold Output Frequency

All Modes

U4-13 Peak Hold Current

Displays the highest current[1)] value that occurred during run

Parameter	Name	Analogue Output Level	Unit
U4-13	Peak Hold Current	No signal output available	0.01 A

U4-14 Peak Hold Output Frequency

Displays the output frequency when the current value shown in U4-13 occurred

Parameter	Name	Analogue Output Level	Unit
U4-14	Peak Hold Output Frequency	No signal output available	0.01 Hz

1) MEMOBUS/Modbus reading uses a scaling of 8192 for 100% of the drive rated output current

U4: Maintenance Monitors

U4-16: Motor Overload Estimate (oL1)

All Modes

U4-16 Motor Overload Estimate (oL1)
Shows the value of the motor overload detection accumulator

- **100% is equal to the oL1 detection level**

Parameter	Name	Analogue Output Level	Unit
U4-16	Motor Overload Estimate	10 V or 20 mA: 100%	0.1%

Note: Refer to L1-01 (Motor Overload Protection Selection) and L2-02 (Motor Overload Protection Time)

U4-18: Frequency Reference Source Selection

All Modes

U4-18 Frequency Reference Source Selection
Displays the source for the frequency reference as XY-nn

- **X: indicates which reference is used:**
  - **1 = Reference 1 (b1-01)**
  - **2 = Reference 2 (b1-15)**

- **Y-nn: indicates the reference source**
  - **0-01 = Digital operator**
  - **1-01 = Analogue (terminal A1)**
  - **1-02 = Analogue (terminal A2)**
  - **1-03 = Analogue (terminal A3)**
  - **2-02 to 17 = Multi-step speed (d1-02 to 17)**
  - **3-01 = MEMOBUS/Modbus communications**
  - **4-01 = Communication option card**
  - **5-01 = Pulse input**
  - **7-01 = DWEZ**

U4-19: Frequency Reference from MEMOBUS/Modbus Comm.
U4-20: Option Frequency Reference

J V A

All Modes

U4-19 Frequency Reference from MEMOBUS/Modbus Comm.

Displays the frequency reference provided by MEMOBUS/Modbus (decimal)

Parameter	Name	Analogue Output Level	Unit
U4-19	Frequency Reference from MEMOBUS/Modbus Comm.	No signal output available	0.01%

U4-20 Option Frequency Reference

Displays the frequency reference input by an option card (decimal)

Parameter	Name	Analogue Output Level	Unit
U4-20	Option Frequency Reference	No signal output available	0.01%

U4-21: Run Command Source Selection

All Modes

U4-21 Run Command Source Selection
Displays the source for the Run command as XY-nn

- **X: indicates which Run source is used:**
  - **1 = Reference 1 (b1-02)**
  - **2 = Reference 2 (b1-16)**

- **Y: Input power supply data**
  - **0 = Digital operator**
  - **1 = External terminals**
  - **3 = MEMOBUS/Modbus communications**
  - **4 = Communication option card**
  - **7 = DWEZ**

- **nn: Run command limit status data**
  - **➔ See next page**

U4-21: Run Command Source Selection - Continued

J V A

All Modes

U4-21 Run Command Source Selection Continuation

- nn: Run command limit status data
  - 00: No limit status
  - 01: Run command was left on when stopped in the PRG mode
  - 02: Run command was left on when switching from LOCAL to REMOTE operation
  - 03: Waiting for soft charge bypass contactor after power up (Uv or Uv1 flashes after 10 s)
  - 04: Waiting for “Run command prohibited” time period to end
  - 05: Fast Stop (digital input, digital operator)
  - 06: b1-17 (Run command given at power-up)
  - 07: During baseblock while coast to stop with timer
  - 08: Frequency reference is below minimal reference during baseblock
  - 09: Waiting for Enter command

U4: Maintenance Monitors

U4-22: MEMOBUS/Modbus Communications Reference
U4-23: Communication Option Card Reference

J V A

All Modes

U4-22 MEMOBUS/Modbus Communications Reference

Displays the drive control data set by MEMOBUS/Modbus communications register no. 0001H as a four-digit hexadecimal number

