YASKAWA

HV600

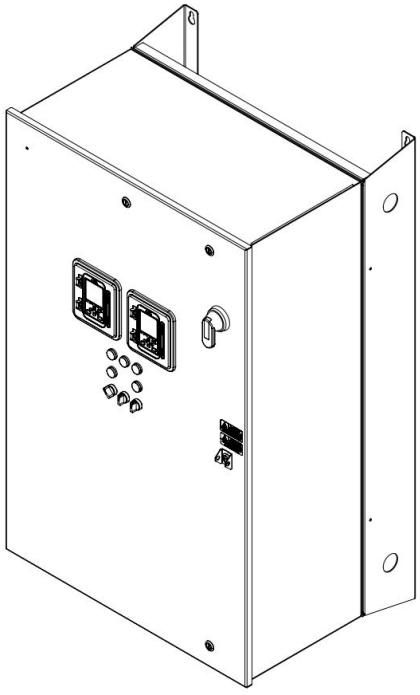
REDUNDANT DRIVE OPERATIONAL TEST MANUAL

AC DRIVE FOR HVAC FAN & PUMP APPLICATIONS

MODELS:

H6RxBxxx
Three-Phase 480 V: 3 to 250 HP

PDF
yaskawa.com/TOEPYAIH6R01



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1 Preface and Safety

Yaskawa manufactures products used as components in a wide variety of industrial systems and equipment. The selection and application of Yaskawa products remain the responsibility of the equipment manufacturer or end user. Yaskawa accepts no responsibility for the way its products are incorporated into the final system design. Under no circumstances should any Yaskawa product be incorporated into any product or design as the exclusive or sole safety control. Without exception, all controls should be designed to detect faults dynamically and fail safely under all circumstances. All systems or equipment designed to incorporate a product manufactured by Yaskawa must be supplied to the end user with appropriate warnings and instructions as to the safe use and operation of that part. Any warnings provided by Yaskawa must be promptly provided to the end user. Yaskawa offers an express warranty only as to the quality of its products in conforming to standards and specifications published in the Yaskawa manual. NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS OFFERED. Yaskawa assumes no liability for any personal injury, property damage, losses, or claims arising from misapplication of its products.

◆ Applicable Documents

These documents are applicable to the HV600 Bypass (Redundant) Drive. Read and understand these documents before installing, operating, or servicing this system. The system must be installed according to this document and local codes.

Table 1.1 HV600 Bypass (Redundant) Instructions

Drive Series	Document
HV600	HV600 Redundant Drive Operational Test Manual (TOEPYAIH6R01) *1
	HV600 Redundant Schematic Diagram (DS.H1R112.01) *1
	HV600 Installation & Primary Operation (TOEPC71061732)

*1 Packaged with the drive.

◆ Supplemental Safety Information

Read and understand this manual and the HV600 Installation & Primary Operation manual before you install, operate, or do maintenance on this drive. Install the drive as specified by the HV600 Installation & Primary Operation manual and local codes. Observe all safety messages in this manual and the standard drive manuals.

◆ General Safety

General Precautions
• Some figures in the instructions include options and drives without covers or safety shields to more clearly show the inside of the drive. Replace covers and shields before operation. Use options and drives only as specified by the instructions. • The figures in this manual are examples only. All figures do not apply to all products included in this manual. • Yaskawa can change the products, specifications, and content of the instructions without notice to make the product and/or the instructions better. • If you damage or lose these instructions, contact a Yaskawa representative or the nearest Yaskawa sales office on the rear cover of the manual, and tell them the document number on the front cover to order new copies.

