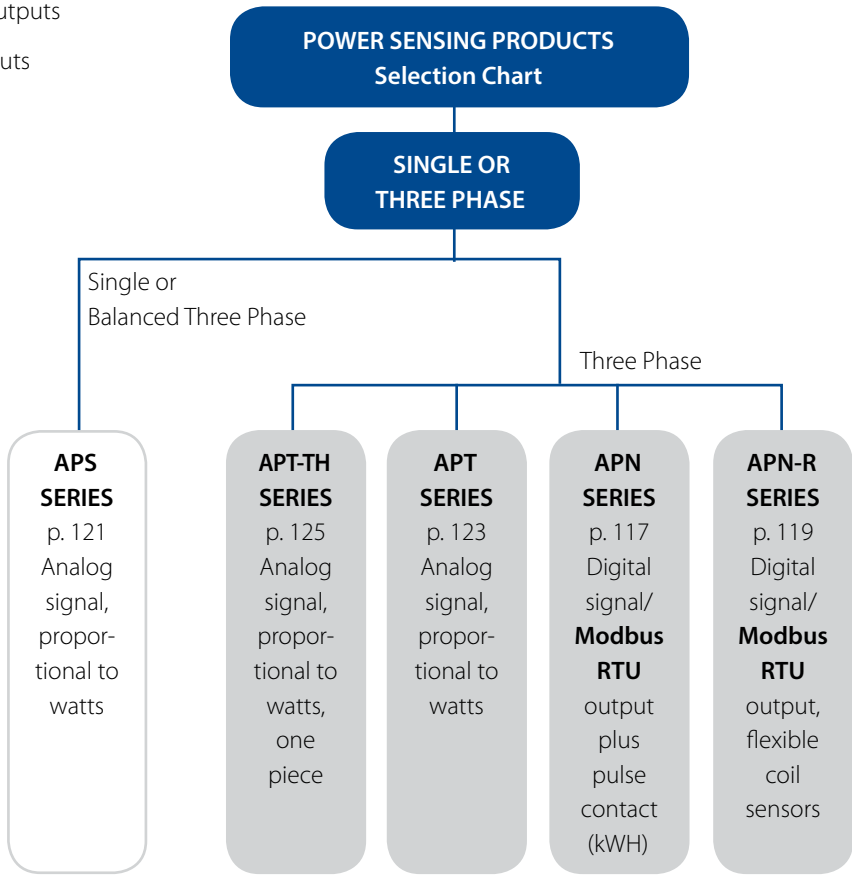
Power Sensing Products

Our power monitoring sensors measure loads and improve performance by providing instantaneous True Power kW or accumulated kWh data. They are simple, reliable and accurate. Digital communications are available in some models. Contact the factory or a local distributor for more information.

Features:

- 4–20 mA, 0–10 VDC, and/or networked outputs
- Accepts standard 5 A or 0–333 mV CT inputs
- DIN rail compatibility



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APN SERIES
Power Monitor

APN Series Power Monitors measure three phases of current and voltage and computes 14 values necessary to track power usage. These monitors use current transformers to measure the amperes. The line voltage connects directly to the transducer, up to 600 VAC. The result is 14 data points in the RS485 **Modbus RTU** format. There is also a pulse contact which opens and closes as watt hours are accumulated. The APN can be configured to accept 5 A secondary current transformers or the safer ProteCT™ low voltage output CTs. Either type will produce an accurate set of data to help you save energy and avoid utility surcharges.

APN Power Monitor with **Modbus RTU** Output

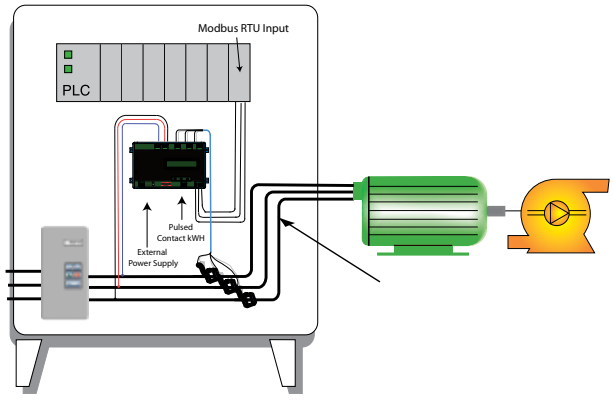
Power Sensing Applications

Plant Energy Management
- Measure the power usage of a single piece of equipment, an area of a plant, or the entire facility.

Conveyors
- Detect jams and overloads.
- Check that the belt is loaded properly by measuring the power consumption.

