

T-VER-E50B2**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Follow safe electrical work practices. See NFPA 70E in the USA, or applicable local codes.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Read, understand and follow the instructions before installing this product.
- Turn off all power supplying equipment before working on or inside the equipment.
- Any covers that may be displaced during the installation must be reinstalled before powering the unit.
- Use a properly rated voltage sensing device to confirm power is off.

DO NOT DEPEND ON THIS PRODUCT FOR VOLTAGE INDICATION

Failure to follow these instructions will result in death or serious injury.

NOTICE

- This product is not intended for life or safety applications.
- Do not install this product in hazardous or classified locations.
- The installer is responsible for conformance to all applicable codes.
- Mount this product inside a suitable fire and electrical enclosure.

FCC PART 15 INFORMATION

Note: This equipment has been tested by the manufacturer and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference in which case the user will be required to correct the interference at his own expense. Modifications to this product without the express authorization of Veris Industries nullify this statement.

For use in a Pollution Degree 2 or better environment only. A Pollution Degree 2 environment must control conductive pollution and the possibility of condensation or high humidity. Consider the enclosure, the correct use of ventilation, thermal properties of the equipment, and the relationship with the environment. Installation category: CAT II or CAT III

Provide a disconnect device to disconnect the meter from the supply source. Place this device in close proximity to the equipment and within easy reach of the operator, and mark it as the disconnecting device. The disconnecting device shall meet the relevant requirements of IEC 60947-1 and IEC 60947-3 and shall be suitable for the application. In the US and Canada, disconnecting fuse holders can be used. Provide overcurrent protection and disconnecting device for supply conductors with approved current limiting devices suitable for protecting the wiring. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.



This symbol indicates an electrical shock hazard exists.



Documentation must be consulted where this symbol is used on this product.

T-VER-E50B2**Compact Power and Energy Meter****Installer's Specifications**Measurement Accuracy:

Real Power and Energy	IEC 62053-22 Class 0.5S, ANSI C12.20 0.5%
Reactive Power and Energy	IEC 62053-23 Class 2, 2%
Current	0.4% (+0.015% per °C deviation from 25°C) from 5% to 100% of range; 0.8% (+0.015% per °C deviation from 25°C) from 1% to 5% of range
Voltage	0.4% (+0.015% per °C deviation from 25°C) from 90V (L-N) to 600VAC (LL)
Sample Rate	2520 samples per second
Data Update Rate	1 sec
Type of Measurements	True RMS up to the 21st harmonic 60 Hz, One to three phase AC system

Input Voltage Characteristics:

Measured AC Voltage	Minimum 90V _{L-N} (156V _{L-L}) for stated accuracy UL Maximums: 600V _{L-L} (347V _{L-N}) CE Maximums: 300V _{L-N} (520V _{L-L})
Metering Over Range	+20%
Impedance	2.5 MΩ (L-N)/5 MΩ (L-L)
Frequency Range	45 to 65 Hz

Input Current Characteristics:

CT Scaling	Primary: Adjustable from 5 A to 32,000 A
Measurement Input Range	0 to 0.333VAC or 0 to 1.0VAC (+20% over-range)
Impedance	10.6kΩ (1/3 V mode) or 32.1kΩ (1 V mode)

Control Power:

AC	5VA max.; Minimum 90VAC, UL Maximums: 600V _{L-L} (347V _{L-N}), CE Maximums: 300V _{L-N} (520V _{L-L})
DC*	3W max.; UL and CE: 125 to 300VDC
Ride Through Time	100 msec at 120VAC

Output:

Amp Hour	N.C., static output (30VAC/DC, 100mA max. @ 25°C, derate 0.56mA per °C above 25°C)
Real/Reactive Energy	N.O., static output (30VAC/DC, 100mA max. @ 25°C, derate 0.56mA per °C above 25°C)
Pulse Contacts	

Mechanical Characteristics:

Weight	0.62 lb (0.28 kg)
IP Degree of Protection (IEC 60529)	IP40 front display; IP20 Meter
Display Characteristics	Back-lit blue LCD
Terminal Block Screw Torque	0.37 ft-lb (0.5 N-m) nominal/0.44 ft-lb (0.6 N-m) max.
Terminal Block Wire Size	26 to 14 AWG (0.13 to 2.08 mm ²)
Rail	T35 (35mm) DIN Rail per EN50022

Environmental Conditions:

Operating Temperature	-30° to 70°C
Storage Temperature	-40° to 85°C
Humidity Range	<95% RH (non-condensing)
Altitude of Operation	3 km max.

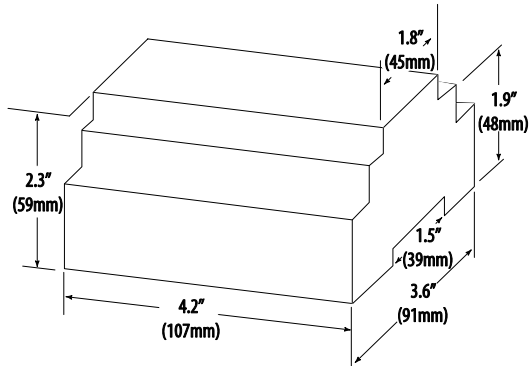
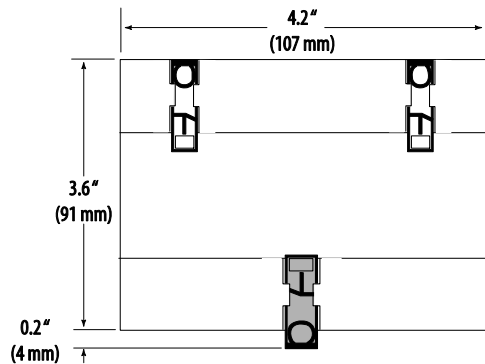
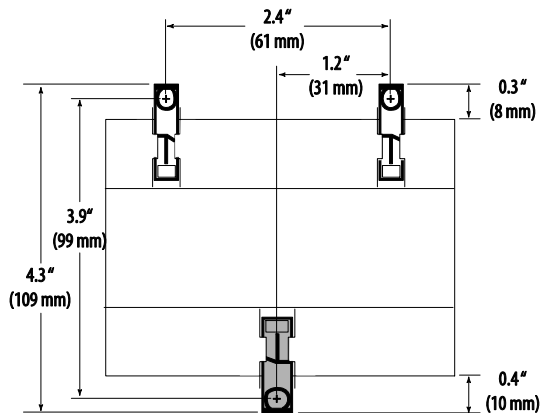
Metering Category:

