3VMS

3-Phase Voltage Monitor and Surge Protector

INSTALLATION, OPERATION & APPLICATION GUIDE

For more information on our complete range of American-made products – plus wiring diagrams, troubleshooting tips and more, visit us at **www.icmcontrols.com**

MADE IN AMERICA

GENERAL INSTALLATION

CAUTION: Remove all power at the main service panel before installing or servicing the 3VMS by switching off the appropriate breaker or removing the appropriate fuse.

1. With the 3VMS enclosure in a vertical position, drill an appropriately sized hole for the appropriate waterproof whip (NEMA rated waterproof wire raceway) you will be using.
2. Mount the appropriate NEMA rated waterproof wire raceway to the 3VMS enclosure.
3. Mount the four feet which come with the enclosure to the four corner holes in the bottom of the enclosure.
4. Lay the 3VMS against the desired mounting location and using appropriate hardware, fasten the 3VMS to the desired location through the holes in the feet.
5. Bring Line voltage 208VAC power wires to the contactor input (L_1, L_2 and L_3) and wire your equipment load wires to the contactor output (T_1, T_2 and T_3) as seen in the System Diagram.
6. Connect the incoming source ground to the ground bus. Attach a ground wire from the ground bus to the chassis ground.

IMPORTANT SAFETY INFORMATION

WARNING! : ELECTRICAL SHOCK HAZARD – ***Before installing this unit, turn off power at the main service panel by removing the fuse or switching the appropriate circuit breaker to the OFF position.***

- ***This control should be installed by a trained professional***
- ***Incorrect installation can cause personal injuries, property damage or even death.***
- ***Follow all local & national codes while installing control.***
- ***WARNING — No Serviceable Parts (Attention: Aucune pièce remplaçable ou reparable).***
- ***WARNING — Shock hazard — Do not open (ATTENTION – RISQUE DE CHOC – NE PAS OUVRIR).***

ICM450A BUTTON FUNCTIONS

		SETUP	READ	FAULT
Press arrows to scroll through and select user parameter settings in Setup mode. HOLD down for fast edit.		Press to enter Setup mode and select user parameters.	Hold for voltage display a → b, b → c, a → c (simultaneously).	Press to read faults. Hold for 5 seconds to clear faults and reset memory.

Voltage Read Calibration

Hold down both the UP & Down buttons simultaneously to enter calibration mode (Fault and Setup LEDs will flash). Press the Up & Down buttons individually to adjust display voltage allowing a few seconds between presses for voltage averaging. Press READ to exit calibration.

GENERAL OPERATIONS

Upon installation and application of power, the 3VMS from ICM Controls will monitor the incoming line voltage for variations including phase loss, phase reversal, phase unbalance and over/under voltage conditions while providing continuous surge protection. If the voltage parameters are within the preset limits of the voltage monitor, the 3VMS will close the onboard contactor and power the load. If there is an over/under voltage, phase loss, phase reversal or phase unbalance caused by incoming voltage varying outside the preset parameters, the contactor will open and will not close again until the voltage parameters are back in range. The parameters of the ICM450A voltage monitor can be customized for specific operation but it is recommended to leave them at the preset values.

WARNING! Do not set the voltage setpoint of the ICM450A above 240VAC and no more than 10% over voltage or potential damage to 3VMS could occur.

The 3VMS will constantly monitor voltage surges and suppress surges within the limits of the ICM530 specifications. Once surge suppression capability is compromised, the LED on the ICM530 will stop illuminating and the ICM530 will require replacement.

3VMS PRODUCT SPECIFICATIONS

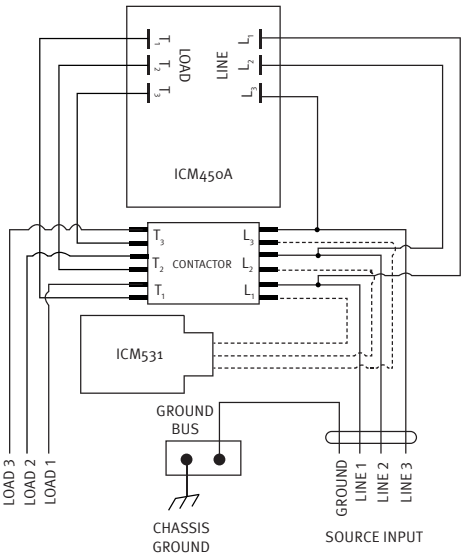
Input:
- **Frequency:** 50/60 Hz
- **Line voltage:** 208/240 VAC

