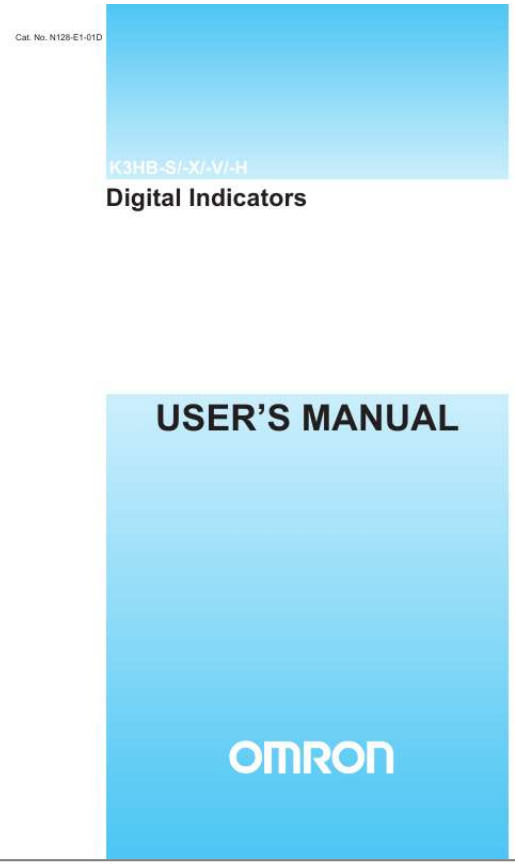

Manual abstract:

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However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products. DIMENSIONS AND WEIGHTS Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown. PERFORMANCE DATA Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability. ERRORS AND OMISSIONS The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions. III Safety Precautions Definition of Precautionary Information The following notation is used in this manual to provide precautions required to ensure safe usage of the product. The safety precautions that are provided are extremely important to safety.

Always read and heed the information provided in all safety precautions. The following notation is used. Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage. Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

WARNING CAUTION Symbols Symbol Meaning General Caution Indicates non-specific general cautions, warnings, and dangers. Caution Electrical Shock Caution Indicates possibility of electric shock under specific conditions. Prohibition General Prohibition Indicates non-specific general prohibitions. General Caution Indicates non-specific general cautions, warnings, and dangers. Mandatory Caution IV Precautions WARNING Do not touch the terminals while power is being supplied.

Doing so may possibly result in electric shock. Make sure that the terminal cover is installed before using the product. Always provide protective circuits in the network. Without protective circuits, malfunctions may possibly result in accidents that cause serious injury or significant property damage. Provide double or triple safety measures in external control circuits, such as emergency stop circuits, interlock circuits, or limit circuits, to ensure safety in the system if an abnormality occurs due to malfunction of the product or another external factor affecting the product's operation.

CAUTION Do not allow pieces of metal, wire clippings, or fine metallic shavings or filings from installation to enter the product. Doing so may occasionally result in electric shock, fire, or malfunction. Do not use the product in locations where flammable or explosive gases are present. Doing so may occasionally result in minor or moderate explosion, causing minor or moderate injury, or property damage. Do not attempt to disassemble, repair, or modify the product.

Doing so may occasionally result in minor or moderate injury due to electric shock. Do not use the equipment for measurements within Measurement Categories III and IV for K3HB-X and II, III, and IV for K3HB-S, K3HB-V, and K3HB-H (according to IEC61010-1). Doing so may occasionally cause unexpected operation, resulting in minor or moderate injury, or damage to the equipment. Use the equipment for measurements only within the Measurement Category for which the product is designed. Perform correct setting of the product according to the application. Failure to do so may occasionally cause unexpected operation, resulting in minor or moderate injury, or damage to the equipment. Ensure safety in the event of product failure by taking safety measures, such as installing a separate monitoring system. Product failure may occasionally prevent operation of comparative outputs, resulting in damage to the connected facilities and equipment. Tighten the screws on the terminal block and the connector locking screws securely using a tightening torque within the following ranges. Loose screws may occasionally cause fire, resulting in minor or moderate injury, or damage to the equipment.
Terminal block screws: 0.43 to 0.58 N·m Connector locking screws: 0.18 to 0.22 N·m V CAUTION Make sure that the product will not be adversely affected if the DeviceNet cycle time is lengthened as a result of changing the program with online editing.
Extending the cycle time may cause unexpected operation, occasionally resulting in minor or moderate injury, or damage to the equipment. Before transferring programs to other nodes or changing I/O memory of other nodes, check the nodes to confirm safety. Changing the program or I/O memory of other nodes may occasionally cause unexpected operation, resulting in minor or moderate injury, or damage to the equipment. VI Precautions for Safe Use (1) Do not use the product in the following locations. · Locations subject to direct radiant heat from heating equipment · Locations where the product may come into contact with water or oil · Locations subject to direct sunlight · Locations where dust or corrosive gases (in particular, sulfuric or ammonia gas) are present · Locations subject to extreme temperature changes · Locations where icing or condensation may occur · Locations subject to excessive shocks or vibration (2) Do not use the product in locations subject to temperatures or humidity levels outside the specified ranges or in locations prone to condensation. If the product is installed in a panel, ensure that the temperature around the product (not the temperature around the panel) does not go outside the specified range. (3) Provide sufficient space around the product for heat dissipation. (4) Use and store the product within the specified temperature and humidity ranges. If several products are mounted side-by-side or arranged in a vertical line, the heat dissipation will cause the internal temperature of the products to rise, shortening the service life. If necessary, cool the products using a fan or other cooling method. (5) The service life of the output relays depends on the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life. Using the product beyond its service life may result in contact welding or burning. (6) Install the product horizontally. (7) Mount to a panel between 1 and 8-mm thick.