Pump Monitoring
- Detect dry run from clogged, intake, or discharge line.
- Monitor impeller cavitation and bearing wear.

Pump Jam & Suction Loss Protection



For additional Application Examples, go to www.nktechnologies.com/applications

Power Sensing Features

Modbus RTU Output
- RS485 communication protocol reduces the cost involved with proprietary data logging software.
- Compatible with most automation systems.

Externally Powered
- Improves reliability when used in conditions where power interruptions and voltage sags are common.

Compact DIN Rail* or Panel Mounted Case
- Clearly labeled terminals provide quick installation.
- Low profile reduces cabinet depth requirements.

LED Displays Network Communication
- Provides quick visual indication that network is operational.

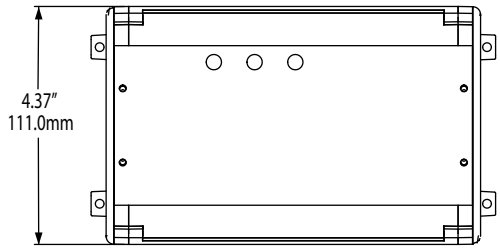
Finger Safe Terminals
- Safe and secure connectors.

UL/cUL Approved
- Accepted worldwide.

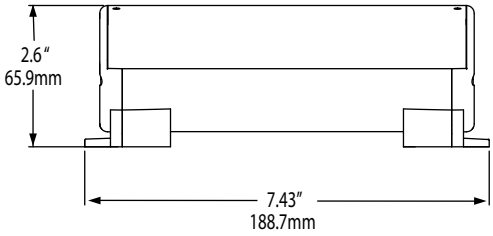
*For information on the DIN rail accessories kit, see page 140.

Power Sensing Dimensions

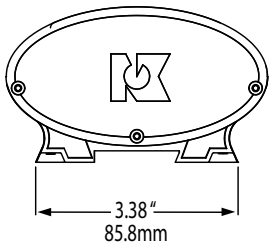
Case Front View



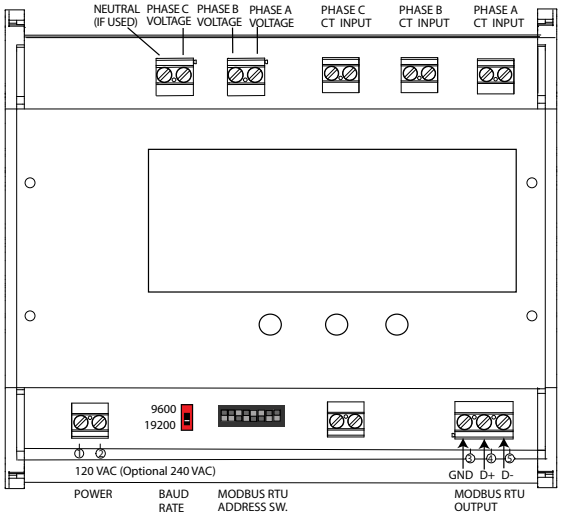
Case Top View



Case Side View



Power Sensing Connections



Power Sensing Specifications

Power Supply	• 24 VAC/DC (21–27 V) • 120 VAC (100–125 V) • 240 VAC (200–250 V)
Power Consumption	• 24 VAC/DC: <100 mA • 120 VAC: <50 mA • 240 VAC: <25 mA
Measurement	5A CT input: 3000 A 0.333 mV input: 1500 A
Primary Voltage	100 to 600 VAC
Output	• **Modbus RTU** - 14 Data Points • Pulsed Contact KWH
Accuracy	<1% FS
Response Time	120 ms
Isolation Voltage	Tested to 4 KV
Frequency Range	50–60 Hz
Case	UL94 V-0 Flammability Rated
Environmental	-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing
Listings	UL/cUL approved

Power Sensing Data Point Table

	Phase A	Phase B	Phase C	Type
Current	●	●	●	RMS
Voltage	●	●	●	RMS
kW	●	●	●	Active
Power Factor	●	●	●	Instantaneous
Power Factor				Average
kWH				Total

Power Sensing Ordering Information

Sample Model Number: APN-600-MV-120-MOD

AC power transducer, 600 VAC maximum input, ProteCT™ current inputs, 120 VAC powered, RS485 **Modbus** output with pulse contact for kWH.

