NK Technologies
Current Sensors for Automation

A Company Built Upon A History Of Innovation

Founded in 1982, when Maynard Kuljian saw the need for an economical way to measure current draw, Neilson-Kuljian, Inc., became the first to develop the low-cost solid-state current sensing technology that underlies the industry today. True to this heritage, NK Technologies has maintained a focus on developing and manufacturing innovative, cost-effective current sensing products designed to add value and to meet or exceed our customers’ performance expectations. With a portfolio of over 1300 models, NK Technologies remains a leading supplier of current measurement solutions to the industrial and factory automation markets. As the needs of these markets change, NK Technologies is well-positioned to respond with sophisticated new product designs and improved product functionality necessary to meet those applications.

www.nktechnologies.com

Go online for more information
• Up-to-date Product Information
• Application Examples
• Engineering Resource Articles
• Sign Up for Product Updates
• Distributor Information

As a leader in the industry, NK Technologies takes its commitment to customers seriously and considers customer satisfaction a top priority. Timely response to customer inquiries, knowledgeable technical support, a willingness to develop custom solutions to meet specific customer needs, and an organizational commitment to delivering reliable, quality products on time are the hallmarks of excellence which our customers have come to rely on and expect from NK Technologies, a company built upon a history of innovation.

CONTENTS

Current Sensing Switches ........................................ 4
Selection Guide .................................................. 43
AS, AS-Compact Case, AS1-NBR-AAC-Q, AT1,
AS1, AS4M, AS2, ATD, AS2, AS4P-FO, ASRT,
ASWP-CLS, ASLP-CLS, AT1, D13, D35-FO
AC Current Transducers ....................................... 40
Selection Guide .................................................. 41
AT, AVR, ATVRF, ATRFL, ATRF-LF, ATRF, ATRP,
ATRFL-FL, ATR, AT1, AT1FL, ATR
DC Current Transducers .................................... 72
Selection Guide .................................................. 72
DT 4-Wire Split-Core, DT 4-Wire Solid-Core,
DT 3-Wire, DT & 12 VDC, DT-FD High Voltage,
DT-DL Large Aperture, DT 2-Wire Looped Power
Ground Fault Protection .................................... 90
Selection Guide .................................................. 90
AG, AGC, AGCLL, AGC-LT, AGT-FD, DGD
Voltage Transformers ......................................... 109
Selection Guide .................................................. 109
VTS, VTSQ, VOQ, VTU-Q, VTU-DIN
Power Sensing Products .................................... 120
Selection Guide .................................................. 120
APN, APN-R, API, API, APT-TH
Signal Converters .............................................. 131
Selection Guide .................................................. 131
ADC, CTC
Current Transformers ........................................ 136
CT1MS & CT1LS, Current Transformers,
CTRC, ProtocTM
AMPFlasheTM .................................................. 143
AMPFIasheTM ACI
Accessories ..................................................... 144
DIN Rail Kits
Index by Name .................................................. 148
Index by Product ............................................... 149
RoHS 2/ISO/Terms & Conditions
See the Inside Back Cover of this catalog for:
• RoHS Certificate of Compliance
• ISO-9001 and ISO-14001 Certification
• Terms & Conditions

We will help you ... for FREE!
The New NK Technologies Test & Evaluation Program can expedite your evaluation process by getting the right product in your engineers hands for evaluation fast and free!

✓ Are you an OEM using switches and transducers on the equipment you sell to your customers?
✓ Are you looking for a test & evaluation unit?
✓ Would you like to avoid the time & hassle associated with buying a unit?

Get your design moving forward by following these simple steps:
#1 - Complete following form at www.nktechnologies.com/testunit/
#2 - Meet either in person or by telephone with our Application Engineering team to discuss your product selection so we can confirm the product you have selected is best for your application.
#3 - NK Technologies will ship you your test & evaluation unit at no cost.
#4 - You agree to meet either in person or by telephone sometime in the next 60 days to review the product operation, analyze test results and coordinate a plan to move forward with the design.