North America	CAT III; for distribution systems up to 347 V L-N/600VAC L-L
CE	CAT III; for distribution systems up to 300 V L-N
Dielectric Withstand	Per UL 508, EN61010
Conducted and Radiated Emissions	FCC part 15 Class B, EN55011/EN61000 Class B (residential and light industrial)
Conducted and Radiated Immunity	EN61000 Class A (heavy industrial)

Safety:

North America (cULus)	UL508 (open type device)/CSA 22.2 No. 14-05
Europe (CE)	EN61010-1:2001

* External DC current limiting is required, see fuse recommendations.

DIMENSIONSHousingBottom View (DIN Mount Configuration)Bottom View (Screw Mount Configuration)**OPERATION**

The E50B2 DIN Rail Power Meter provides a solution for measuring energy data with a single device. Inputs include Control Power, CT, and 3-phase voltage. The LCD screen on the faceplate allows instant output viewing.

The meter is housed in a plastic enclosure suitable for installation on T35 DIN rail according to EN50022. The E50 can be mounted with any orientation over the entire ambient temperature range, either on a DIN rail or in a panel. The meter is not sensitive to CT orientation to reduce installation errors.

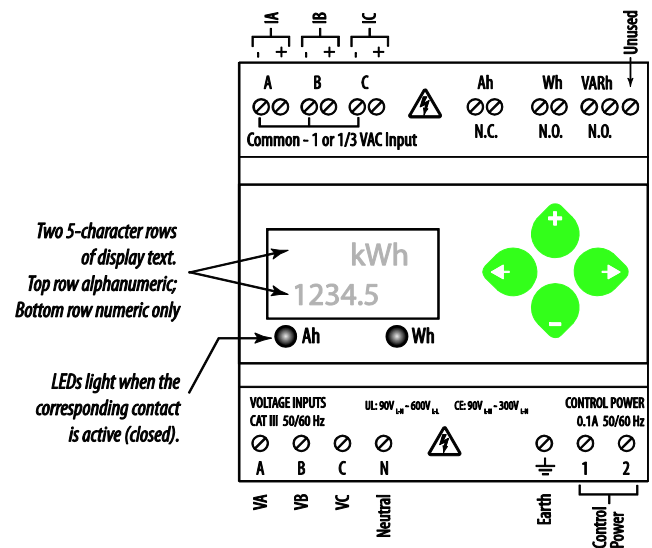
DATA OUTPUTS

Native:

- Volt Ampere Reactive Hour (VARh)
- Watt Hours (Wh)
- Ampere Hour (Ah)

Derived in HOBOWare®:

- True Power (Watts)
- True Power (KW)
- Kilowatt Hours (KWh)
- Reactive Power (VAR)
- Volt-Amps (VA)
- Volts (V)
- Amps (A)
- Power Factor (PF)

PRODUCT DIAGRAM

INSTALLATION

Disconnect power prior to installation.



Any covers that may be displaced during the installation must be reinstalled before powering the unit.

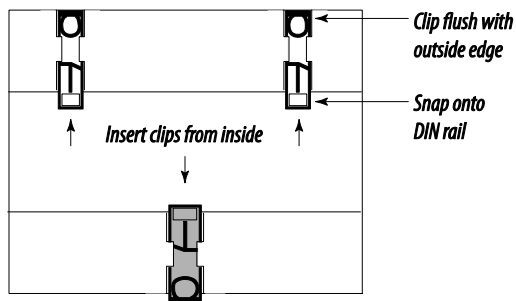
Mount the meter in an appropriate electrical enclosure near equipment to be monitored.

Do not install on the load side of a Variable Frequency Drive (VFD).

The meter can be mounted in two ways: on standard 35 mm DIN rail or screw-mounted to the back of the enclosure.

A. DIN Rail Mounting

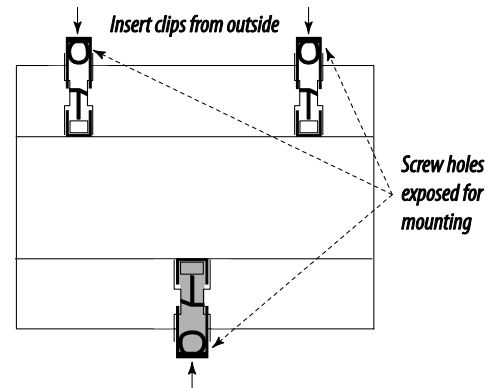
1. Attach mounting clips to the underside of the housing by sliding them into the slots from the inside. The stopping pegs must face the housing, and the outside edge of the clip must be flush with the outside edge of the housing.
2. Snap the clips onto the DIN rail. See diagram of the underside of the meter.



3. To prevent horizontal shifting across the DIN rail, use two end stop clips.

B. Screw Mounting

1. Attach the mounting clips to the underside of the housing by sliding them into the slots from the outside. The stopping pegs must face the housing, and the screw hole must be exposed on the outside of the housing.
2. Use three #8 screws (not supplied) to mount the meter to the back of the enclosure. See diagram of the underside of the meter.

**SUPPORTED SYSTEM TYPES**

The E50B2 meter has a number of different possible system wiring configurations (see Wiring Diagrams, page 5–6). To configure the meter, set the System Type via the User Interface. The System Type tells the meter which of its current and voltage inputs are valid, which are to be ignored, and if neutral is connected. Setting the correct System Type prevents unwanted energy accumulation on unused inputs, selects the formula to calculate the Theoretical Maximum System Power, and determines which phase loss algorithm is to be used. The phase loss algorithm is configured as a percent of the Line-to-Line System Voltage (except when in System Type 1L + 1n) and also calculates the expected Line to Neutral voltages for system types that have Neutral (System Types 2L + 1N and 3L + 1n).