(8) Use the specified size of crimp terminals (M3, width: 5.8 mm max.) for wiring. To connect bare wires, use AWG22 (cross section: 0.326 mm2) to AWG14 (cross section: 2.081 mm2) to wire the power supply terminals and AWG28 (cross section: 0.081 mm2) to AWG16 (cross section: 1.309 mm2) for other terminals. (Length of exposed wire: 6 to 8 mm) (9) In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or in the same cable as power lines.
Other measures for reducing noise include running lines along separate ducts and using shield lines. (10) Ensure that the rated voltage is achieved no longer than 2 s after turning the power ON. (11) Allow the product to operate without load for at least 15 minutes after the power is turned ON. (12) Do not install the product near devices generating strong high-frequency waves or surges. When using a noise filter, check the voltage and current and install it as close to the product as possible.
(13) Do not use thinner to clean the product. Use commercially available alcohol. (14) Be sure to confirm the name and polarity for each terminal before wiring the terminal block and connectors. (15) Use the product within the: Corrected second and third cells in Input column. Page A-2: Corrected third and fourth cells in Absolute max.
ratings of inputs column. 01B March 2005 01C December 2006 01D April 2007 X About this Manual Manual Structure Preface Provides precautionary information, a manual revision history, an overview of the manual contents, information on using this manual, and other general information. Section 1 Section 2 Section 3 Outline Provides an overview and describes the features of the product. Preparations Describes the mounting and wiring required before using the product. Basic Application Methods Shows typical applications for the product. Also shows wiring and parameter settings which enables the user to understand how to use the product from practical examples. Initial Setup Describes the initial setup process when using this product. Functions and Operations Describes the functions and settings methods for more effective use of functions, displays, outputs, and settings for each application. User Calibration Describes the methods for user calibration. Troubleshooting Describes how to check and possible countermeasures for errors.

Section 4 Section 5 Section 6 Section 7 Appendices Provides specifications and settings lists. XI Settings Data Notation The letters of the alphabet in settings data are displayed as shown below. a A n N b B o O c C p P d D q Q e E r R f F s S g G t T h H u U i I v V j J w W k K x X l L y Y m M z Z Applicable Model Notation The following symbols are used to indicate the applicable models for specific functions. X K3HB-X@@ V K3HB-V@@ H K3HB-H@@ S K3HB-S@@ XII Contents CONTENTS Section 1 Outline 1.1 1.2 1.3 Main Functions and Features of the K3HB .

In addition, any constant can be set and measurement values can be added to or subtracted from a constant. Timing hold Using external timing signal inputs, synchronous measurements can be made and maximum values, minimum values, and the difference between maximum and minimum values can be measured. P.5-18 XVSH Timing delay The start and stop timing for measurements can be adjusted using timing signals. P.5-9 S P.5-33 X V S H Filter Average processing Average processing of input signals with extreme changes or noise smooths out the display and makes control stable.

Previous average value comparison Slight changes can be removed from input signals to detect only extreme changes. P.5-38 X V S H P.5-41 X V S H Input compensation Forced-zero Forces the present value to 0. Effective to set a reference value from which to perform measurements. Tare zero Shifts the current value measured with a forced zero to 0 again. Effective, for example, when two compounds are measured separately. P.5-67 XVS Step value Sets the step size for changing the value of the rightmost digit of the measurement value. Zero-trimming Compensates for gradual changes in input signals from, for example, sensor temperature drift, based on OK data (PASS data) at measurement.
P.5-70 XVS Temperature input shift Shifts the temperature input value. P.5-65 Zero-limit X V S Changes the display value to 0 for input values less than the set value. Effective when drift and displacement of values near zero need to be eliminated.
P.5-36 XVS P.5-80 X V S H P.5-24 H 1-2 1.1 Main Functions and Features of the K3HB Key operations Outline Teaching During scaling, the input value during measurement can be set, as is, as the scaling input value.
P.5-14 XVS (Setting Scaling) Key protection Limits key-operated level and parameter changes to prevent inadvertent key operations and malfunctions. P.5-102 Outputs Comparative output pattern The comparative output pattern can be selected as standard output, zone output, and level output. P.5-44 XVSH PASS output change Comparative results other than PASS and error signals can be output from the PASS output terminal. Hysteresis Prevents comparative output chattering when the measurement value fluctuates slightly near the set value. P.5-46 XVSH Output OFF delay Connects the comparative output OFF timing for a set interval. Comparative output ON times can be held when comparative results change quickly.

P.5-55 XVSH Startup compensation timer Constant-time measurements can be stopped by an external signal input. Output refresh stop Holds the output status when comparative results outputs other than PASS turn ON. P.5-52 X V S H Shot output Produces a constant comparative output ON time. P.5-57 X V S H P.5-49 X V S H Output logic Reverses the output logic of comparative outputs for comparative results. Output test Output operation can be confirmed without actual input signals, by setting test measurement values using the keys. P.
5-90 XVSH P.5-59 X V S H P.5-27 X V S H Linear output Outputs currents or voltages proportional to measurement values as they change. P.5-65 XVSH Standby sequence Turns the comparative output OFF until the measurement value enters the PASS range.
P.5-61 XVSH 1-3 Section 1 Outline Display Outline Display value selection The current display value can be selected from the present value, the maximum value, and the minimum value. Display color selection The PV display color can be set to either green or red. The present value color can be switched according to the status of comparative outputs. P.
5-83 XVSH Scaling Can convert the input signal to any display value. Display refresh period When inputs change quickly, the display refresh period can be delayed to reduce flickering and make the display easier to read. P.5-73 XVSH Comparative set value display The comparative set value can be set to not display during operation. P.5-78 X V S H Position meter Displays the current measurement value as a position in relation to the scaling width on a meter with 20 sections. P.5-85 XVSH Decimal point display Disables displaying numerals the decimal point in measurement values. P.5-93 P.

5-14 X V S P.5-82 X V S H H Other Max/Min hold Holds the maximum and minimum measurement values. Bank selection Eight comparative set value banks can be selected using the keys on the front of the Unit or by external inputs. Groups of comparative set values can be set and can be selected as groups. P.5-93 XVSH User calibration Allows the user to calibrate the K3HB. P.6-1 XVSH Bank copy Any bank setting can be copied to all banks. P.5-54 X V S H P. 5-98 X V S H Cold junction compensation Enables or disables terminal temperature compensation. P.5-31 Power interruption memory Enables recording the maximum and minimum values when power is interrupted. P.5-75 XVS H H 1-4 1.
2 Component Names and Functions 1.2 Component Names and Functions Outline Level/bank display Max/Min status Comparative output status Status indicators SV display status MAX/MIN Key LEVEL Key SHIFT Key MODE Key UP Key PV display 8 88888 88888 Position meter SV display No. Name PV display SV display Position meter Comparative output status indicators Max/Min status indicator Level/bank display Function Displays PVs, maximum values, minimum values, parameter names, and error names. Displays SVs and monitor values. Displays the position of the PV with respect to a desired scale. Display the status of comparative outputs. Turns ON when the maximum value or minimum value is displayed in the RUN level. In RUN level, displays the bank if the bank function is ON. (Turns OFF if the bank function is OFF.) In other levels, displays the current level. T-ZR: Turns ON when the tare zero function is executed. Turns OFF if it is not executed or is cleared. Zero: Turns ON when the forced-zero function is executed. Turns OFF if it is not executed or is cleared. (Excluding the K3HB-H.