Surge Protection:
- **Max Surge Protection:** 150,000 amps

Output
- **Type:** Relay, SPDT
- **Contactor:** 40A, 208/240VAC

Dimensions:
6.5"L x 4.75"W x 1.09"D

SYSTEM DIAGRAM



ICM 450A SPECIFICATIONS

ICM450A Programmable 3-Phase Line Voltage Monitor

The ICM450A 3-phase offering, provides superior motor protection from premature failure and damage caused by common voltage faults such as phase unbalance, over/under voltage, phase loss and phase reversal.

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Input:
- **Frequency:** 50/60 Hz
- **Control voltage:** 18-240 VAC

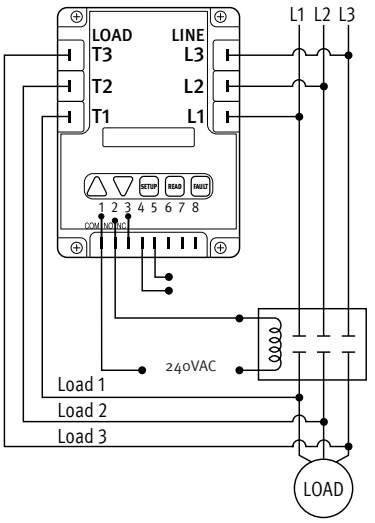
Output:
- **Type:** Relay, SPDT
- **Voltage range:** 277 VAC @ 6A, general purpose

Ambient Operating Temperature: -40ºF to +149ºF (-40ºC to +65ºC)

Storage Temperature: -40ºF to +185ºF (-40ºC to +80ºC)

Dimensions: 6.5"L x 4.75"W x 1.09"D

ICM 450A WIRING DIAGRAM



⚠ CAUTION!

Installation of the 3VMS shall be performed by trained technicians only. Adhere to all local and national electric codes.

Disconnect all power to the system before making any connections.

FAULT CONDITIONS

Press and release fault button to scroll through all saved faults.

⁂ **Note:** *For initial setup, press and hold FAULT for 5 seconds to remove any previously stored faults.*

Fault	Problem	Corrective Action
Back Phase Loss	Not all three of the phases on the load side are present	1. Re-energize the contactor. 2. If the fault reappears after the load energizes: a. Turn all power OFF b. Check all load side connections c. Check the contacts of the contactor for debris or excess carbon.
Back Phase Rev	Loads 1, 2, or 3 are not in sequence (not 120º phase shifted)	1. Turn OFF all power. 2. Swap any 2 phases on the load side of the **ICM450A** only (example: swap load 1 and load 2)* 3. Re-apply power.
Back Phase Unbalance	A voltage unbalance between the three load phases exceeds the unbalance setpoint	1. Press the **READ** button to observe the present load voltages. Check system for unbalance cause. 2. Increase the fault interrogation time if necessary. 3. Increase the percent unbalance setting if necessary.
Front Over Voltage	Average phase to phase voltage exceeds the maximum percentage	1. Check system for over-voltage cause. 2. Increase the percent over-voltage setting if necessary. 3. Increase the fault interrogation time if necessary.
Front Phase Loss	Not all three of the phases on the line side are present	1. Press and hold the **READ** button on the phase monitor or use an AC voltmeter to carefully measure all three phase to phase line voltages (***example:*** Line 1 ➔ Line 2, Line 2 ➔ Line 3, Line 3 ➔ Line 1). 2. Repair the missing phase.
Front Phase Reversal	Lines 1, 2, or 3 are not in sequence (not 120º phase shifted)	1. Turn OFF all power. 2. Swap any 2 phases on the line side of the **ICM450A** (example: swap Line 1 and Line 2)* 3. Re-apply power.
Front Phase Unbalance	A voltage unbalance between the three line phases exceeds the unbalance setpoint	1. Press the **READ** button to observe the present load voltages. Check system for unbalance cause. 2. Increase the fault interrogation time if necessary. 3. Increase the percent unbalance setting if necessary.
Front Under Voltage	Average phase to phase voltage is below the minimum percentage	1. Check system for under-voltage cause. 2. Increase the percent under-voltage setting if necessary. 3. Increase the fault interrogation time if necessary.