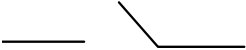



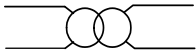
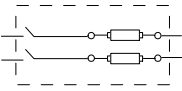
Values that are not valid in a particular System Type will display as “----” on the User Interface

No. of wires	CTs		Voltage Connections			System Type	Phase Loss Measurements			Wiring Diagram
	Qty	ID	Qty	ID	Type	User Interface: SETUP>S SYS	VLL	VLN	Balance	Diagram Number
2	1	A	2	A, N	L-N	1L + 1n		AN		1
2	1	A	2	A, B	L-L	2L	AB			2
3	2	A,B	3	A, B, N	L-L with N	2L + 1n	AB	AN, BN	AN, BN	3
3	3	A, B,C	3	A, B, C	Delta	3L	AB, BC, CA		AB, BC, CA	4
4	3	A, B, C	4	A, B, C, N	Grounded Wye	3L + 1n	AB, BC, CA	AN, BN, CN	AN, BN, CN & AB, BC, CA	5, 6

WIRING

To avoid distortion, use parallel wires for control power and voltage inputs.

The following symbols are used in the wiring diagrams on the following pages.

Symbol	Description
	Voltage Disconnect Switch
	Fuse (installer is responsible for ensuring compliance with local requirements. No fuses are included with the meter.)
	Earth ground
	Current Transducer
	Potential Transformer
	Protection containing a voltage disconnect switch with a fuse or disconnect circuit breaker. The protection device must be rated for the available short-circuit current at the connection point.

CAUTION**RISK OF EQUIPMENT DAMAGE**

- This product is designed only for use with 1V or 0.33V current transducers (CTs).
- DO NOT USE CURRENT OUTPUT (e.g. 5A) CTs ON THIS PRODUCT.
- Failure to follow these instructions can result in overheating and permanent equipment damage.

WIRING DIAGRAMS

⚠ WARNING ⚡

RISK OF ELECTRIC SHOCK OR PERMANENT EQUIPMENT DAMAGE

CT negative terminals are referenced to the meter's neutral and may be at elevated voltages

- Do not contact meter terminals while the unit is connected
- Do not connect or short other circuits to the CT terminals

Failure to follow these instructions may cause injury, death or equipment damage.

CTs are not polarity sensitive. No need to observe orientation.

Diagram 1: 1-Phase Line-to-Neutral 2-Wire System 1 CT
SYSTEM TYPE 1L + 1n

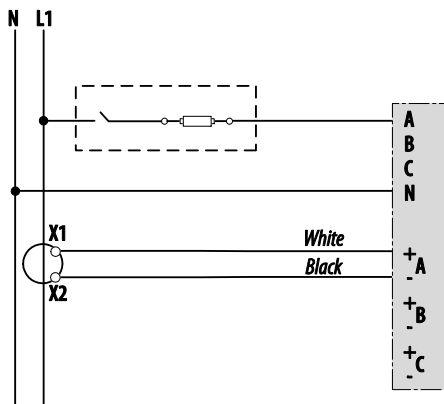


Diagram 2: 1-Phase Line-to-Line 2-Wire System 1 CT
SYSTEM TYPE 2L

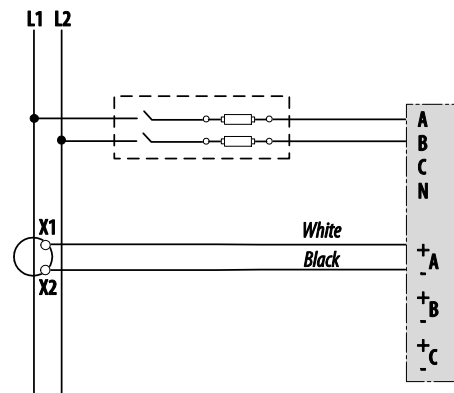


Diagram 3: 1-Phase Direct Voltage Connection 2 CT
SYSTEM TYPE 2L + 1n

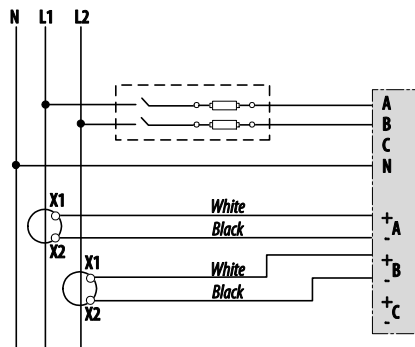


Diagram 4: 3-Phase 3-Wire System 3 CT no PT
SYSTEM TYPE 2L + 1n

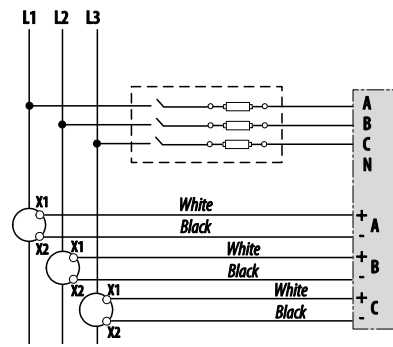


Diagram 5: 3-Phase 4-Wire Wye Direct Voltage Input Connection 3 CT
SYSTEM TYPE 3L + 1n