) Hold: Turns ON/OFF when hold input turns ON/OFF. TG: Turns ON when the timing signal turns ON. Otherwise OFF. T: Turns ON when parameters for which teaching can be performed are displayed. HH, H, L, LL: In RUN level, turn ON when the comparative set values HH, H, L, and LL are displayed. Used to switch the display between the PV, maximum value, and minimum value and to reset the maximum and minimum values. Used to switch level. Used to switch the parameters displayed. Used to change parameter settings. When changing a set value, this key is used to move along the digits.
When changing a set value, this key is used to change the actual value. When a measurement value is displayed, this key is used to execute or clear the forced-zero function or to execute teaching. Status indicators SV display status indicators MAX/MIN Key LEVEL Key MODE Key SHIFT Key UP Key 1-5 Section 1 Outline 1.

3 Internal Block Diagram Outline Key Display Analog input terminal Input circuit AD converter Microcomputer Drive circuit Transistor output EEPROM Drive circuit Contact outputs Event input terminal Linear output Sensor power supply Event input circuit Linear output circuit Waveshaping circuit Drive circuit Filter Drive circuit Communications driver Communications terminal Constant voltage circuit 1 Constant voltage circuit 2 Constant voltage circuit 3 Constant voltage circuit 1 Power supply circuit Operating power supply 1-6 Section 2 Preparations Preparations 2.1 Mounting .

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... 2-2 2-4 2-1 Section 2 Preparations 2.1 Mounting External Dimensions Preparations 101.2 91 Character size for main display (mm) PV display SV display 100 (112) 8 7.6 8 2.6 14.2 12 1.3 96 95 (DeviceNet models: 97) 2 48 4.

9 Panel Cutout Dimensions 120 min. 75 min. 92 +0.8 -0 2-2 45 +0.6 -0 44.

8 2.1 Mounting Mounting Method (1) Insert the K3HB into the mounting cutout in the panel. (2) Insert watertight packing around the Unit to make the mounting watertight. Watertight packing Preparations (3) Insert the adapter into the grooves on the left and right sides of the rear case and push until it reaches the panel and is fixed in place. Adapter LCD Field of Vision The K3HB is designed to have the best visibility at the angles shown in the following diagram.

10° 30° 2-3 Section 2 Preparations 2.2 Using I/O A Operating Power Supply A 1 2 3 4 5 6 BCDE Preparations 100 to 240 VAC 24 VAC/ VDC *Check the required power supply type. B Sensor Power Supply/Output Sensor power supply + PASS output 0- 5/ 1- 5/ 0- 10A C Relays, Transistors, BCD, and DeviceNet Relay output <K34-C1> Relay output <K34-C2> Transistor output <K34-T1><K34-T2> NPN PNP Sensor power supply + linear output 0- 5/ 1- 5/ 0- 10V N/ C N/ C N/ C 12 VDC 80 mA 0- 20/ 4- 20mA 10 VDC 100 mA0- 20/ 4- 20mA N/ C 10 VDC 100 mA Sensor power supply 10 VDC 100 mA 12 VDC 80 mA <K33- <K33CPB> CPA> <K33- <K33- <K33- <K33L2B> L1B> L2A> L1A> 12 VDC 80 mA Sensor power supply N/ C Sensor power supply B(+) B(+) SD SD Sensor power supply Sensor power supply 10 VDC 100 mA N/ C 10 VDC 100 mA A(-) 10 VDC 100 mA 12 VDC 80 mA 12 VDC 80 mA A(-) 12 VDC 80 mA N/ C REQUEST MAX REQ. COMMON PASS MIN REQ. RUN HOLD L DATA VALID LL RESET OVER POLARITY COMMON HH N/C 4 3 H 10 10 50 26 1 2 4 8 1 2 4 8 B(+) A(-) B(+) A(-) N/ C RD SG SG RD 1: V- (Power supply cable: Black) 2: CAN L (Communications cable: Blue) 3: Shield 4: CAN H (Communications cable: White) 5: V+ (Power supply cable: Red) Applicable Connector: HR31-5.08P-5SC (01) (HIROSE ELECTRIC CO., LTD.) 1 N/C N/C N/C N/C N/C N/C N/C N/C N/C N/C N/C N/C 25 8 <K33-B> <K33-A> RS-232C RS-232C <K33<K33FLK1B> FLK1A> RS-485 RS-485 <K33<K33FLK3A> FLK3B> 1 COMMON 2 10 0 4 8 1 2 10 1 4 8 1 2 10 2 4 * Attach the provided crimp terminals. The BCD COMMON is shared. The pins indicated in the above diagram as blank (white) boxes have been removed.

*Only one of RS-232C/RS-485 communications, BCD, or DeviceNet can be used by each Digital Indicator. BCD Output Cable Model K32-BCD K3HB end Shape Connected device end (PLC, display device, etc.) COMMON Pin arrangement 1 100 101 38 mm Cover: 300 mm 102 46.5 mm D-sub connector (37-pin female) Cover: 17JE-37H-1A (manufactured by DDK) Connector: Equivalent to 17JE-13370-02 (manufactured by DDK) Stand: 17L-002A (manufactured by DDK) 103 104 HDR-E50LPA5 (manufactured by Honda Tsushin Co., Ltd) Connector: HDR-E50MAG1 (manufactured by Honda Tsushin Co., Ltd) 1 2 4 8 1 2 4 8 1 2 4 8 1 2 4 8 1 2 4 8 1 2 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 12 3 45 Sensor power supply + communications BCD (NPN Open Collector): <K34-BCD> · Applicable Connector (Sold separately) HDR-E50MAG1 (HONDA TSUSHIN KOGYO CO., LTD.) · Special Cable (Sold separately) K32-BCD (OMRON) (HDR-E50MAG1 with 0.3-m cable) DeviceNet Connector (Included): DRT <K34-DRT> 4 104 8 OVER DATA VALID RUN COMMON REQUEST MAX REQ. MIN REQ.