It’s that easy — so start today!
Current Sensing Switches

Ideal for off/on status, overload or underload indication, current sensing switches from NK Technologies combine a CT, signal conditioner and output contacts into a single package for use with industrial and factory automation equipment.

Features:
- Multiple output ranges
- Adjustable or fixed setpoints
- Models with integral time delay available
- Choice of N.O or N.C., AC or DC contacts
- Self-powered and split-core options

Features:
- Multiple output ranges
- Adjustable or fixed setpoints
- Models with integral time delay available
- Choice of N.O or N.C., AC or DC contacts
- Self-powered and split-core options

- **AS1 SERIES**
  - Current Sensing Switches ......................................................... page 6
- **AS1 SERIES COMPACT CASE**
  - AC Current Sensing Switches .............................................. page 13
- **AS1 NOR-FT-GO SERIES**
  - Current Sensing Switches ......................................................... page 8
- **A3S SERIES**
  - Current Sensing Switches ......................................................... page 10
- **ASL SERIES**
  - Linear Adjustment Setpoint Switches ................................ page 14
- **ASM SERIES**
  - Self-calibrating Current Sensing Smart Switches ............ page 16
- **ASC SERIES**
  - Factory-calibrated Current Operated Switches ............ page 18
- **ASO SERIES**
  - Current Sensing Switches ......................................................... page 20
- **ASX SERIES**
  - Current Sensing Switches ......................................................... page 22
- **ASP-FD SERIES**
  - Current Sensing Switches ......................................................... page 24
- **ASXP SERIES**
  - Current Sensing Switches ......................................................... page 26
- **ASXP-LS SERIES**
  - Current Sensing Switches ......................................................... page 28
- **ASX SERIES**
  - Current Sensing Switches ......................................................... page 30
- **ATL SERIES WITH DIGITAL SETPOINT DISPLAY**
  - Current Sensing Transducers/Switches ......................... page 68
- **ATS SERIES WITH ROTARY SWITCH SETPOINT**
  - Current Sensing Transducers/Switches ......................... page 70
- **DS1 SERIES**
  - DC Current Sensing Switches ......................................................... page 34
- **DS3 SERIES**
  - Current Sensing Switches ......................................................... page 36
- **DS1-FD SERIES**
  - DC or AC Current Sensing Switches ................................ page 38

**Features:**
- Multiple output ranges
- Adjustable or fixed setpoints
- Models with integral time delay available
- Choice of N.O or N.C., AC or DC contacts
- Self-powered and split-core options

**Features:**
- Multiple output ranges
- Adjustable or fixed setpoints
- Models with integral time delay available
- Choice of N.O or N.C., AC or DC contacts
- Self-powered and split-core options

- **AS1 SERIES**
  - Current Sensing Switches ......................................................... page 6
- **AS1 SERIES COMPACT CASE**
  - AC Current Sensing Switches .............................................. page 13
- **AS1 NOR-FT-GO SERIES**
  - Current Sensing Switches ......................................................... page 8
- **A3S SERIES**
  - Current Sensing Switches ......................................................... page 10
- **ASL SERIES**
  - Linear Adjustment Setpoint Switches ................................ page 14
- **ASM SERIES**
  - Self-calibrating Current Sensing Smart Switches ............ page 16
- **ASC SERIES**
  - Factory-calibrated Current Operated Switches ............ page 18
- **ASO SERIES**
  - Current Sensing Switches ......................................................... page 20
- **ASX SERIES**
  - Current Sensing Switches ......................................................... page 22
- **ASP-FD SERIES**
  - Current Sensing Switches ......................................................... page 24
- **ASXP SERIES**
  - Current Sensing Switches ......................................................... page 26
- **ASXP-LS SERIES**
  - Current Sensing Switches ......................................................... page 28
- **ASX SERIES**
  - Current Sensing Switches ......................................................... page 30
- **ATL SERIES WITH DIGITAL SETPOINT DISPLAY**
  - Current Sensing Transducers/Switches ......................... page 68
- **ATS SERIES WITH ROTARY SWITCH SETPOINT**
  - Current Sensing Transducers/Switches ......................... page 70
- **DS1 SERIES**
  - DC Current Sensing Switches ......................................................... page 34
- **DS3 SERIES**
  - Current Sensing Switches ......................................................... page 36
- **DS1-FD SERIES**
  - DC or AC Current Sensing Switches ................................ page 38
AS1 SERIES
Current Sensing Switches