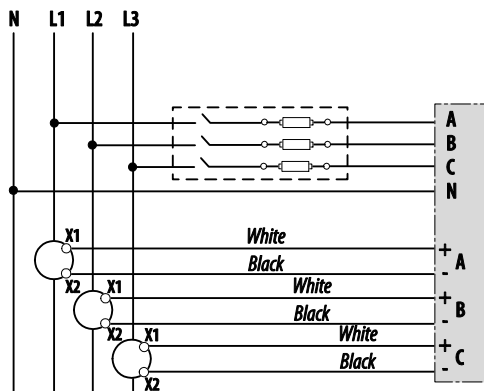
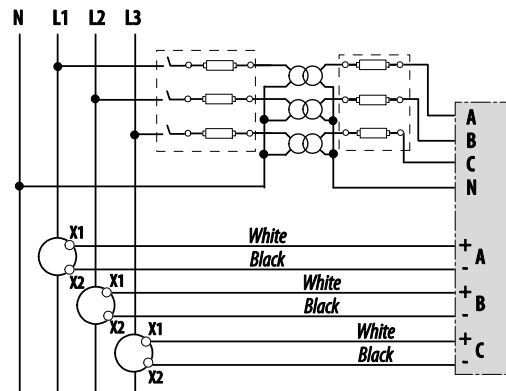
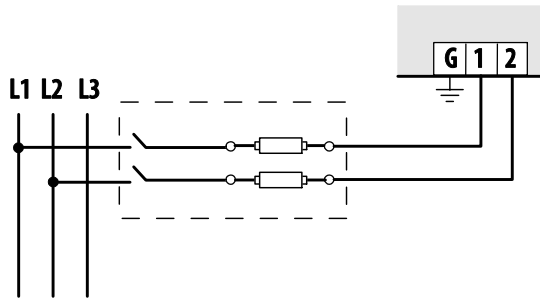


Diagram 6: 3-Phase 4-Wire Wye Connection 3 CT 3 PT
SYSTEM TYPE 3L + 1n



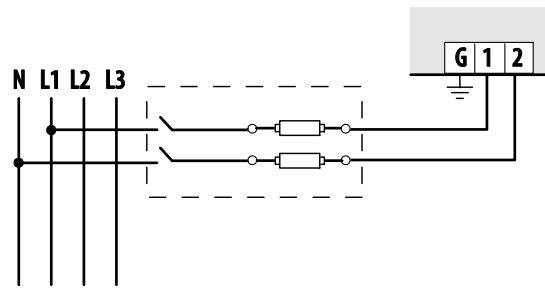
CONTROL POWER

Direct Connect Control Power
Line to Line (L-L)



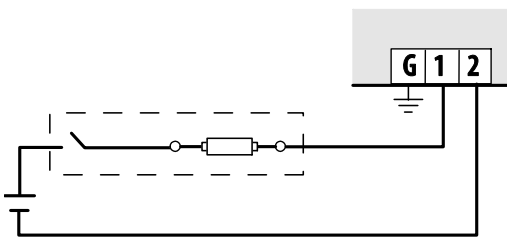
Line to Line from 90VAC to 600VAC (UL) (520VAC for CE). In UL installations, the lines may be floating (such as a delta). If any lines are tied to an earth (such as a corner grounded delta), see the Line to Neutral installation limits. In CE compliant installations, the lines must be neutral (earth) referenced at less than 300VAC_{L-N}.

Direct Connect Control Power
Line to Neutral (L-N)



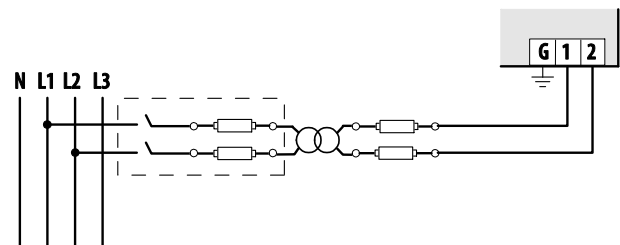
Line to Neutral from 90VAC to 347 VAC (UL) or 300VAC (CE)

Direct Connect Control Power DC



DC Control Power from 125VDC to 300VDC (UL and CE max.)

Control Power Transformers (CPT) Connection



The Control Power Transformer may be wired L-N or L-L. Output to meet meter input requirements.

Fuse Recommendations:

Keep the fuses close to the power source (obey local and national code requirements).

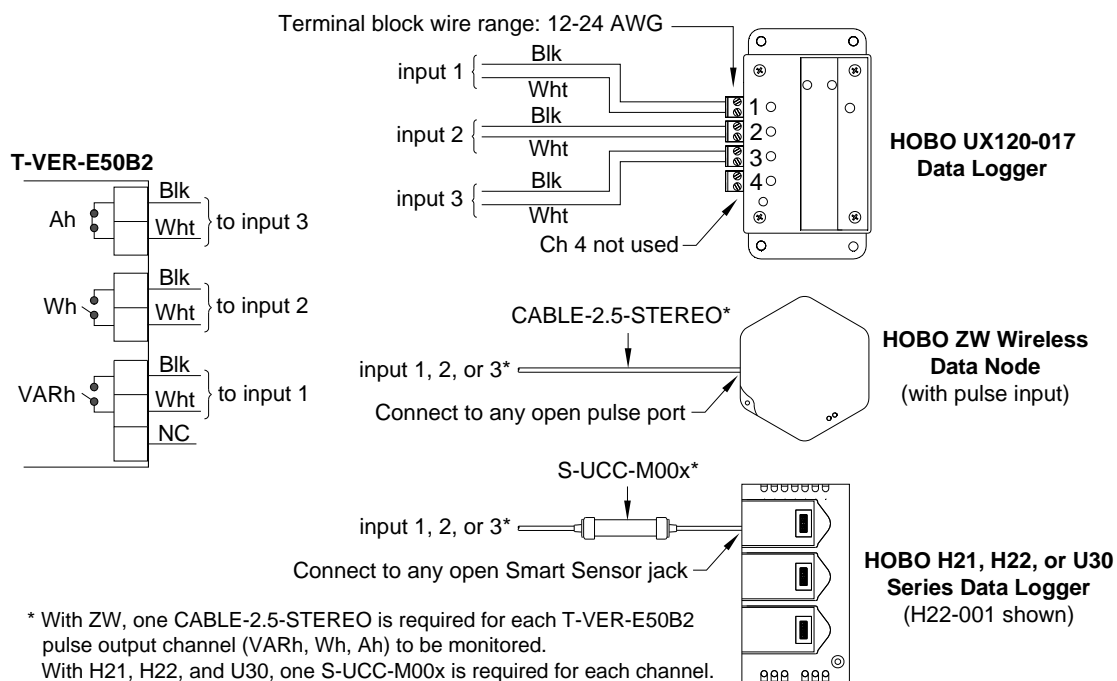
For selecting fuses and circuit breakers, use the following criteria:

- Current interrupt capacity should be selected based on the installation category and fault current capability.
- Over-current protection should be selected with a time delay.
- The voltage rating should be sufficient for the input voltage applied.
- Provide overcurrent protection and disconnecting means to protect the wiring. For DC installations, the installer must provide external circuit protection (suggested: 0.5 A time delay fuses).