HOLD RESET POLARITY HH H PASS L LL COMMON Note: The BCD Output Cable has a D-sub plug. Cover: 17JE-37H-1A (manufactured by DDK); Connector: equivalent to 17JE-23370-02 (D1) (manufactured by DDK) 2-4 2.2 Using I/O E Analog Input Current input E Analog Input AC voltage only E Analog Input E1 N/C E2 A E3 B E1 E1 Input B E2 Input A E3 COM E4 Input A E5 Input B AB N/C C D N/C N/C E2 E3 A Pt Voltage input Preparations E4 E4 C E5 D E6 COM + B TC B' E5 E6 COM N/ C E6 COM *Refer to the measurement range on the front panel. K3HB-H K3HB-S K3HB-X, V D Event Input Models with Terminal Blocks <K35-1><K35-3> TIMING S-TMR HOLD RESET ZERO COM Models with Connectors <K35-2><K35-4> 1: TIMING 3: HOLD 5: ZERO 7: BANK4 9: BANK1 2: S-TMR 4: RESET 6: COM 8: BANK2 10: COM · Applicable Connector (Sold separately) XG4M-1030 (OMRON) · Special Cable (Sold separately) K32-DICN (OMRON) (XG4M-1030 with 3 m cable) Special Cable (for Event Inputs with 8-pin Connector) Model K32-DICN

9 1 10 2 Cable marking Appearance Wiring Pin No. 1 2 3 4 5 6 7 8 9 10 Signal name N/C S-TMR HOLD RESET N/C COM BANK4 BANK2 BANK1 COM 3,000 mm (3 m) 2-5 Section 2 Preparations Wiring Use crimp terminals suitable for M3 screws, as shown below. 5.8 mm max. Preparations 5.8 mm max. Use cables with a heat resistance of at least 70ºC. Power Supply A 1 2 3 4 5 6 B C D E Supply power to terminal numbers A1 and A2. The power supply specifications are outlined below. 100 to 240 VAC, 50/60 Hz, 18 VA max. (at max. load) 24 VAC/VDC, 50/60 Hz, 12 VA max./7 W max. (at max. load) (No polarity) When the power is turned ON, a power supply capacity greater than the rated power supply is required. When multiple Units are being used, make sure that the operating power supply has sufficient capacity. Complying with UL/CSA Standards Use an SELV power supply with overcurrent protection for the DC power supply.

An SELV power supply has double or reinforced insulation between the input and output, an output voltage of 30 V rms and 42.4 V peak, and is 60 VDC or less. Recommended Power Supply: S8VS-06024@ (from OMRON) Sensor Power Supply A 1 2 3 4 5 6 B C D E The sensor power can be supplied from terminals B5 and B6. The power supply specifications are outlined below. 12 VDC 80 mA or 10 VDC 100 mA B5 + - B6 2-6 2.

2 Using I/O Linear Output A 1 2 3 4 5 6 B C D E Linear currents and voltages are output between terminals B1 to B2 and between B3 to B4. Connect a load within the specified range. Linear output + Preparations B1 - B2 + B3 - B4 + B5 - B6 Circuit Diagrams Linear voltage output + B1 5 k min. L - B2 Linear current output + B3 500 max. L - B4 Sensor power supply 2-7 Section 2 Preparations Comparative Outputs A 1 2 3 4 5 6 B C D E Comparative outputs are output to terminals B1 to B3 and C1 to C6.

Connect loads within specifications. The electrical life expectancy of the relays is 100,000 operations. Circuit Diagrams Contact Outputs <K34-C1> H and L Output Models 5V C1 C2 C3 5V C4 C5 C6 L H Preparations <K34-C2> HH, H, L, and LL Output Models 5V C1 HH C2 H C3 COM C4 L C5 LL C6 COM <K34-CPA> PASS Output Models B1 B2 B3 PASS 2-8 2.2 Using I/O Transistor Outputs <K34-T1> NPN Output Models 8.2 8.

2 8.2 8.2 8.2 C1 C2 HH H Preparations C3 PASS C4 C5 L LL C6 COM <K34-T2> PNP Output Models 8.2 8.

2 8.2 8.2 8.2 C1 C2 HH H C3 PASS C4 C5 L LL C6 COM 2-9 Section 2 Preparations Event Inputs A 1 2 3 4 5 6 B C D E Input control signals. The configuration is shown below. D1 TIMING D2 S-TMR D3 HOLD D4 RESET D5 ZERO 1: TIMING 1 3: HOLD 5: ZERO 7: BANK4 9: BANK1 9 2 2: S-TMR 4: RESET 6: COM 8: BANK2 10 10: COM Preparations D6 COM Models with terminal blocks <K35-1><K35-3> Models with connectors <K35-2><K35-4> Applicable connector: XG4M-1030 (OMRON) Circuit Diagrams <K35-1><K35-2> NPN Input Models BANK (1,2,4) S-TMR: D2 HOLD: D3 RESET: D4 ZERO: D5 12 V 4.7 K 3.9 K COM 12 V 560 TIMING D1 750 COM <K35-3><K35-4> PNP Input Models BANK (1,2,4) S-TMR: D2 HOLD: D3 RESET: D4 ZERO: D5 3.9 K 12 V 4.7 K COM TIMING D1 12 V 750 560 COM 2-10 2.