*** Only swap phases during initial setup, not after the ICM450A has been in operation without errors.**

SETTING THE PARAMETERS

1. Press the SETUP button to enter Setup mode. Setup LED will light.
2. Use the ﹀ and ﹀ arrows to change user parameters.
3. Scroll through setup by pressing and releasing the SETUP button.
4. When the last parameter has been set, the phase average will be displayed and the Setup LED will automatically turn OFF.

Note: The parameters of the 3VMS voltage monitor are preset. Use caution when adjusting the over/ under voltage parameters and the unbalance parameters not to exceed 240VAC and 10 % unbalance or damage to the internal parts of the 3VMS could occur.

PARAMETERS

Parameter	Description	Range	ICM450A Default	3VMS Default
Line Voltage	Average phase to phase line voltage	190-600	208	208VAC
Delay on Break	Amount of time between the load de-energizing and re-energizing	15 seconds - 10 minutes	15 seconds	**
Delay on Fault	Amount of time before the load de-energizes due to a non-critical fault*	0-15 seconds	15 seconds	3 seconds
% Over/Under Voltage	Maximum/minimum phase to phase average voltage, respectively	2-25%	20%	5%
% Phase Unbalance	Amount of allowable voltage unbalance	2-20%	20%	7%
Reset Mode	0 (auto) or number of times the load can be re-energized after a load side fault before a manual reset is necessary	0 (auto) , 1-10	0 (auto)	0 (auto)
Control Mode	With control mode set to OFF, the load will energize if no 3-phase fault conditions exist; with control mode ON, the load will energize if no fault conditions exist and control voltage is present at terminals 4 and 5 of the **ICM450A**	ON or OFF	OFF	OFF
Language	Set to English or Spanish language for display	EN or SP	EN	English

* Non-critical faults are faults such as high/low voltage and phase unbalance and are subject to the delay on fault setting. Critical faults, such as phase loss and phase reversal, do not allow fault interrogation and the response time (under 4 seconds) is not user settable.

** For best recommendations, consult manufacturer of equipment.

TROUBLESHOOTING ICM450A

Problem	LCD Readout	LED Status	Corrective Action
Load will not energize	Phase Average	All LEDs Off	Confirm that the control input (terminals 4 & 5) is NOT connected and NOT configured active (on) in the configuration menu
Load will not energize	Phase Average	Load LED Off, Fault LED blinking	Press **FAULT** once to observe the current fault; correct the condition of the first fault that appears (see Fault Conditions above, for a list of corrective actions)
Fault LED blinks repeatedly while load is energized	Phase Average	Fault LED Blinking, Load LED On	Indicates there are faults saved in the memory, press **FAULT** rapidly to scroll through saved faults; to clear the faults, press and hold **FAULT** for more than 5 seconds
Setup LED is on while load is being energized	Anything Other Than Phase Average	Setup LED On, Load LED On	To exit the setup mode, press either **READ** or **FAULT**
Load will not energize	Reset	Fault LED Blinking	Unit is in lockout, maximum number of retries in manual reset mode has been reached. To reset the control, remove and reset power to the control.
Load turns ON and OFF repeatedly	Displays Existing Fault	Fault LED Blinking	Fix load side fault; press **FAULT** to observe condition; the delay on break period may be too short; press **SETUP** to enter the delay on break mode; press ﹀ to lengthen the delay
Scrambled characters or black boxes on LCD screen	Unreadable	Irrelevant	Processor or memory damaged. Replace ICM control.

ICM530 MAINTENANCE

Periodically check the LED status on the SPD. If the Greenlight is OFF, the protection is no longer available and the SPD needs to be replaced immediately. 12 AWG stranded copper wire or larger required. Product contains no serviceable parts. This device features an internal protection that will disconnect the surge protective component at the end of its useful life but will maintain power to the load – now unprotected.

ICM530 MODE OF OPERATIONS

The ICM530 is a UL Listed Type 1&2 Surge Protective Device for three phase Delta 240 VAC or Wye 120/208 VAC three phase voltage configurations. When a surge occurs, the ICM530 will absorb the surge up to the limits expressed in the ICM530 specifications section of this guide. The ICM530 incorporates thermal protection on the surge elements (TMOV's) which allows for safe disabling of the surge elements when a surge exceeds the thermal limits of the device. The ICM530 has a status light on the control which identifies operational status when illuminated. The ICM530 in this product is rated as a Type 1 Surge Protective Device. Suitable for use on a circuit capable of delivering not more than 200kA RMS symmetrical amperes, 240V maximum (Convient à des circuits produisant au plus 200kA RMS A eff.", 240V maximum).