The earth connection is required for electromagnetic compatibility (EMC) and is not a protective earth ground.

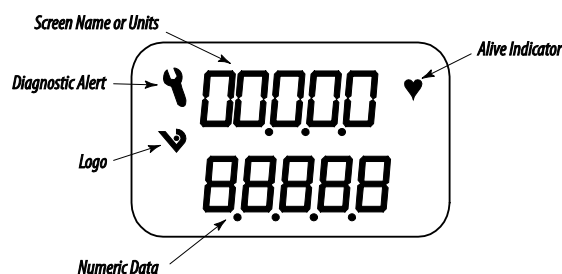
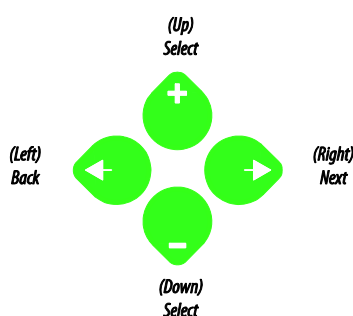
CONNECTING TO THE T-VER-E50B2

The T-VER-E50B2 has three outputs. These outputs can be connected to HOBO loggers as shown below.



Notes when connecting to non-HOBO® devices:

- The T-VER-E50B2 has solid-state outputs rated for 30VAC/DC nom.
- VARh and Wh are normally open; Ah is normally closed.
- Maximum load current is 100mA at 25°C. Derate 0.56mA per °C above 25°C (e.g. 86mA@50°C).
- The over-current protective device must be rated for the short circuit current at the connection point.
- Pulse outputs are only intended to be connected to non-hazardous voltage circuits (SELV or Class 2). Do not connect to hazardous voltages.

DISPLAY SCREEN DIAGRAM**LCD Screen:****Buttons:****QUICK SETUP INSTRUCTIONS**

These instructions assume the meter is set to factory defaults. If it has been previously configured, all optional values should be checked.

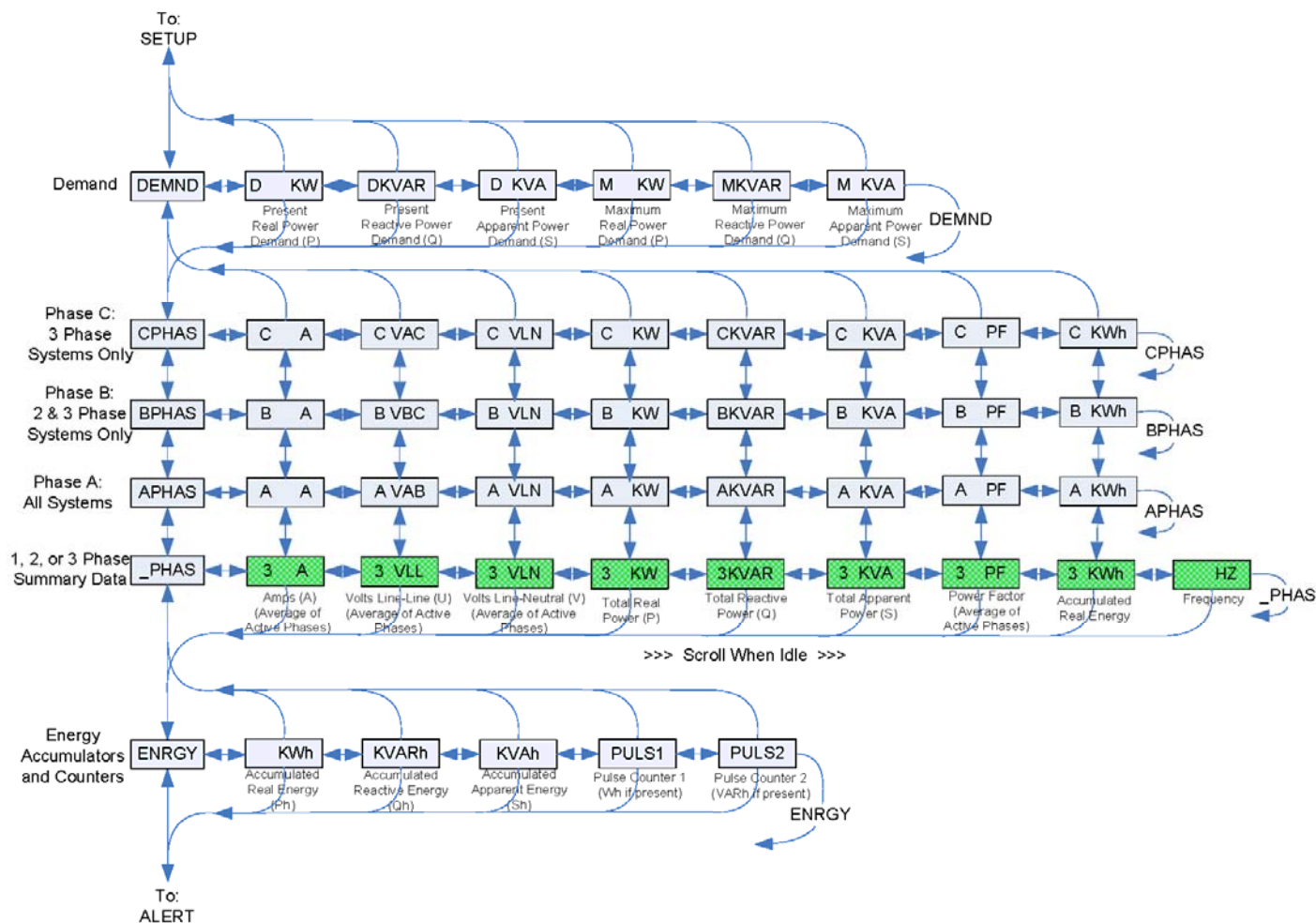
1. Press or repeatedly until SETUP screen appears.
2. to the PASWD screen.
3. through the digits. Use or to select the password (the default is 00000). Exit the screen to the right.
4. to the S CT (Set Current Transducer) screen.
 - a. to the CT V screen. Use or to select the voltage mode Current Transducer output voltage.
 - b. to the CT SZ screen and through the digits. Use or to select the CT size in amps.
 - c. back to the S CT screen.
5. to the S SYS (Set System) screen.
 - a. to the SYSTM screen. Use or to select the System Type (see wiring diagrams on pages 9–10).
 - b. back to the S SYS screen.
6. (Optional) to the S PT (Set Potential Transformer) screen. If PTs are not used, then skip this step.
 - a. to the RATIO screen and through the digits. Use or to select the Potential Transformer step down ratio.
 - b. back to the S PT screen.
7. to the S PWR (Set System Power) screen.
 - a. to the MX MW screen, which displays the calculated Maximum System Power for your reference.
 - b. back to the S PWR screen.
8. to the S PULS (Set Pulse) screen to set the scaling factors for Wh, VARh, and mAh.
 - a. to Wh/P screen. Use or to set the Wh and VARh per pulse (the default is 1).
 - b. to mAh/P screen. Use or to set the mAh per pulse (the default is 10).
 - c. to the mS/P screen, which displays the Pulse Duration Time for your reference (use 10 mS/P for HOBO products).
 - d. back to the S PULS screen.
9. Use to exit the setup screen and then SETUP.
10. Check that the wrench is not displayed on the LCD.
 - a. If the wrench is displayed, use or to find the ALERT screen.
 - b. through the screens to see which alert is on.