	(1)			(2)		(3)			(4)		
APN –	**6**	**0**	**0**	**–**		**–**			**–**	**M**	**O**	**D**

(1) Maximum Primary Voltage

600	600 VAC

(2) Current Input Type

MV	ProteCT™ current transformers, 333 mVAC secondary
5 A	5 A secondary current transformers

(3) Rating Power Supply

24U	24 VAC/DC (100 mA max.)
120	120 VAC (50 mA max.)
240	240 VAC (25 mA max.)

(4) Output Type

MOD	**Modbus RTU** (RS485), pulse contact for kWH

OEMs **Test & Evaluation Units for OEMs**
Free program expedites evaluation process. See page 3 for details.

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APN-R SERIES
Power Monitor

The APN-R Series Power Monitors measure three phases of current and voltage and computes 14 values necessary to track power usage. These monitors use flexible current sensors to measure the amperes, and the line voltage connects directly to the transducer, up to 600 VAC. The result is 14 data points in the RS485 **Modbus RTU** format. There is also a pulse contact which opens and closes as watt hours are accumulated. The APN-R is factory configured with specifically matched flexible coils. The ease of installation over multiple conductors or bus assemblies will speed installation and produce an accurate set of data to help you identify areas of excessive energy consumption and allow intervention to reduce demand.

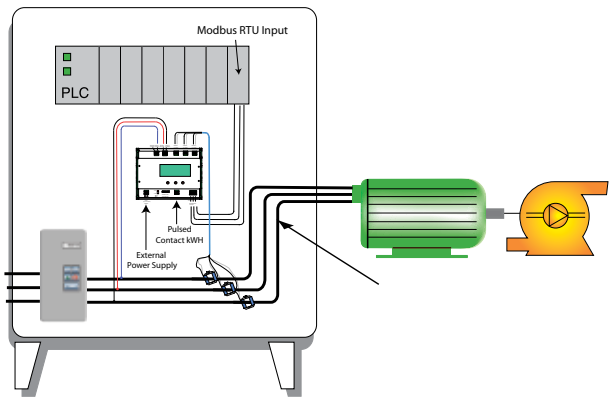
Power Sensing Applications

Plant Energy Management
- Measure the power usage of a single piece of equipment, an area of a plant, or the entire facility.

Conveyors
- Detect jams and overloads.
- Check that the belt is loaded properly by measuring the power consumption.

Pump Monitoring
- Detect dry run from clogged, intake, or discharge line.
- Monitor impeller cavitation and bearing wear.

Pump Jam & Suction Loss Protection



Power Sensing Features

Modbus RTU Output
- RS485 communication protocol reduces the cost involved with proprietary data logging software.
- Compatible with most automation systems.

Externally Powered
- Improves reliability when used in conditions where power interruptions and voltage sags are common.

Compact DIN Rail* or Panel Mounted
- Clearly labeled terminals provide quick installation.
- Low profile reduces cabinet depth requirements.

LED Displays Network Communication
- Provides quick visual indication that network is operational.

Finger Safe Terminals
- Safe and secure connectors.

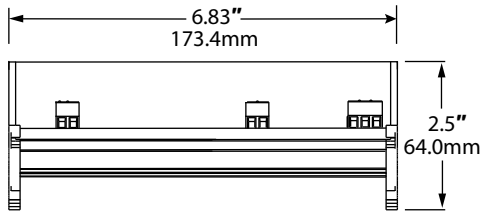
UL/cUL Approved
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 140.

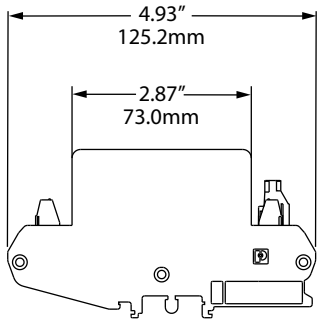
For additional Application Examples, go to www.nktechnologies.com/applications

Power Sensing Dimensions

Case Side View

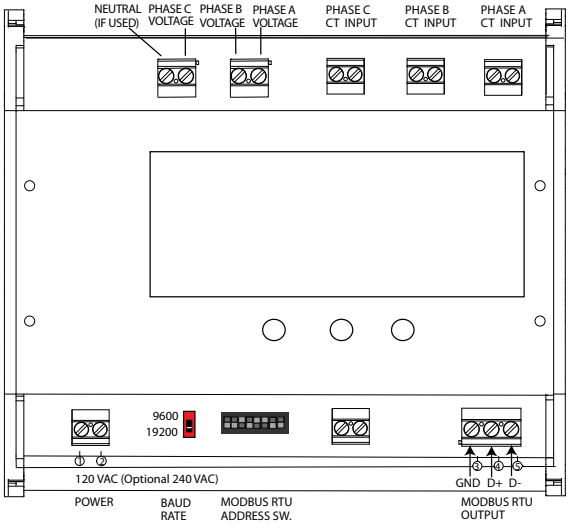


Case Top View



Note: Drawings are not to scale.