AS1 Series Current Sensing Switches combine a current transformer, signal conditioner and limit alarm into a single package for use in status monitoring or proof of operation applications. Offering an extended setpoint range of 1–150 A and universal, solid-state outputs, the self-powered AS1 can be tailored to provide accurate and dependable digital indication of overcurrent conditions across a broad range of applications. Available in solid-core case styles or in a split-core case to maximize ease of installation.

Current Sensing Switch Applications
Electronic Proof of Flow
• Current sensing switches eliminate the need for multiple pipe or duct penetrations and are more reliable than electromechanical pressure or flow switches.
Conveyors
• Detects jams and overloads.
• Interlocks multiple conveyor sections.
Lighting Circuits
• Proof positive that the lamp is energized.
Electrical Heaters
• Faster response than temperature sensors.

Current Sensing Switch Connections
For additional Application Examples, go to www.nktechnologies.com/applications

Current Sensing Switch Specifications
Power Supply
• None, self-powered
Setpoint Range
• Solid-core: 1–150 A (adjustable-specific models)
• Split-core: 1.75–150 A (adjustable-specific models)
Output Description
• Isolated solid-state relay
Output Rating
• N.O. Version 0.15 A @ 240 VAC or VDC
• N.C. Version 0.2 A @ 135 VAC or VDC
• Polarity sensitive
Off-state Leakage
≤10 μA
Response Time
120 ms max.
Time Delay
None
Hysteresis
7%
Overload
• -GO (NOU) 500 A
• -GO (NCU) 400 A
• All other 1000 A
Isolation Voltage
UL listed to 1270 VAC, tested to 5 KV
Frequency Range
6–100 Hz
Case
UL94 V-0 Flammability Rated
Environmental
• 0–95% RH, non-condensing
Listings
UL /cUL, CE

AS1 SERIES
Current Sensing Switch Connections

Current Sensing Switch Dimensions

Current Sensing Switch Features
Universal Output
• N.O. or N.C. solid-state switch for control circuits up to 240 VAC/DC.
• Compatible with most automation systems.
Self-powered
• Cuts installation and operating costs.
Easily Adjustable Setpoint
• Speeds startup.
Solid or Split-core Case
• Versions tailored for each installation.
LED Indication
• Provides quick visual indication of contact status.
Built-in Mounting Feet
• Simple, two-screw panel mounting or attach with DIN rail brackets (included).*
UL/cUL and CE Approved
• Accepted worldwide.
*For information on the DIN rail accessories kit, see page 144.

Current Sensing Switch Applications
Electronic Proof of Flow
• Current sensing switches eliminate the need for multiple pipe or duct penetrations and are more reliable than electromechanical pressure or flow switches.
Conveyors
• Detects jams and overloads.
• Interlocks multiple conveyor sections.
Lighting Circuits
• Proof positive that the lamp is energized.
Electrical Heaters
• Faster response than temperature sensors.