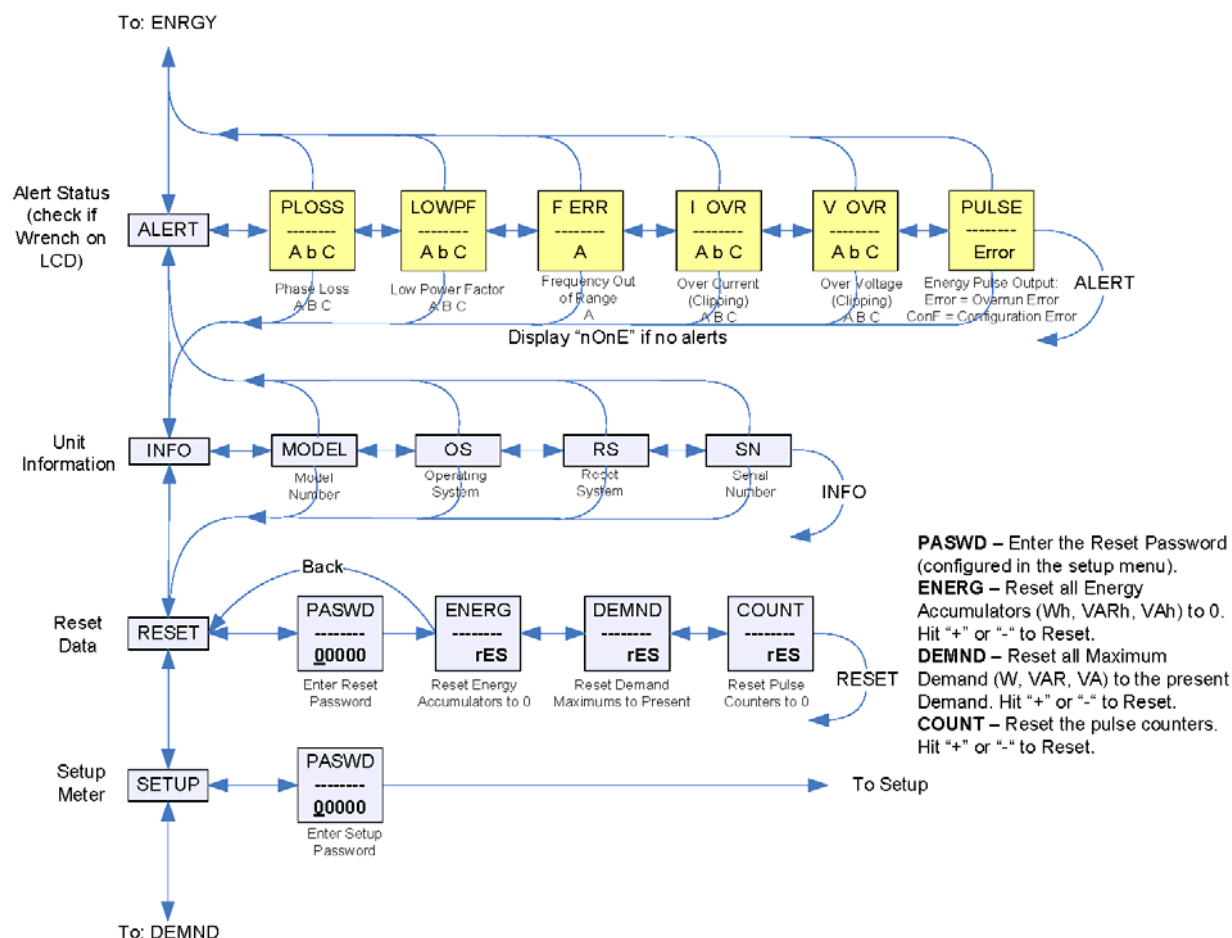
For full setup instructions, see the configuration instructions on the following pages.