2 Using I/O K3HB-X: DC Voltage, DC Current, AC Voltage, or AC Current Input A 1 2 3 4 5 6 A 1 2 3 4 5 6 B C D E B C D E Input the signal to be measured. The following figure shows the inputs that can be measured by each model. Connect the input devices to the terminals shown below according to the input type. Make sure that the allowable instantaneous overload is not exceeded, even momentarily. K3HB-X (AC voltage only) Preparations E1 N/ C (A,B) E2 A B (N/ C) E3 (C) (AC voltage only) E4 C (D) E5 D (N/ C) E6 COM (COM) Circuit Diagram E2, E3, E4, E5 A AC voltage only Buffer Amplifier B COM E6 2-11 Section 2 Preparations Input type DC voltage A B C D DC current A B C D AC voltage A B C D AC current A B C D Input range Maximum measurement range Terminal No. E2 E3 E4 E5 E2 E3 E4 E5 E1 E1 E3 E4 E2 E3 E4 E5 Input impedance (A+B) 10 M min. 1 M min. ±199.99 V ±19.999 V ±1.

9999 V 1.0000 to 5.0000 V -199.99 to 219.99 V -19.

999 to 21.999 V -1.9999 to 2.1999 V 0.5000 to 5.

5000 V Preparations ±199.99 mA ±19.999 mA ±1.9999 mA 4.000 to 20.000 mA 0.0 to 400.0 V 0.00 to 199.99 V 0.

000 to 19.999 V 0.0000 to 1.9999 V 0.000 to 10.000 V 0.0000 to 1.9999 V 0.00 to 199.99 mA 0.

000 to 19.999 mA -199.99 to 219.99 mA -19.999 to 21.

999 mA -1.9999 to 2.1999 mA 2.000 to 22.000 mA 0.

0 to 440.0 V 0.00 to 219.99 V 0.000 to 21.999 V 0.0000 to 1.9999 V 0.000 to 11.000 V 0.

0000 to 2.1999 V 0.00 to 219.99 mA 0.000 to 21.999 mA 1 max. 10 max. 33 max. 10 max. 1 M min.

0.5 VA CT 1 max. 10 max. 2-12 2.2 Using I/O K3HB-V: mV, Load Cell Input A 1 2 3 4 5 6 B C D E Input the signal to be measured.

The following figure shows the inputs that can be measured by each model. Connect the input devices to the terminals shown below according to the input type. Make sure that the allowable instantaneous overload is not exceeded, even momentarily. K3HB-V Preparations E1 N/ C E2 A B E3 E4 C E5 D E6 COM Circuit Diagram E2, E3, E4, E5 A A/D B COM E6 mV, Load cell input A B C D Input range 0.00 to 199.

99 mV 0.000 to 19.999 mV Maximum measurement range Terminal No. E2 E3 E4 E5 Input impedance (A+B) 1 M min. -19.99 to 219.99 mV -19.999 to 21.999 mV -110.00 to 110.

00 mV -199.99 to 219.99 mV ±100.00 mV ±199.99 mV 2-13 Section 2 Preparations K3HB-S: Analog Input A 1 2 3 4 5 6 B C D E Input the signal to be measured. The inputs that can be measured by each model are as follows: Voltage/Current Inputs. Connect the input devices to the terminals shown below according to the input type. Make sure that the absolute maximum rating is not exceeded, even momentarily. K3HB-S Input A Input B Preparations E1 A B E2 4 to 20 mA, 0 to 20 mA 4 to 20 mA, 0 to 20 mA E3 1 to 5 V, 0 to 5 V ±5 V, ±10 V COM E4 A 1 to 5 V, 0 to 5 V ±5 V, ±10 V E5 B E6 Circuit Diagrams N/ C E4,E5 A + B AD V COM E3 A+B = 1 M E1,E2 + 120 AD I COM E3 2-14 2.2 Using I/O K3HB-H: Temperature Input A 1 2 3 4 5 6 B C D E Input the signal to be measured.

The following figure shows the inputs that can be measured by each model. Connect the input devices to the terminals shown below according to the input type. Make sure that the absolute maximum rating is not exceeded, even momentarily. K3HB-H Preparations E1 N/ C E2 E3 A E4 Pt - TC E5 B B' + E6 COM 2-15 Section 2 Preparations Preparations 2-16 Section 3 Basic Application Methods 3.1 3.

2 3.3 3.4 3.5 3.6 3.

7 3.8 Monitoring Tank Levels .....

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... Monitoring Motor Load Current.....

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1 Monitoring Tank Levels Ultrasonic Displacement Sensor E4PA-LS400-M1 500 to 4,000 mm 4 to 20 mA 500 mm 85%: Full tank 80%: Upper limit alarm 3,500 mm Tank level display Process Indicator K3HB-XAD 4,000 mm 4000 mm Basic Application Methods 20%: Lower limit alarm 10%: Dry tank 10 K3HB-XAD input 0 mm 4.00 mA 20.00 mA Connections Diagram K3HB-X 100 to 240 VAC 24 VAC/DC + - D COM Blue (-) Black (4 to 20 mA) E4PA-LS400-M1 Standard Outputs Comparative set value HH Comparative set value H Display High Comparative set value L Comparative set value LL Low ON Output HH Output H Output PASS Output L Output LL OFF 3-3 Section 3 Basic Application Methods RUN Level Parameter Comparative set value HH Comparative set value H Comparative set value L Comparative set value LL Characters Set value 3400 3200 800 400 Control example for the following settings: Full tank alarm set: 3,400 mm Upper limit alarm: 3,200 mm Lower limit alarm: 800 mm Dry tank alarm: 400 mm Remarks Check on the status displays. Basic Application Methods Initial Setting Level (L 0) Parameter Input type A Scaling input value A1 Scaling display value A1 Scaling input value A2 Scaling display value A2 Decimal point position Comparative output pattern Characters Set value in-ta inp. a 1 dsp. a 1 inp. a2 dsp. a2 dp out-p d ad 4. 00 3500 Measurement distance Remarks 20.