Parameter	Name	Analogue Output Level	Unit
U4-22	MEMOBUS/Modbus Communications Reference	No signal output available	-

U4-23 Option Frequency Reference

Displays drive control data set by an option card as a four-digit hexadecimal number

Parameter	Name	Analogue Output Level	Unit
U4-23	Communication Option Card Reference	No signal output available	-

Technical Training – Failure Analysis

o4: Maintenance Monitor Settings

Overview

All Modes

Maintenance monitor settings enable:

- **Resetting the value to zero**
- **Pre-set a desired value to start from**
- **Reset Fault Trace and Fault History monitors (U2-☐☐ and U3-☐☐)**

o4: Maintenance Monitor Settings

o4-01: Cumulative Operation Time Setting

All Modes

o4-01 Cumulative Operation Time Setting

Sets the cumulative operation time of the drive

- **Total operation time can be viewed in monitor U4-01 (Cumulative Operation Time)**
- **The value in o4-01 is set in 10 h units. If a value of 30 is entered for o4-01, then U4-01 will become 300 h.**

Parameter	Name	Setting Range	Default
o4-01	Cumulative Operation Time Setting	0 ~ 9999 h	0 h

o4: Maintenance Monitor Settings

o4-02: Cumulative Operation Time Selection

J V A

All Modes

o4-02 Cumulative Operation Time Selection

Selects the conditions for how the drive keeps track of its total operation time

0: Power-On Time

1: Run Time

Note: This value should be reset to 0 when the DC bus capacitors have been replaced.

o4: Maintenance Monitor Settings

o4-03: Cooling Fan Operation Time Setting

J V A

All Modes

o4-03 Cooling Fan Operation Time Setting

Sets the value for how long the cooling fan has been operating

- **Total time can be viewed in monitor U4-03 (Cooling Fan Operation Time)**
- **o4-03 is incremented every 10 operation hours. Therefore, a value of 30 is equivalent to 300 h, which can be read in U4-03 will become 300 h**
- **Change of o4-03 will update U4-04 also!**

Note: Be sure to reset this parameter back to zero if the cooling fan is replaced

Parameter	Name	Setting Range	Default
o4-03	Cooling Fan Operation Time Setting	0 ~ 9999 h	0 h

o4: Maintenance Monitor Settings

o4-05 ~ o4-07: Maintenance Setting

All Modes

o4-05 Capacitor Maintenance Setting

- For setting or resetting U4-05

o4-07 DC Bus Pre-Charge Relay Maintenance Setting

- For setting or resetting U4-06

o4-09 IGBT Maintenance Setting

- For setting or resetting U4-07

This parameters can set the value of the according maintenance monitor

Note: When item has been replaced reset according parameter to 0

Parameter	Name	Setting Range	Default
o4-05 ~ 07	… Maintenance Setting	0% ~ 150%	0%

o4: Maintenance Monitor Settings

o4-11: U2, U3 Initialization

All Modes

o4-11 U2, U3 Initialization

o4-11 is for resetting the data for the U2-☐☐ and U3-☐☐ monitors

0: No action

1: Reset fault data

Note: Once o4-11 is set to 1 and the ENTER key is pressed, fault data is erased and the display returns to 0.

F7 resets U2-☐☐ parameters automatically with mains power on. Therefore, trace information in F7 gets lost with mains power cycle.

o4-12: kWh Monitor Initialization

All Modes

o4-12 kWh Monitor Initialization

o4-11 is for resetting the data for the U4-10 (kWh, Lower 4 Digits) and U4-11 (kWh, Upper 4 Digits) monitors

0: No action

1: Reset kWh data

Note: Once o4-12 is set to 1 and the ENTER key is pressed, kWh data is erased and the display returns to 0

o4: Maintenance Monitor Settings

o4-13: Number of Run Commands Counter Initialization

All Modes

o4-13 Number of Run Commands Counter Initialization

o4-13 is for resetting U4-2 (Number of Run Commands)

0: No action

1: Reset Number of Run Commands

Note: Once o4-13 is set to 1 and the ENTER key is pressed, the counter value is erased and the display returns to 0

Technical Training – Failure Analysis