Current Sensing Switch Ordering Information
Sample Model Number: AS1-NOU-SP
Adjustable AC current sensing switch, normally open, split-core case.
(DIN rail adapters are included)

(1) (2) (3)
AS1 – – –
(1) Output Rating
NOU Normally Open
NCU Normally Closed
(2) Case Style
FF Solid-core, front terminal
FT Solid-core, top terminal
SP Split-core
(3) Options
Standard, with LED (Blank)
GO Non-adjustable, output changes with min. current present (solid-core 0.75 A, split-core 1.25 A)
NL No LED
Y39 Output Bypass Switch (not UL listed) – available for FT case only

For additional Application Examples, go to www.nktechnologies.com/applications
AS1 NOR-FT-GO SERIES

Current Sensing Switches

AS1 NOR-FT-GO Series Current Sensing Switches provide an electromechanical relay contact. The output of this specialized switch allows the sensor to control much more current than other AS1 models. This contact can control loads up to 5 A, AC or DC. Solid-state contacts generally have a much lower capacity, making this sensor much more versatile than most self-powered models. Available in a solid-core case only.

Current Sensing Switch Applications

Electronic Proof of Flow
- Current sensing switches eliminate the need for multiple conduits or duct penetrations and are more reliable than electromechanical pressure or flow switches.

Compressor Monitoring
- Detect when the compressor is running.
- Allows for time of use logging; helps maintenance scheduling.

Heaters
- Sense system operation.

Fan Interlocks
- Sense system operation.
- Use to turn on a duct booster fan when clothes dryer is energized.

Current Sensing Switch Features

Electromechanical Output
- N.O. mechanical output relay for detection of current; closes on current increase.

Fixed Setpoint
- Cuts installation and operating costs.

Self-powered
- Reduces installation time and costs.

Integral Mounting Feet
- Built-in feet for direct panel mounting or attachment of DIN rail compatible brackets.*

UL/cUL and CE Approved
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

Current Sensing Switch Applications

Electronic Proof of Flow
- Current sensing switches eliminate the need for multiple conduits or duct penetrations and are more reliable than electromechanical pressure or flow switches.

Compressor Monitoring
- Detect when the compressor is running.
- Allows for time of use logging; helps maintenance scheduling.

Heaters
- Sense system operation.

Fan Interlocks
- Sense system operation.
- Use to turn on a duct booster fan when clothes dryer is energized.

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.

Current Sensing Switch Specifications

- Power Supply: None, self-powered
- Setpoint Range: Go/No-go, 5.8 A (factory set)
- Output Description: Electromechanical SPST relay
- Output Rating: + 5 A @ 250 VAC
- + 5 A @ 30 VDC
- Response Time: 120 ms
- Time Delay: None
- Hysteresis: 8%
- Overload: 6 sec. @ 400 A, 1 sec. @ 1000 A
- Isolation Voltage: UL listed to 1270 VAC, tested to 5 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

Current Sensing Switch Dimensions

FT Case

Current Sensing Switch Connections

Power Supply
- None, self-powered

Setpoint Range
- Go/No-go, 5.8 A (factory set)

Output Description
- Electromechanical SPST relay

Output Rating
- + 5 A @ 250 VAC
- + 5 A @ 30 VDC

Response Time
- 120 ms

Time Delay
- None

Hysteresis
- 8%

Overload
- 6 sec. @ 400 A, 1 sec. @ 1000 A

Isolation Voltage
- UL listed to 1270 VAC, tested to 5 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

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

Current Sensing Switch Monitoring a Fan Load

For additional Application Examples, go to www.nktechnologies.com/applications
AS3 SERIES

Current Sensing Switches

AS3 Series Current Sensing Switches provide the same dependable indication of status offered by the AS1, but with the added benefit of increased setpoint accuracy. A choice of three, jumper-selectable input ranges allows the AS3 to be tailored to an application, providing more precise control through improved setpoint resolution. Self-powering, isolated solid-state outputs, 1–6 A, 6–40 A and 40–200 A input ranges, and a choice of split- or solid-core case are standard.

AS3 Series Version 4

Current Sensing Switch Applications

Electronic Proof of Flow
- No need for pipe or duct penetrations.
- More reliable than electromechanical pressure or flow switches.
Conveyors
- Detects jams and overloads.
- Interfaces multiple conveyor sections.
Lighting Circuits
- Easier to install and more accurate than photocells.
Electrical Heaters
- Faster response than temperature sensors.