DANGER *Do not ignore the safety messages in this manual. If you ignore the safety messages in this manual, it will cause serious injury or death. The manufacturer is not responsible for injuries or damage to equipment.*

DANGER *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

WARNING *Arc Flash Hazard. Obey local codes and Arc Flash safety requirements contained in the Standard for Electrical Safety in the Workplace NFPA 70E (2009 Edition or later) and the Workplace Electrical Safety, Canadian Standards Association (CSA) Z462-12. Obey safe work procedures and use applicable personal protective equipment (PPE). If you do not obey these requirements and procedures, it can cause serious injury or death.*

WARNING *Sudden Movement Hazard. Remove all personnel and objects from the area around the drive, motor, and machine and attach covers, couplings, shaft keys, and machine loads before you energize the drive. If personnel are too close or if there are missing parts, it can cause serious injury or death.*

⚠ WARNING *Electrical Shock Hazard. Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive. If personnel are not approved, it can cause serious injury or death.*

⚠ WARNING *Electrical Shock Hazard. Do not remove covers or touch circuit boards while the drive is energized. If you touch the internal components of an energized drive, it can cause serious injury or death.*

NOTICE *Damage to Equipment. When you touch the drive and circuit boards, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

NOTICE *Damage to Equipment. Do not do a withstand voltage test or use a megohmmeter or megger insulation tester on the drive. These tests can cause damage to the drive.*

NOTICE *Do not operate a drive or connected equipment that has damaged or missing parts. You can cause damage to the drive and connected equipment.*

2 Product Overview

◆ About this Product

The HV600 Redundant Drive Package is engineered for use in critical HVAC building automation applications that require continuous reliable motor control.

This document provides a procedure to test the operation of the Redundant Drive Package after wiring and programming of the drive is complete.

The redundant drive package contains two HV600 drives that have HVAC application-specific software macros and real-time clocks in a IP20/UL Type 1 or IP55/UL Type 12 enclosure to make sure that a drive fault will not interrupt operation.

Feature highlights for the redundant drive package include:

- Standard lockable main input disconnect switch (optional circuit breaker)
- 115 Vac control transformer, fused
- Semiconductor fuses for each drive
- Damper control circuit with end of travel feedback with two adjustable wait time functions
- Selectable manual or auto transfer
- Drive A-Auto-Drive B switch
- Hand-Off-Auto switch
- Single input/output wiring points
- Single control wiring point
- Two door-mounted keypads

Popular building automation communication protocols BACnet, Siemens APOGEE, Johnson Controls Metasys and MEMOBUS/Modbus are embedded in the drive. Interface cards for LonWorks, Ethernet/IP, EtherNet/IP (DLR), Modbus TCP/IP (Dual-Port and Single-Port), and Multi-protocol EtherNet are offered separately.

◆ Applicable Models

This document applies to the drive models in Table 2.1.

Table 2.1 Applicable Models

Drive Series	Models
HV600 Redundant Drive Package	H6RxBxxx

◆ How to Read Redundant Drive Catalog Codes

Use the information in Figure 2.1 and Table 2.2 to read the catalog codes.

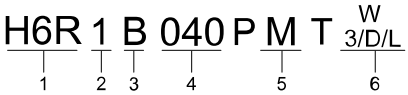


Figure 2.1 Catalog Code

Table 2.2 Catalog Code Details

No.	Description
1	HV600 Redundant Drive
2	Enclosure type • 1: IP20/UL Type 1 • 2: IP55/UL Type 12
3	Input power supply voltage • B: Three-Phase 480 V
4	NEC rated output amps
5	Power options • M: Lockable circuit breaker (100 kA SCCR Panel Rating)
6	Control options • W: Custom nameplate • D: EtherNet/IP • L: LonWorks • 3: Multi-Protocol EtherNet

◆ Models (H6RxBxxx)

Rated Input Voltage	Rated Output Current (Amps)	Redundant Drive Package Model No. H6RxBxxx	Nominal HP *1	Dimensions (in)		
				H	W	D
480 V Three-Phase	4.8	005	3	43.5	26.6	21.4
	7.6	008	5			
	11	011	7.5			
	14	014	10			
	21	021	15			
	27	027	20			
	34	034	25			
	40	040	30	55.0	33.2	26.2
	52	052	40			
	65	065	50			
	77	077	60			
	96	096	75			
	124	124	100			
	156	156	125	85.4	41.3	34.4
	180	180	150			
	240	240	200	Contact Yaskawa		
	302	302	250			

*1 Horsepower rating is based on standard NEMA B, 4-pole motor design as represented in NEC table 430.150 Full Load Current, Three-Phase Alternating Current Motors at 480 volts.