Power Sensing Connections



Power Sensing Specifications

Power Supply	• 24 VAC/DC (21–27 V) • 120 VAC (100–125 V) • 240 VAC (200–250 V)
Power Consumption	• 24 VAC/DC: <100 mA • 120 VAC: <50 mA • 240 VAC: <25 mA
Measurement	2000 A
Primary Voltage	100 to 600 VAC
Output	• **Modbus RTU** - 14 Data Points • Pulsed Contact KWH
Accuracy	<1% (10 – 100% of range)
Response Time	120 ms
Isolation Voltage	Tested to 4 KV
Frequency Range	50/60 Hz
Case	UL94 V-0 Flammability Rated
Environmental	-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing
Listings	UL/cUL

Power Sensing Data Point Table

	Phase A	Phase B	Phase C	Type
Current	●	●	●	RMS
Voltage	●	●	●	RMS
kW	●	●	●	Active
Power Factor	●	●	●	Instantaneous
Power Factor				Average
kWH				Total

Power Sensing Ordering Information

Sample Model Number: APN-600-RC1-120-MOD

AC power transducer, 600 VAC maximum input, flexible current inputs (0–500 A range), 120 VAC powered, RS485 **Modbus** output with pulse contact for kWH.

	(1)			(2)			(3)			(4)		
APN –	**6**	**0**	**0**	–			–			–	**M**	**O**	**D**

(1) Maximum Primary Voltage

600	600 VAC

(2) Current Input Type

RC1	Flexible coil sensors 0–500 A range
RC2	Flexible coil sensors 0–2000 A range

(3) Rating Power Supply

24U	24 VAC/DC
120	120 VAC
240	240 VAC

(4) Output Type

MOD	**Modbus RTU** (RS485), pulse contact for kWH

OEMs **Test & Evaluation Units for OEMs**
Free program expedites evaluation process. See page 3 for details.

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APS SERIES
Power Transducers

APS Series kWH Power Transducers offer an inexpensive way to measure kWH on single- and three-phase balanced loads. The APS Series constantly measures motor power consumption, which is proportional to the amount of work being done and an indication of the motor load. Ideal for mixing, grinding, machining and pumping applications where power measurement is needed, the APS Series includes a CT, voltage sensor and output signal conditioner in a single package designed for easy installation. Available for input currents up to 180 A and voltages up to 600 VAC.

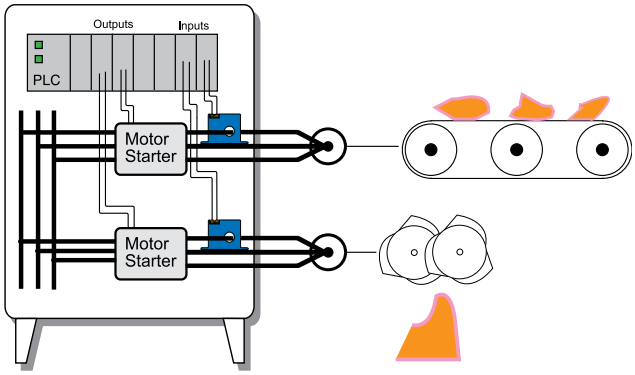
Power Sensing Applications

Grinding and Milling Control
- Measure grinder horsepower; optimize feed rates.

Viscosity Control
- Continuously calculate mixer kW draw; monitor viscosity without entering vessel.

Tool Monitoring and Jam Protection
- Measure drive motor HP to determine tool travel or contact with work.
- Monitor motor horsepower to provide an indication of motor jams.

Crusher/Grinder/Shredder Motor Interlocks



For additional Application Examples, go to www.nktechnologies.com/applications

Power Sensing Features

True Power Measurement
- Measures true power (HP or kW) on balanced loads; accounts for voltage and power factor fluctuations and improves sensitivity to load changes.
- Requires only one or two power legs for installation.