000 0 3,500 mm E4PA-LS400-M1 Output 0 mm 4.00 mA 20.00 mA ,,,,, nomal Input Adjustment Level (L 1) Parameter Timing hold Zero-limit Zero-limit value Averaging type Averaging times Characters Set value tmg-h z-lim lim-p avg-t avg-n nomal on 0 move 4 Normal Remarks Enables the zero-limit function. Displays 0 for values less than zero. Moving average 4 3-4 3.1 Monitoring Tank Levels Display Adjustment Level (L 2) Parameter Display value selection Position meter type Position meter upper limit Position meter lower limit Characters Set value disp pos-t pos-h pv inc 4000 Remarks Present value Incremental display pos-l 0 Full-scale 0.0 to 4,000 mm Other parameters are set to their default values. Basic Application Methods 3-5 Section 3 Basic Application Methods 3.2 Monitoring Motor Load Current Advantages of Using the K3HB-X · The motor load current can be monitored and the measurement value and output status held when the motor is tripped. The K3HB-X will hold this status even if a power interruption occurs.
· A 75:5 current transformer (CT) can be used for motor current detection. · Up to 10 A can be input directly using the K3HB-XAA. · Current can be displayed in amperes (A) up to two digits past the decimal point (@@. A) on the K3HB-XAA. Basic Application Methods · Two-level output detection can be used for the upper limit.
· The startup compensation timer on the K3HB-XAA can be set to prohibit measurements for a certain amount of time after the motor startup signal is received to prevent judgments that result in inadvertent output due to inrush current measured when the motor starts. · The startup compensation timer is set to 10 s. · An output is generated when the H and L values exceed the comparative output settings. (Uses two-level detection for the upper limit.) Power supply ON signal Magnetic relay 0 to 50 A AC CT 75:5 Comparative output 1 (comparative output H) Comparative output 2 (comparative output L) 0 to 5 A Process Indicator K3HB-XAA Motor Connections Diagram Comparative output H Startup compensation timer input K3HB-X Power supply side 100 to 240 VAC 24 VAC/DC Comparative output L 3-6 3.
2 Monitoring Motor Load Current · Comparative set value H is 50.00 A and comparative set value L is 40.00 A. Level output Display High 50.00 A Comparative set value H 40.00 A Comparative set value L Low ON Output H Output PASS Output L OFF Basic Application Methods RUN Level Parameter Comparative set value H Comparative set value L Characters Set value 50. 00 40. 00 Remarks Control example for the following settings: Comparative output 1: 50.00 A Comparative output 2: 40.00 A Check on the status displays.

Initial Setting Level (L 0) The Setting Level Protect setting must be set to 0 (SET.PT = 0) to enable moving to the advanced function setting level. Parameter Input type A Scaling input value A1 Scaling display value A1 Scaling input value A2 Scaling display value A2 Decimal point position Comparative output pattern Move to advanced function setting level Characters Set value in-ta inp. a 1 dsp. a 1 inp. a2 dsp. a2 dp out-p amov a aa 0. 000 0 5. 000 7500 ,,,. ,, level -0169 Level output Move to advanced function setting level to set the startup compensation timer K3HB-XAA input 0.
00 A 0.000 A 5.000 A Display value: CT primary current 75.00 A Remarks 3-7 Section 3 Basic Application Methods Advanced Function Setting Level (L f) Parameter Startup compensation timer Characters Set value s-tmr 10. 0 Remarks Set the startup compensation timer at motor startup to 10 s.
*Input Adjustment Level (L 1) Parameter Timing hold Characters Set value tmg-h nomal Normal Remarks Display Adjustment Level (L 2) Basic Application Methods Parameter Display value selection Characters Set value disp pv Remarks Present value Other parameters are set to their default values. 3-8 3.3 Weighing Material 3.3 Weighing Material Advantages of Using the K3HB-V · Resin can be weighed · A load-cell sensor is used to detect the weight of resin. (For example, 0 to 100 kg can be displayed with a rated load cell specification of 100 kg, recommended applied voltage of 10 V and rated output of 2 mV/V.) · *Here, 2 mV/V means the load cell outputs 2 mV with 1 V applied at the rated load (100-kg weight in this case). With 10 V applied, the load cell output is 20 mV (= 2 mV x 10). · The weight of the resin is displayed on the K3HB-VLC in kilograms (@@.@ kg). · The weight of the resin is displayed using the 20-section display on the position meter (provides a full-scale level display). · The number of measurements to be averaged (averaging times) can be set to 4 to ensure stable readings of levels in relation to full scale. · The rightmost digit on the display can be rounded to 0 or 5. · The weight of the tank can be subtracted to display only the weight of the resin. (A forced-zero function can be used to shift the reading on the display to 0 when the empty tank is on the scale.) Basic Application Methods Resin Weighing Indicator K3HB-VLC Load Cell Sensor (example) Rating: 100 kg, 2 mV/V output, Recommended applied voltage: 10 V Connections Diagram K3HB-V Operation Operation 100 to 240 VAC 24 VDC/AC +IN +OUT -OUT -IN 3-9 Section 3 Basic Application Methods Initial Setting Level (L 0) Parameter Input type A Scaling input value A1 Scaling display value A1 Scaling input value A2 Scaling display value A2 Decimal point position Characters Set value in-ta inp.*

a 1 1 dsp. a b lc 0. 000 0 Display value: Weight 100.0 kg Remarks inp. a2 dsp. a2 20. 000 1000 0.0 kg 0 20.000 K3HB-VLC input Basic Application Methods dp ,,,,. , Input Adjustment Level (L 1) Parameter Timing hold Zero-limit Zero-limit value Step value Averaging type Averaging times Characters Set value tmg-h z-lim lim-p step avg-t avg-n nomal on 0 5 nove 4 Normal Remarks Enables the zero-limit function.

Displays 0 for values less than zero. Rightmost digit will change from 0 to 5 to 0, etc. Moving average 4 Display Adjustment Level (L 2) Parameter Display value selection Position meter type Position meter upper limit Position meter lower limit Characters Set value disp pos-t pos-h pv inc 1000 Remarks Present value Incremental display pos-l 0 Full-scale 0.0 to 100.0 kg Other parameters are set to their default values.

3-10 3.4 Temperature Monitoring/Control with Multi-level Output 3.4 Temperature Monitoring/Control with Multi-level Output Advantages of Using the K3HB-H · The temperature inside the furnace can be monitored and multilevel judgment outputs can be used to perform control outputs according to the temperature inside the furnace. · The temperature inside the furnace is detected using an E52PR@C Thermocouple. · The temperature range of the E52-PR@C is 0 to 1,400ºC.