ICM530 SPECIFICATIONS

Description	Ratings
Service Voltage (3-Phase)	240 VAC Delta Wye
Max Surge Current	150 kA
Short Circuit Current Rating (SCCR)	200 kA
Nominal Discharge Current (In)	20 kA
SPD Type	Type 1 (Can also be used in Type 2 applications)
Surge Protection Technology	TFMOV
Protection Mode	3 for Delta configuration 6 for Wye configuration (neutral tied to ground)
VPR (Vpk)	**VOLTS (V)** **MODE** **VPR (Vpk)** 240 L-L 1200 208/120 L-L 1200 L-N 700
Maximum Continuous Operation Voltage (MCOV)	**L-L:** 300 VAC **L-N:** (for Wye configuration only): 150 VAC
Input Power Frequency	50/60Hz
Diagnostics	Green LED indicates surge protection present
Enclosure Rating	NEMA/Type 4X water tight plastic enclosure for outdoor and indoor installation
Installation Point	Electrical panel/disconnect
Dimensions	4.3" X 4.1" X 2.3"
Operating Temperature	-40°F to 185°F (-40°C to 85°C)
Operating Humidity	Less than 85%, noncondensing
Operating Altitude	Less than 2000 meters
Agency Certification and Approvals	ANSI/UL1449 4th Edition Listed Device - cULus Listed

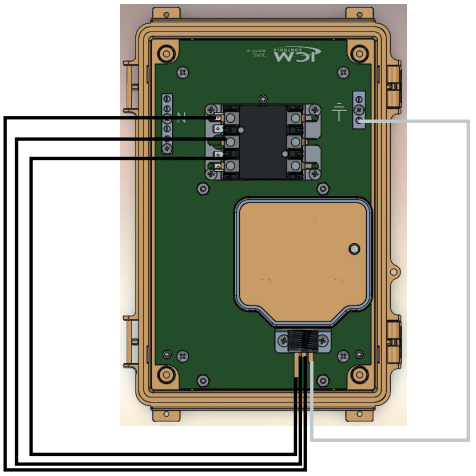
ICM 530 COMPONENT REPLACEMENT INSTRUCTIONS

CAUTION: Remove all power at the main service panel before installing or servicing the 3VMS by switching off the appropriate breaker or removing the appropriate fuse.

CAUTION! Make sure all power to the 3VMS is disconnected

- Remove the three screws on the closeout cover and remove the close out cover
- Remove the four mounting screws on the ICM450A from the standoffs and lift the ICM450A away to access the ICM530
- Remove the three black wires of the ICM530 from the contactor line side and remove the white neutral wire from the neutral buss bar
- Remove the two screws on the ICM530 mounting bracket and lift out the ICM530
- Losen and remove the locking nut on the ICM530 mounting bracket using a flat blade screwdriver and remove the nonfunctional ICM530 from the mounting bracket and discard appropriately
- Re-install the new ICM531 to the mounting bracket and fasten with the locking nut from the previous step and tighten using a flat blade screwdriver
- Re- install the ICM531 in reverse order from the previous steps
- Re-install the closeout cover when finished , secure with screws provided and restore power. The LED light should be illuminated when power is present

ICM 530 WIRING DIAGRAM



ICM450A COMPONENT REPLACEMENT INSTRUCTIONS

CAUTION! Make sure all power to the 3VMS is disconnected

- Remove the three screws on the closeout cover and remove the close out cover
- Remove the three-line side wires and the three load side wires from the ICM450A *(Reference 450A wiring diagram on page 2)*
- Remove the wires at terminals 1 (Com) and 2 (NO)
- Remove the nonfunctional ICM450A and replace it with a new ICM450A
- Reassemble in reverse order
- Re-install close out cover and secure with screws provided; then check operation

LIMITED LIFETIME PROTECTION WARRANTY

For warranty information and registration, please go to www.icmcontrols.com and click on Warranty Registration.

MADE IN AMERICA

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