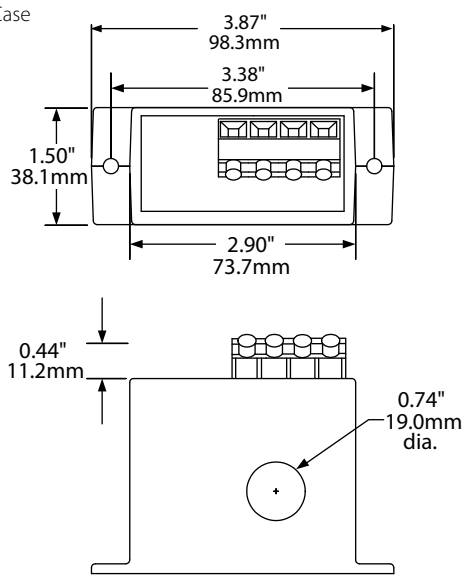
Fast and Easy Installation
- Current and voltage sensors in one package and 24 VDC loop-powered supply allows for quick and easy two-wire installation.

Factory-calibrated Ranges
- Single range factory calibrated to ensure accuracy.

UL/cUL Approved
- Accepted worldwide.

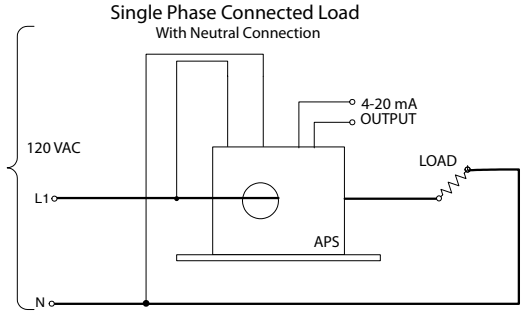
Power Sensing Dimensions

FL Case

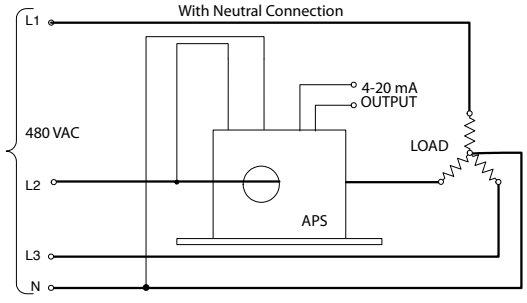


Power Sensing Connections

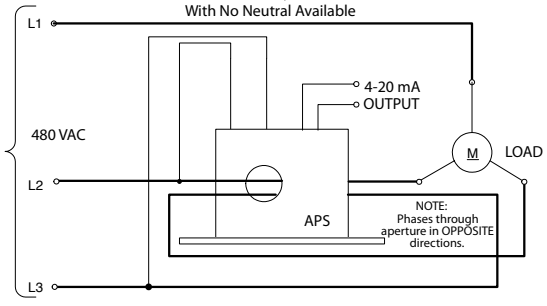
Single Phase Connected Load
With Neutral Connection



Three Phase Connected Load
With Neutral Connection



Three Phase Delta or Wye Connected Load
With No Neutral Available



OEMs **Test & Evaluation Units for OEMs**
Free program expedites evaluation process. See page 3 for details.

Power Sensing Specifications

Power Supply	24 VDC loop-powered (12–36 V)
Primary Voltage Input	120, 240, 480 or 600 VAC
Output	4–20 mA proportional to max. KW; 25 mA limit
Accuracy	<1% FS
Loading	500 Ω @ 24 VDC
Response Time	100 ms (to 90% of step change)
Isolation Voltage	UL listed to 1270 VAC, tested to 5 KV
Frequency Range	50–60 Hz
Case	UL94 V-0 Flammability Rated
Environmental	-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing
Listings	UL/cUL (except 600 V models)

Power Sensing Ordering Information

Sample Model Number: APS4-420-24L-10.0
Single phase watt transducer, 10 kW range, 480 VAC input, may be wired with two opposite current wire passes, 4–20 mA output, loop-powered.

	(1)		(2)			(3)				(4)			
APS		–	4	2	0	–	2	4	L	–			

(1) Input Voltage

1	120 VAC
2	240 VAC
4	480 VAC
6	600 VAC (not UL listed)

(2) Output Signal

420	4–20 mA

(3) Power Supply

24L	24 VDC loop-powered

(4) Input Range

0.5	0.5 KW
0.75	0.75 KW
1.0	1.0 KW
2.0	2.0 KW
5.0	5.0 KW
10.0	10 KW
20.0	20 KW
50.0	50 KW
75.0	75 KW
100	100 KW

Note: Not all ranges available for every voltage range. Minimum current for stated accuracy is 2 A, maximum current 180 A.

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APT SERIES
Power Transducers

APT Power Transducers measure three phases of current and voltage, and produce an industry standard analog signal proportional to the watts used. These monitors use current transformers to measure the amperes, and the line voltage connects directly to the transducer, up to 600 VAC. The APT Power Transducer can be configured to accept 5 A secondary current transformers or the safer ProteCT™ low voltage output sensors. Either type of current sensing will produce an accurate output signal to help you identify areas of excessive energy consumption and allow intervention to reduce demand.