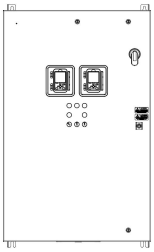
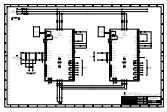
3 Receiving and System Components

Do these tasks after you receive the Redundant Drive Package:

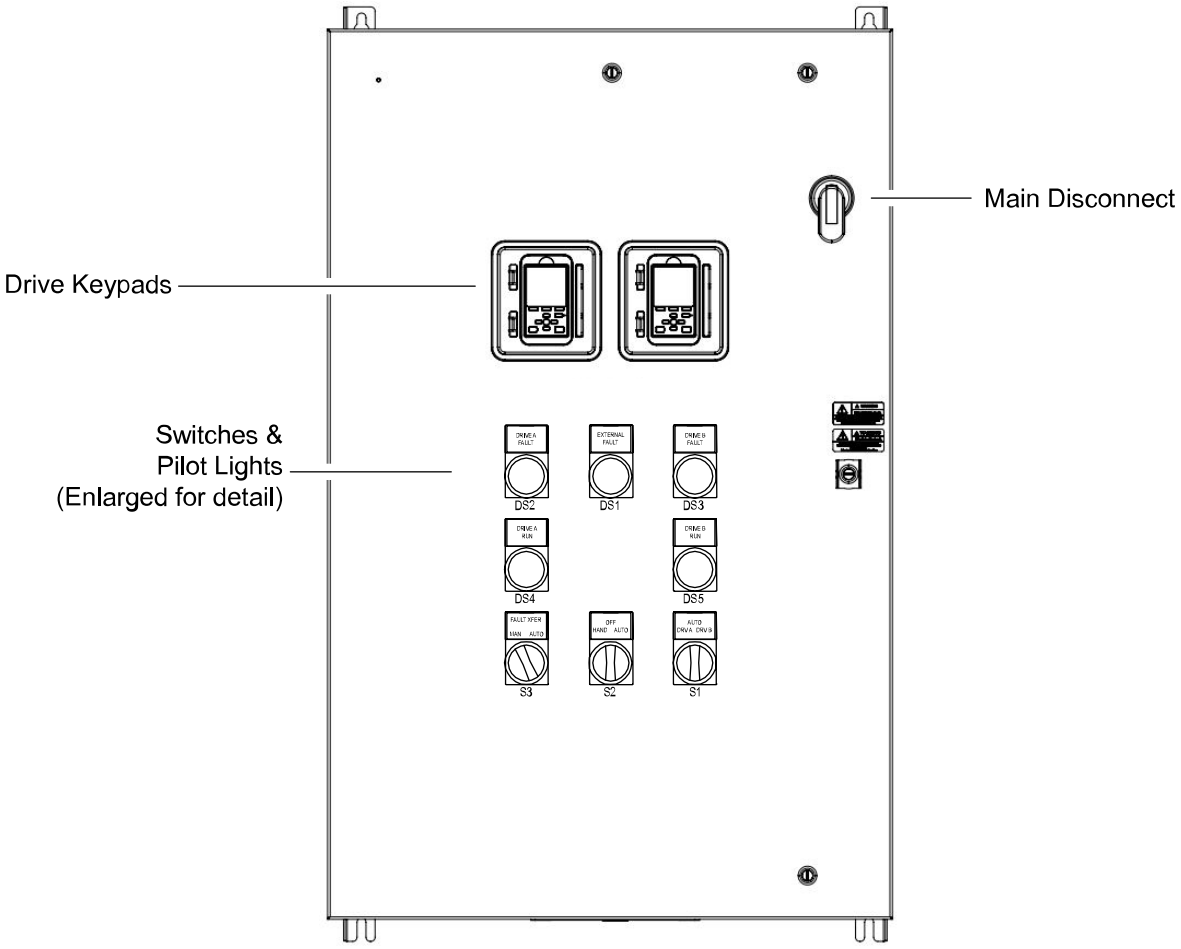
- Inspect the package for damage. Contact the shipper immediately if the package appears damaged upon receipt.
- Verify receipt of the correct model by checking the catalog code printed on the nameplate of the package.
- Contact your supplier if you have received the wrong model or the package does not function properly.