· The temperature is displayed in @@@.@ ºC on the K3HB-HTA. (Can display temperature in increments as small as 0.1ºC.) · The furnace temperature can be displayed using the 20-section display on the position meter (provides a full-scale level display). · Comparative output HH turns ON when the furnace is 1,000ºC or higher. Comparative output H turns ON while the furnace is between 800ºC and 1,000ºC. Comparative output LL turns ON when the furnace is 200ºC or lower. Comparative output L turns ON while the furnace is between 200.1ºC and 500ºC.

· The standby sequence function disables the comparative output from the time the K3HB-HTA starts until the measurement value reaches the PASS range. Basic Application Methods Thermocouple E52-PR@C Measurement range: 0 to 1,400ºC Comparative set value HH: Upper limit alarm Comparative set value H: To heating control Furnace Temperature Indicator K3HB-HTA PASS output Comparative set value L: To cooling control Connections Diagram Comparative set value L Comparative set value LL Comparative set value LL: Lower limit alarm K3HB-H 100 to 240 VAC 24 VAC/DC Comparative set value H Comparative set value HH 3-11 Section 3 Basic Application Methods Zone Outputs Display High 1000.0°C 800.0°C Comparative set value HH Comparative set value H 500.0°C 200.0°C Comparative set value L Comparative set value LL Low ON Output HH Output H Output PASS Output L Output LL OFF Basic Application Methods RUN Level Parameter Comparative set value HH Comparative set value H Comparative set value L Comparative set value LL Characters Set value 1000. 0 800. 0 500. 0 200. 0 Control example for the following settings: Upper limit warning: 1,000.

0°C Heating output: 800.0°C Cooling output: 500.0°C Lower limit warning: 200.0°C Remarks Check on the status displays. Initial Setting Level (L 0) The Setting Level Protect setting must be set to 0 (SET.

PT=0) to enable moving to the advanced function setting level. Parameter Input type A Temperature unit Comparative output pattern Move to advanced function setting level Characters Set value in-ta d-u out-p amov 11-r c zone -0169 Remarks Set the R thermocouple sensor range. Set the temperature unit to °C. Zone outputs Move to advanced function setting level to set the standby sequence. Advanced Function Setting Level (L f) Parameter Standby sequence Characters Set value stdby on Remarks Enable the standby sequence.

3-12 3.4 Temperature Monitoring/Control with Multi-level Output Input Adjustment Level (L 1) Parameter Timing hold Characters Set value tmg-h nomal Normal Remarks Display Adjustment Level (L 2) Parameter Display value selection Position meter type Position meter upper limit Position meter lower limit Decimal point position Characters Set value disp pos-t pos-h pv ic 1400. 0 Remarks Present value Incremental display pos-l 0 Full-scale 0.0°C to 1400.0°C Basic Application Methods pvdp on Display numbers below the decimal point. Other parameters are set to their default values. 3-13 Section 3 Basic Application Methods 3.5 Product Height Measurement and OK/NG Judgement Advantages of Using the K3HB-S · The sampling hold function can be used together with a sync sensor to display and hold product heights. · The forced-zero function can be used for one-touch zero adjustment. · The position meter display can be used to display how far the measurement value deviates from the center.

· The dimensions of molded parts can be checked or caps that are not tight on PET bottles can be detected. Basic Application Methods Checking Dimensions after Press-fitting Displacement Sensor Z4W-V25R Forced-zero pushbutton switch Sync Sensor E3X-DA11-N K3HB-S Displacement Sensor Z4W-V25R Forced-zero pushbutton switch Sync Sensor E3X-DA11-N 24 VDC + - Blue Brown Black K3HB-S Operating power supply Operating power supply TIMING Input A COM + - ZERO COM Connected internally. Black Shield wire Brown Blue 3-14 3.5 Product Height Measurement and OK/NG Judgement 2 mm Shape of workpiece R Far Displacement sensor output Near Sync sensor ON OFF Insufficient press-fitting Press-fitting omitted 3 mm K3HB-S Display 0. 00 2. 00 -3. 00 K3HB-S Comparative outputs PASS H LL Basic Application Methods K3HB-S Setting Details RUN Level Parameter Comparative set value HH Comparative set value H Comparative set value L Comparative set value LL Characters Set value 3. 00 2. 00 -2. 00 -3.

00 Example of monitoring in two stages, at the ±2 mm and ±3 mm from the reference. Remarks Check on the status displays. Initial Setting Level (L 0) Parameter Calculation Input type A Scaling input value A1 Scaling display value A1 Scaling input value A2 Scaling display value A2 Decimal point position Characters Set value cal in-ta inp. a 1 dsp. a 1 inp.

a2 dsp. a2 dp 0 4-20 4. 000 Z4W-V25R Output (mA) Remarks A -4. 00 20. 000 20 4 4.

00 ,,,. ,, -4 0 4 Displacement (mm) Input Adjustment Level (L 1) Parameter Timing hold Characters Set value tmg-h s-h Remarks Sampling hold 3-15 Section 3 Basic Application Methods Display Adjustment Level (L 2) Parameter Position meter type Position meter upper limit Position meter lower limit Characters Set value pos-t pos-h dev 4. 00 Remarks Deviation display pos-l -4. 00 Full-scale ±4 mm Other parameters are set to their default values.

Basic Application Methods 3-16 3.6 Panel Thickness Inspection 3.6 Panel Thickness Inspection Advantages of Using the K3HB-S · Calculation mode K-(A+B) can be used to convert panel thickness to actual size and measure it from the outputs of two displacement sensors. · The forced-zero function can be used for one-touch deviation measurement from a reference panel thickness. Displacement Sensor Z4W-V25R Forced-zero pushbutton switch Basic Application Methods K3HB-S 24 VDC + - Forced-zero pushbutton switch K3HB-S Operating power supply Operating power supply Input B Input A COM + - ZERO COM Black Black Shield wire Brown Blue Sensor A 25 Brown Blue Units (mm) Sensor B 25 20 Displacement Sensor Z4W-V25R 3-17 Section 3 Basic Application Methods Workpiece dimensions 21 20 Panel thickness OK 19 Panel too thin Panel too thick A+B Sum of distances measured by two Z4W-V25R Sensors K3HB-S display When K = 70.00 49.