APT Power Monitor with Analog Output

Power Sensing Applications

Plant Energy Management
- Measure the power usage of a single piece of equipment, an area of a plant or the entire facility.

Conveyors
- Detects jams and overloads.
- Check that the belt is loaded properly by measuring the power consumption.

Pump Monitoring
- Detect dry run from clogged intact or discharge line.
- Monitor impeller cavitation and bearing wear.

Power Sensing Features

Industry Standard Analog Outputs
- Choose 4–20 mA, 0–5 or 0–10 VDC.
- Compatible with most automation systems.

Externally Powered
- Improves reliability when used in conditions where power interruptions and voltage sags are common.

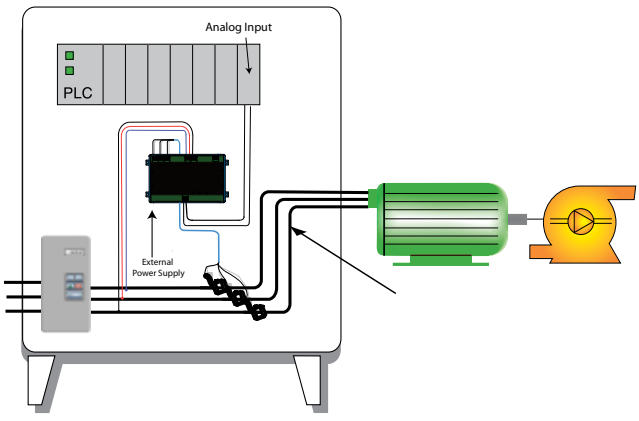
Compact DIN Rail* or Panel Mounted
- Clearly labeled terminals provide quick installation.
- Low profile reduces cabinet depth requirements.

Finger Safe Terminals
- Safe and secure connectors.

UL/cUL Approved
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 140.

Pump Jam & Suction Loss Protection



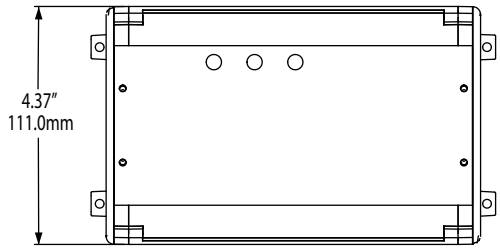
For additional Application Examples, go to www.nktechnologies.com/applications

APT Output Values

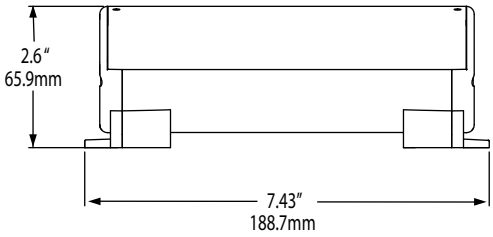
APT Power Transducers produce full range output. When the current transformer is producing its maximum signal, the primary voltage is at the range maximum and power factor is at unity. As an example, using the APT-480-5 A-120-420 with 400:5 current transformers, the transducer will produce 20 mA when there is 400 A through the CT and the primary voltage is 480. If the transducer is used to monitor a three-phase circuit using three CTs, 20 mA represents 332,544 watts. The equation for three-phase wattage is voltage times amperage, times the square root of three (1.732) times power factor. If this transducer is used to monitor a three-phase load using two CTs, the transducer will produce 14.67 mA, or the output will represent 2/3 of the actual watts being used under the same conditions: 480 V primary voltage, 400 A through 400:5 CTs and unity power factor.

Power Sensing Dimensions

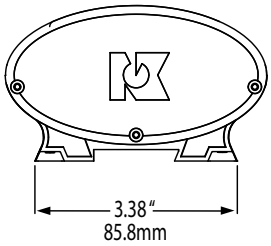
Case Front View



Case Top View

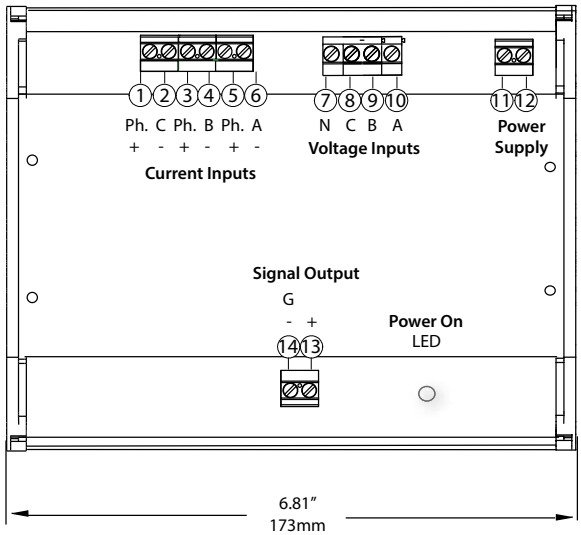


Case Side View



Note: Drawings are not to scale.