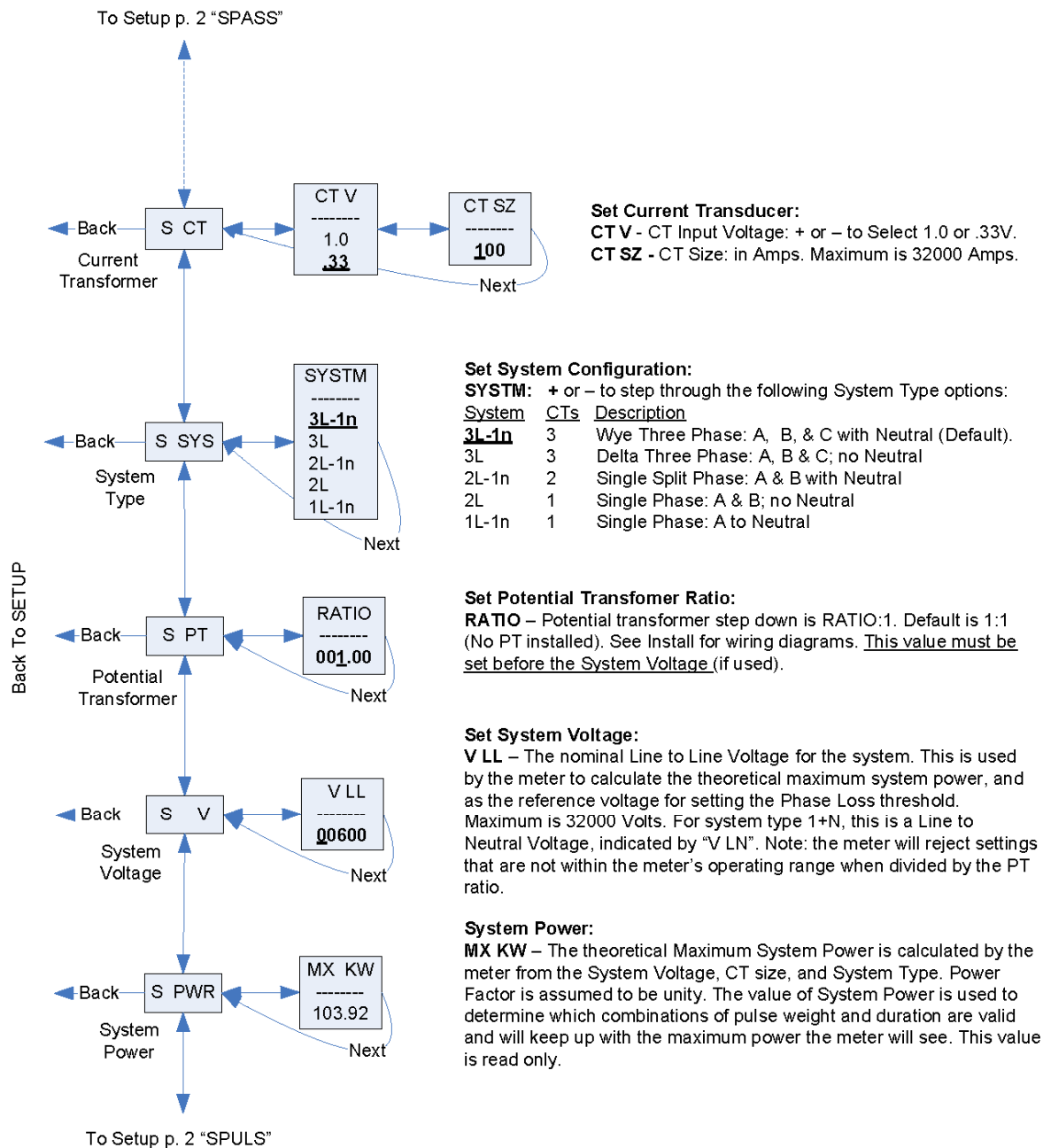
UI MENU ABBREVIATIONS DEFINED

The user can set the display mode to IEC or IEEE notation in the SETUP menu.