00 21. 00 50. 00 20. 00 51. 00 19. 00 H Comparative outputs Basic Application Methods PASS L K3HB-S Settings Details RUN Level Parameter Comparative set value H Comparative set value L Characters Set value 20. 50 19. 50 Remarks Monitoring a difference of ±0.5 mm for a reference panel thickness of 20 mm Check on the status displays. 3-18 3.
6 Panel Thickness Inspection Initial Setting Level (L 0) Parameter Calculation Input type A Scaling input value A1 Scaling display value A1 Scaling input value A2 Scaling display value A2 Input type B Scaling input value B1 Scaling display value B1 Scaling input value B2 Scaling display value B2 Constant K Characters Set value cal in-ta inp. a 1 dsp. a 1 inp. a2 dsp. a2 in-tb inp.
b1 dsp. b1 inp. b2 dsp. b2 k 5 4-20 4. 000 2100 20.
000 2900 4-20 4. 000 2100 20. 000 2900 7000 Reference panel thickness 20 mm + sensor displacement 25 mm × 2 4 -4 0 4 Displacement (mm) Remarks K-(A+B) Z4W-V25R Output (mA) 20 Basic Application Methods Decimal point position dp ,,,. ,, Input Adjustment Level (L 1) Parameter Timing hold Characters Set value tmg-h nomal Normal Remarks Other parameters are set to their default values. 3-19 Section 3 Basic Application Methods 3.7 Measurement of Disk Eccentricity Advantages of Using the K3HB-S · The peak-to-peak hold function can be used for simple eccentricity measurement by measuring the difference between the maximum and minimum values for linear sensor signals that change continuously. · Measurements are taken during the timing input (pushbutton switch in diagram) is ON and the last result is held when it is OFF. · Applications such as measuring shaft eccentricity are possible. (Similar applications are possible for non-metallic objects using an ultrasonic displacement sensor.) Basic Application Methods Linear Proximity Sensor E2CA TIMING input pushbutton switch K3HB-S Linear Proximity Sensor E2CA 24 VDC + - 0V K3HB-S Operating power supply Operating power supply Linear output 0V (+) TIMING 12 V Input A COM + Connected internally.

COM Pushbutton switch (Measures only while ON.) 3-20 3.7 Measurement of Disk Eccentricity 1 rotation Status of workpiece Linear Proximity Sensor output Far A Near Pushbutton switch ON OFF ON while rotating once or more. Basic Application Methods K3HB-S display (Reset status) When the workpiece has rotated once or more, the desired value A is measured. A K3HB-S Setting Details Initial Setting Level (L 0) Parameter Calculation Input type A Scaling input value A1 Scaling display value A1 Scaling input value A2 Scaling display value A2 Decimal point position Characters Set value cal in-ta inp. a 1 dsp. a 1 inp. a2 dsp. a2 dp 0 4-20 4. 000 E2CA Remarks A 0.
40 20. 000 Output (mA) 20 4 2. 00 ,,,. ,, 0.4 2 Displacement (mm) Input Adjustment Level (L 1) Parameter Timing hold Characters Set value tmg-h p-p Remarks Peak-to-peak hold Other parameters are set to their default values.
3-21 Section 3 Basic Application Methods 3.8 Step Inspection Advantages of Using the K3HB-S · Calculation mode A-B can be used to measure steps using two displacement sensors. · The forced-zero function can be used to easily adjust the reference step dimension to the actual object. · The effects of carrier line movement can be eliminated using a normal dimensions check to measure the dimensions between the workpiece surface and the carrier line surface. Checking Molded Parts Dimensions Basic Application Methods Displacement Sensor Z4W-V25R Forced-zero pushbutton switch K3HB-S Sync Sensor E3Z-D62 24VDC + - Sync Sensor E3Z-D62 Blue K3HB-S Operating power supply Operating power supply TIMING Forced-zero pushbutton switch Brown Black Input B Input A COM + - ZERO COM Black Black Connected internally.
Displacement Sensor Z4W-V25R Shield wire Brown Blue Sensor B Sensor A Brown Blue Units (mm) 2 3-22 3.8 Step Inspection Displacement sensor B Displacement sensor A 3.00 2.80 3.20 (20 mA) 29 mm Displacement sensor (12 mA) 25 mm (A) output (4 mA) 21 mm (20 mA) 29 mm Displacement sensor (12 mA) 25 mm (B) output (4 mA) 21 mm Sync sensor output ON K3HB-S display OFF ON (Carrier movement) 26.0 mm 25.6 mm 26.4 mm (Carrier movement) 23.0 mm 22.8 mm 23.

*2 mm 3. 00 H 2. 80 3. 20 Basic Application Methods OFF ON OFF K3HB-S comparative outputs PASS L ON OFF * The previous judgement result is held until the Sync Sensor turns ON. (All outputs turn OFF when RESET input is received.) K3HB-S Setting Details RUN Level Parameter Comparative set value H Comparative set value L Characters Set value 2. 50 1. 50 Remarks Monitoring a difference of ±0.5 mm for a reference step of 2 mm Check on the status displays. 3-23 Section 3 Basic Application Methods Initial Setting Level (L 0) Parameter Calculation Input type A Scaling input value A1 Scaling display value A1 Scaling input value A2 Scaling display value A2 Characters Set value cal in-ta inp.*
a 1 dsp. a 1 inp. a2 dsp. a2 in-tb inp. b1 dsp.
b1 inp. b2 dsp. b2 dp 4 4-20 4. 000 2100 20. 000 2900 4-20 4.
000 2100 20. 000 2900 ,,,. ,, 4 -4 0 4 Displacement (mm) Remarks A-B Z4W-V25R Output (mA) 20 Basic Application Methods Input type B Scaling input value B1 Scaling display value B1 Scaling input value B2 Scaling display value B2 Decimal point position Input Adjustment Level (L 1) Parameter Timing hold Characters Set value tmg-h s-h Remarks Sampling hold Other parameters are set to their default values. 3-24 Section 4 Initial Setup 4.1 4.2 4.3 4.4 K3HB-X Initial Setup Example (K3HB-XVD)...

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..... K3HB-V Initial Setup Example (K3HB-VLC) ...

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..... K3HB-H Initial Setup Example (K3HB-HTA) ...

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