◆ Package Contents

Table 3.1 Contents of Package

Contents		Quantity
Drive Package		1
HV600 Redundant Drive Operational Test Manual		1
HV600 Redundant Schematic Diagram		1

◆ System Components



◆ Factory Set Parameters

Table 3.2 Factory Set HV600 Bypass (Redundant Drive) Parameters

Parameter	Value	Unit	Description
b1-08	1	–	Run Command Selection in Programming Mode = Accept RUN while Programming.
b3-01	1	–	Speed Search Selection at Start = Enabled
b3-05	3.0	sec.	Speed Search Delay Time
d1-01	10.0	Hz	Frequency Reference 1 (HAND Mode)
d2-01	–	%	Frequency Reference Upper Limit (Must be set by user)
d2-02	–	%	Frequency Reference Lower Limit (Must be set by user)
E1-01	480	V	Input Voltage Setting
E1-04	–	Hz	Maximum Output Frequency (Must be set by user)
E1-05	460	V	Maximum Output Voltage Setting
E2-01	–	Amps	Motor Rated Current (FLA) (Must be set by user)
H1-05	6E	–	Terminal Sx Function Selection = HAND Command ON : HAND Mode OFF : OFF Mode or AUTO Mode
H1-06	18	–	Terminal Sx Function Selection = Timer Function
H1-07	6D	–	Terminal Sx Function Selection = AUTO Command ON : AUTO Mode OFF : OFF Mode or HAND Mode
H2-01	0	–	Term M1-M2 Function Selection = During Run ON : Drive is running OFF : Drive is stopping
H2-02	12	–	Term M3-M4 Function Selection = Timer Output
H3-03	0.0	%	Terminal A1 Gain Setting
H3-09	2	–	Terminal A2 Signal Level Selection = 4 to 20 mA
L4-05	0	–	Frequency Reference Loss Detection Selection = Stop
L5-01	10	–	Number of Auto-Restart Attempts
L5-03	5.0	sec.	Time to Continue Making Fault Restarts (Time Between Auto Restart Attempts)
o3-02	1	–	Copy Allowed Selection = Enabled
S5-01	1	–	HAND Frequency Reference Selection = *S5-05*
S5-04	1	–	HAND-OFF-AUTO Behavior = Normal
S5-05	10	Hz	HAND Frequency Reference 1
S5-07	0	–	HAND Key Function Selection = Disabled

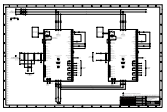
4 Primary Operation Tests

Do the Primary Operation Test procedures *Primary Operation Test (Drive A) on page 10*, *Primary Operation Test (Drive B) on page 11*, and *Expanded Function Test on page 11* for all applications. Make sure that you program Drive A and Drive B with the same settings.

Test procedure *Confirm Auto-Transfer Function on page 12* is optional based on the application requirements.