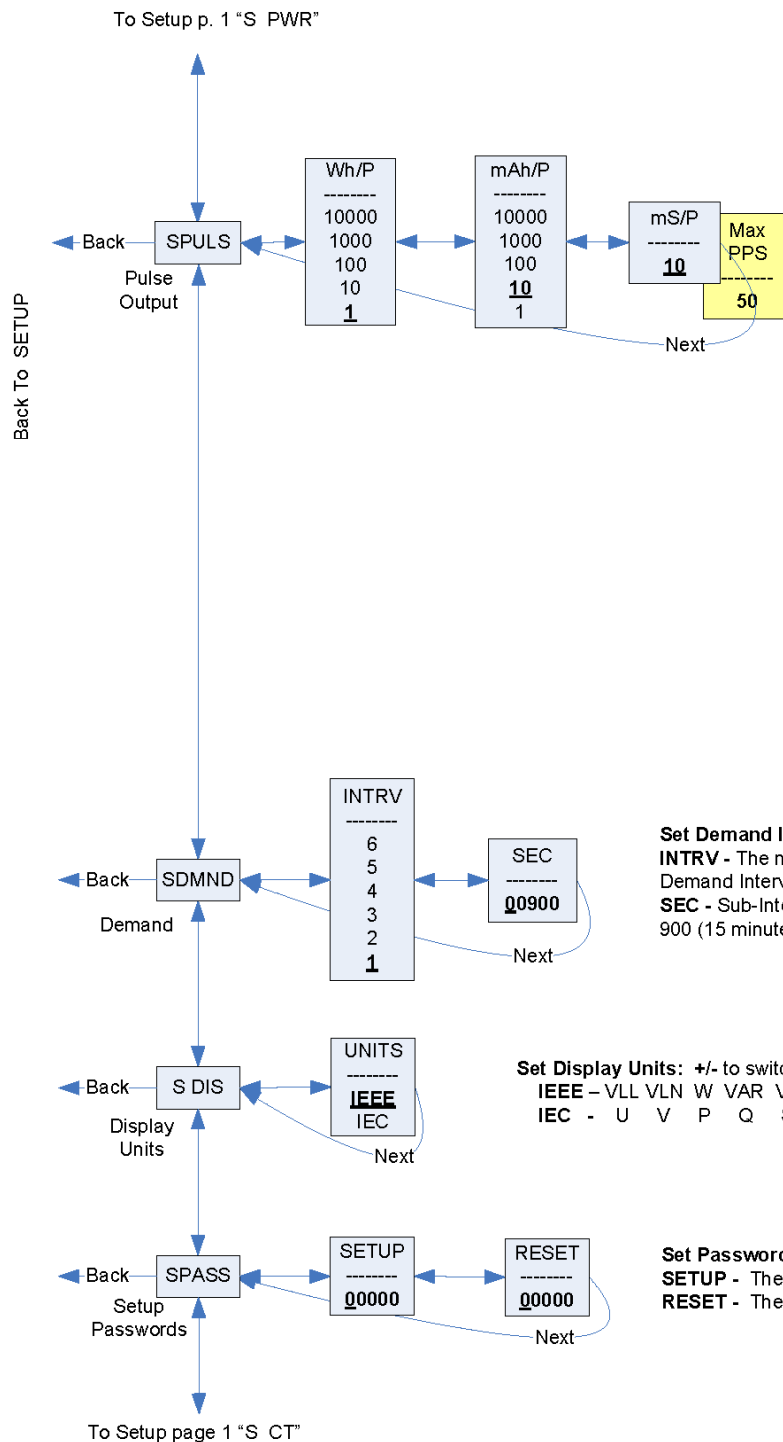
Main Menu		
IEC	IEEE	Description
D	D	Demand
MAX	M	Maximum Demand
P	W	Present Real Power
Q	VAR	Present Reactive Power
S	VA	Present Apparent Power
A	A	Amps
UAB, UBC, UAC	VAB, VBC, VAC	Voltage Line to Line
V	VLN	Voltage Line to Neutral
PF	PF	Power Factor
U	VLL	Voltage Line to Line
HZ	HZ	Frequency
kSh	kVAh	Accumulated Apparent Energy
kQh	kVARh	Accumulated Reactive Energy
kPh	kWh	Accumulated Real Energy
PLOSS	PLOSS	Phase Loss
LOWPF	LOWPF	Low Power Factor Error
F ERR	F ERR	Frequency Error
I OVR	I OVR	Over Current
V OVR	V OVR	Over Voltage
PULSE	PULSE	kWh Pulse Output Overrun (configuration error)
_PHASE	_PHASE	Summary Data for 1, 2, or 3 active phases
ALERT	ALERT	Diagnostic Alert Status
INFO	INFO	Unit Information
MODEL	MODEL	Model Number
OS	OS	Operating System
RS	RS	Reset System
SN	SN	Serial Number
RESET	RESET	Reset Data
PASWD	PASWD	Enter Reset or Setup Password
ENERG	ENERG	Reset Energy Accumulators
DEMND	DEMND	Reset Demand Maximums

USER INTERFACE FOR DATA CONFIGURATION

USER INTERFACE FOR DATA CONFIGURATION (continued)

USER INTERFACE FOR SETUP

Note: **Bold** is the Default.

USER INTERFACE FOR SETUP (continued)**Set Pulse:**

The System Type, CT size, PT Ratio, and System Voltage must all be configured before setting the Pulse Energy. If any of these parameters are changed, the meter will hunt for a new Pulse Duration, but will not change the Pulse Energy. If it cannot find a solution, the meter will display the wrench, show "ConF" in the ALARM -> PULSE screen, and enable Energy pulse output configuration error bit in the Modbus Diagnostic Alert Bitmap (if equipped). The Triple Pulse Output Meter is locked at 10mS per pulse duration.

Wh/P - Set Pulse Energy: In In Watt Hours (& VAR Hours) per Pulse. When moving down to a smaller energy, the meter will not allow the selection if it cannot find a pulse duration that will allow the pulse output to keep up with Theoretical Maximum System Power (see S_PWR screen). When moving up to a larger energy, the meter will jump to the first value where it can find a valid solution.

mAh/P - Set Pulse Energy: In milliamp hours per pulse, (1000 mAh = 1 Ah). When moving down to a smaller Amp- Hours, the meter will not allow the selection if it cannot keep up with Theoretical Maximum Current, calculated as the number of CT inputs (set by the system type, see S_SYS) multiplied by the CT size (see S_CT). When moving up to a larger value, the meter will jump to the first value where it can find a valid solution.

mS/P - Minimum Pulse Duration Time: This read only value is fixed at 10ms per closure. The open time is greater than or equal to the closure time. The maximum Pulses Per Second (PPS) is shown in yellow.

Set Demand Interval:

INTRV - The number of Sub-Intervals (1 to 6) in a Demand Interval. Default is 1 (block demand).

SEC - Sub-Interval length in seconds. Default is 900 (15 minutes).

Set Display Units: +/- to switch between:

IEEE - VLL VLN W VAR VA Units.

IEC - U V P Q S Units.

Set Passwords:

SETUP - The Password to enter the SETUP menu.

RESET - The Password to enter the RESET menu.

TROUBLESHOOTING

Problem	Cause	Solution
The display is blank after applying control power to the meter.	The meter is not receiving adequate power.	Verify that the meter control power is receiving the required voltage. Verify that the heart icon is blinking. Check the fuse.
The data displayed is inaccurate.	Incorrect setup values	Verify the values entered for power meter setup parameters (CT and PT ratings, system type, etc.). See the Setup section.
	Incorrect voltage inputs	Check power meter voltage input terminals to verify adequate voltage.
	Power meter is wired improperly.	Check all CTs and PTs to verify correct connection to the same service, PT polarity, and adequate powering. See the Wiring Diagrams section for more information.

CHINA ROHS COMPLIANCE INFORMATION (EFUP TABLE)

部件名称	产品中有害有毒物质或元素的名称及含量Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
电子线路板	X	0	0	0	0	0
0 = 表示该有害有毒物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。 X = 表示该有害有毒物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的限量要求。						
Z000057-0A						