Power Sensing Connections



Power Sensing Specifications

Power Supply	• 24 VAC/DC (21–26 V) • 120 VAC (108–132 V) • 240 VAC (216–264 V)
Power Consumption	<2 VA
Primary Voltage Input	120, 240, 480 or 600 VAC
Output	• 4–20 mA current • 0–5 or 0–10 VDC
Accuracy	<0.5% FS
Response Time	120 ms
Isolation Voltage	Tested to 4 KV
Frequency Range	6–100 Hz
Case	UL94 V-0 Flammability Rated
Environmental	-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing
Listings	UL/cUL

Power Sensing Ordering Information

Sample Model Number: APT-480-MV-120-420

AC power transducer, 480 VAC input, ProteCT™ current inputs, 120 VAC powered, 4–20 mA output, DIN rail mounting.

	(1)		(2)		(3)			(4)		
APT –				–			–			

(1) Primary Voltage

120	120 VAC
240	240 VAC
480	480 VAC
600	600 VAC

(2) Current Input Type

MV	ProteCT™ current transformers, 333 mVAC secondary
5 A	5 A secondary current transformers

(3) Power Supply

24U	24 VAC/DC
120	120 VAC
240	240 VAC

(4) Output Type

420	4–20 mA proportional to wattage (see calculation example under APT Output Values)
005	0–5 VDC
010	0–10 VDC

Power Sensing Products

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APT-TH SERIES

Three-hole Power Transducer

The APT-TH Series Power Transducers monitor watt consumption of three phase loads. They provide an analog signal proportional to the active power consumed by the monitored load. The three current carrying conductors pass through the three windows of the top section and the matching voltage input at the terminals. The APT-TH is a one-piece solution for measuring power; no external current transformers are needed and installation is easy. The design of the APT-TH ensures that the monitor is always correctly orientated. If connected improperly by mismatching the current and voltage inputs, or placing a conductor through the sensing window back to front rather than front to back, the LED will change color from green to amber. The LED will also turn amber if the phase A conductor is placed through the phase B sensing window, or if power factor is lower than 0.50.

Power Transducer Applications

Pump Monitoring

- Monitor pumps to detect open intake or outflow lines, cavitation or failing bearings.

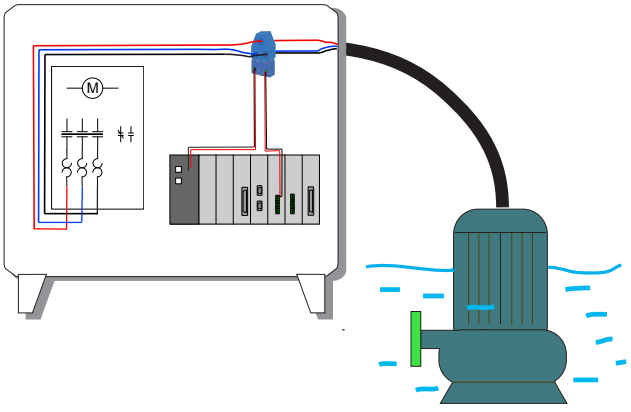
Grinding and Milling

- Measure wattage/horsepower to optimize feed rate.
- Detect broken or missing tools or drill bits.
- Detect when the tool contacts the material.

Equipment Monitoring

- Constant output proportional to wattage consumed can be compared with utility bills, providing a cost per hour or cost per operation of a machine or process.

Submersible Pump Application



Power Transducer Features

One-piece Solution

- No external current transformers.
- No chance for loose CT secondary provides added safety.

Easy Installation

- Snaps onto DIN rail or can be panel mounted using screws.

Finger Safe Terminals for Safety

LED Indicator

- LED on base shows correct phase relationship match.
- Green for normal operation.
- Orange for incorrect installation.