◆ Primary Operation Test (Drive A)

Table 4.1 Primary Operation Test (Drive A)

Check	Step	Details	Figure
□	1	Verify that the parameters in Drive A and Drive B are set to Yaskawa factory default values. Refer to Yaskawa schematic DS.H6R112.01, Table 1. Factory Set HV600 Bypass (Redundant Drive) Parameters for default settings. Use the keypad to correct any parameter values that are different than what is shown in DS.H6R112.01	
□	2	Set the HAND-OFF-AUTO switch to “OFF”.	
□	3	Set the MAN-FAULT XFER-AUTO switch to “MAN” for manual.	
□	4	Set the DRV A-AUTO-DRV B switch to “DRV A”.	
□	5	SET THE HAND-OFF-AUTO switch to “HAND” to start the drive and control drive operation. Use the keypad to adjust manual speed reference. Do the normal startup procedure (check rotation direction, check damper position if necessary, set min/max speeds and accel/decel times, etc.).	
□	6	When commissioning is complete, set the HAND-OFF-AUTO switch to “OFF” to stop the drive.	

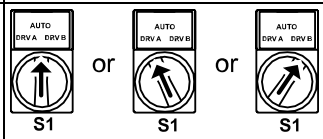
◆ Primary Operation Test (Drive B)

Table 4.2 Primary Operation Test (Drive B)

Check	Step	Details	Figure
□	7	Set the HAND-OFF-AUTO switch to “OFF”.	
□	8	Set the MAN-FAULT XFER-AUTO switch to “MAN” for manual.	
□	9	Set the DRV A-AUTO-DRV B switch to “DRV B”.	
□	10	SET THE HAND-OFF-AUTO switch to “HAND” to start the drive and control drive operation. Use the keypad to adjust manual speed reference. Do the normal startup procedure (check rotation direction, check damper position if necessary, set min/max speeds and accel/decel times, etc.).	
□	11	When commissioning is complete, set the HAND-OFF-AUTO switch to “OFF” to stop the drive.	

◆ Expanded Function Test

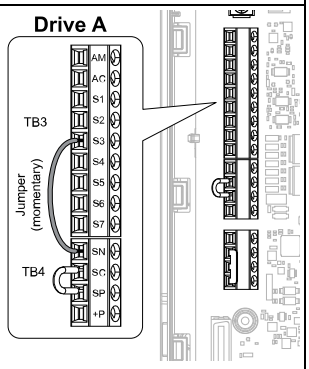
Table 4.3 Expanded Function Test

Check	Step	Details	Figure
□	12	Check AUTO control for correct operation. Set the HAND-OFF-AUTO switch to “AUTO”.	
□	13	When you will use the Building Automation System (BAS) to select Drive A or Drive B, set the DRV A-AUTO-DRV B switch to “AUTO”. When you will NOT use the BAS to select Drive A or Drive B, set the DRV A-AUTO-DRV B switch to “DRV A” or “DRV B” to manually select each drive..	
□	14	Confirm that you can use the BAS to start and stop Drive A and Drive B in AUTO.	-
□	15	Confirm that you can use the BAS to change the speed reference for Drive A and Drive B.	-

◆ Confirm Auto-Transfer Function

This test is optional based on the application requirements.

Table 4.4 Confirm Auto-Transfer Function

Check	Step	Details	Figure
□	16	Set the MAN-FAULT XFER-AUTO switch to “AUTO”.	
□	17	Set the DRV A-AUTO-DRV B switch to “AUTO”.	
□	18	Set the HAND-OFF-AUTO switch to “HAND" to start Drive A.	
□	19	Confirm that you can use the BAS to change the speed reference for Drive A and Drive B.	-
□	20	If necessary, remove the front cover from Drive A to access the TB3 and TB4 terminal blocks below the control board. While Drive A is running, momentarily jumper terminal TB4 SN to TB3 S3 (external fault normally open) to trigger a fault in Drive A. **Note:** When you jumper terminal SN to S3, Drive A will fault on an *EF3* fault code. Confirm that the corresponding drive fault relay output is in a faulted state. Drive B will then attempt to start immediately. Confirm Drive B starts operating.	
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Revision History

Date of Publication	Revision Number	Revised Content
April 2023	<2>	Revision: Applicable Documents and Catalog Code
February 2023	<1>	Revision: Document title Addition: Factory Set Parameters
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Specifications are subject to change without notice for ongoing product modifications and improvements.

Original Instructions

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