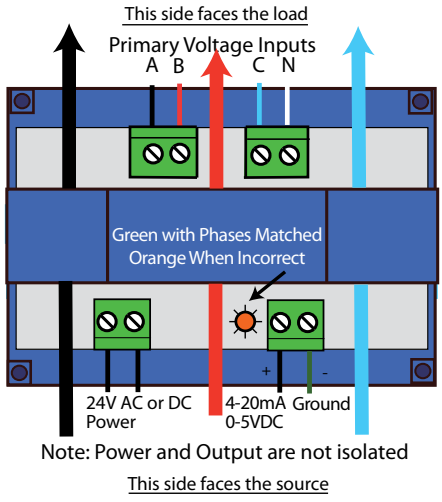
Three Ample Sensing Windows

- Wire carrying 200 A fits easily.

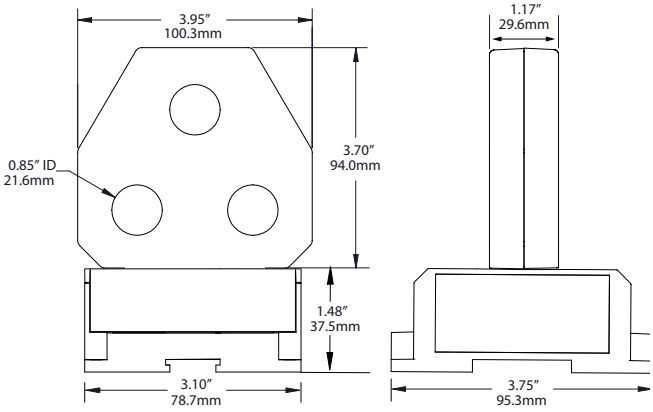
Designed to meet UL, cUL and CE

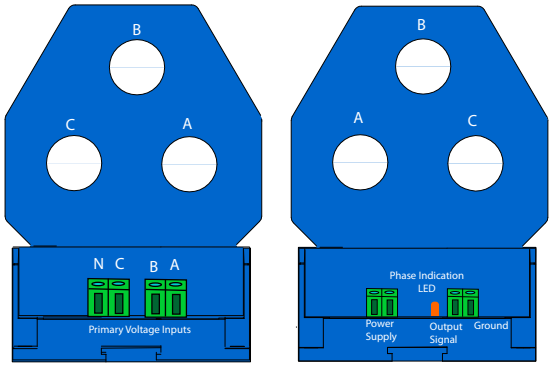
- Accepted worldwide.

Power Transducer Connections



Power Transducer Dimensions





Load View Source View

Model Information

	APT1 (208 V)	APT2 (240 V)	APT4 (480 V)	APT6 (600 V)
0.5 kW	*	*	NA	NA
0.75 kW	*	*	NA	NA
1.00 kW	*	*	*	NA
2.00 kW	*	*	*	*
5.00 kW	*	*	*	*
7.50 kW	*	*	*	*
10.0 kW	*	*	*	*
15.0 kW	*	*	*	*
20.0 kW	*	*	*	*
40.0 kW	*	*	*	*
50.0 kW	*	*	*	*
60.0 kW	*	*	*	*
75.0 kW	*	*	*	*
100 kW	NA	NA	*	*
150 kW	NA	NA	*	*
200 kW	NA	NA	NA	*

Power Transducer Specifications

Power Supply	24 VAC or DC
Power Consumption	<4 VA
Primary Voltage Input	208, 240, 480, 600 VAC
Output	4–20 mA 0–5 VDC
Response Time	500 ms (10–90% step change)
Accuracy	+/-1% FS
Frequency Range	40–100 Hz
Case	UL94 V-0 Flammability Rated
Environmental	-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing
Listings	Designed to meet UL, cUL and CE

Ordering Information

Sample Model Number: APT1-005-24U-10.0-TH, power transducer, 208 V, three-phase monitored voltage, output 0–5 VDC, 24 VAC/DC powered, 10.0 kW input range, three-hole, solid-core case.

	(1)		(2)			(3)			(4)				(5)	
APT		-				-	2	4	U	-				-	T	H

(1) Monitored Voltage

1	208 V three-phase
2	240 V three-phase
4	480 V three-phase
6	600 V three-phase

(2) Output Signal

420	4–20 mA
005	0–5 VDC

(3) Power Supply

24U	24 VAC/DC

(4) Input Range (kW)*

0.50	5.00	20.0	75.0
0.75	7.50	40.0	100
1.00	10.0	50.0	150
2.00	15.0	60.0	200

(5) Case

TH	Three-hole, solid-core

Note: Note all ranges are available for each primary voltage input range. See Model Information chart.

OEMs **Test & Evaluation Units for OEMs**
Free program expedites evaluation process. See page 3 for details.

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