AS1, AS3, ASX, ASXP Series Sample Output

Motor Inrush
Normal Running Current
Jam
Belt or Coupling Breaks

Motor Off

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

Test & Evaluation Units for OEMs
Free program expedites evaluation process. See page 3 for details.
The AS1 Series Compact Case Current Sensing Switches are compact and inexpensive. The easy-to-use ring slips onto the conductor to give a solid-state contact for indication of current flow. Ideal for use in control panels, or wherever confirmation of current flow is desired. AS1 Series-CC current sensing switches are a cost-effective way to detect live conductors and see current flow to fans, heaters, pumps, lighting or other AC powered devices.

**Current Sensing Switch Applications**
- Quick reporting of electric motor load status.
- Identify open heater circuit connection.
- Independent verification that the load is energized.
- Confirmation of operation for critical lighting or equipment.
- Low off state leakage is perfect for use as an input to a programmable logic controller.

**Current Sensing Switch Features**

- **Low Sensitivity Turn-on Point**
  - Detect currents as low as 0.5 A with a single conductor pass; eliminates the need to wrap conductors multiple times to increase sensitivity.

- **Reliable Solid-state Output**
  - No moving parts provides a nearly unlimited number of operations; powered from the monitored circuit.

- **Choice of Outputs**
  - Normally Open or Normally Closed connection. Connect the 24” long leads to a local controller or to a terminal block for remote operation.

- **UL/cUL and CE Approved**
  - Accepted worldwide.

### Current Sensing Switch Ordering Information

Sample Model Number: AS1-NOU-CC

Adjustable AC current sensing switch, normally open, solid-core case, without indicating LED (DIN rail adapters are included).

<table>
<thead>
<tr>
<th>AS1 –</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Output Rating</td>
<td>(2)</td>
</tr>
<tr>
<td>NOU</td>
<td>Normally Open</td>
<td></td>
</tr>
<tr>
<td>NCAC</td>
<td>Normally Closed, 1 A @ 240 VAC</td>
<td></td>
</tr>
<tr>
<td>NOC</td>
<td>Normally Open, 0.15 A @ 30 VDC</td>
<td></td>
</tr>
<tr>
<td>NCDC</td>
<td>Normally Closed, 0.15 A @ 30 VDC</td>
<td></td>
</tr>
<tr>
<td>D3</td>
<td>Dual, Normally Open, 30 VDC (1 FT only)</td>
<td></td>
</tr>
<tr>
<td>DCC</td>
<td>T.N.O, T.N.C, Solid State, 0.15 A @ 30 VDC (1 FT only)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(2) Case Style</th>
<th>(3) Options</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF</td>
<td>Solid-core, front terminal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FT</td>
<td>Solid-core, top terminal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>No LED</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BS</td>
<td>3 A @ 120 VAC (FF only)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BS</td>
<td>15 A @ 120 VAC (FF only)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Current Sensing Switch Specifications**

- **Power Supply**
  - None, self-powered

- **Setpoint Range**
  - 0.5 A (factory set)

- **Output Description**
  - Isolated solid-state relay

- **Output Rating**
  - 0.2 A @ 120 VAC/DC (N.O.)
  - 0.15 A @ 135 VAC/DC (N.C.)

- **Off-state Leakage**
  - <10 μA

- **Response Time**
  - 120 ms

- **Hysteresis**
  - 5%

- **Overload**
  - 6 sec. @ 500 A, 1 sec. @ 1000 A

- **Isolation Voltage**
  - UL listed to 1270 VAC, tested to 5 KV

- **Frequency Range**
  - 50–400 Hz

- **Case**
  - UL94 V-0 Flammability Rated

- **Environmental**
  - 0 to 95% RH, non-condensing

- **Listings**
  - UL /cUL, CE

### Current Sensing Switch Ordering Information

Sample Model Number: AS3-NOAC-FF-NL

Adjustable AC current sensing switch, normally open AC contacts, solid-core case, without indicating LED. (DIN rail adapters are included)

<table>
<thead>
<tr>
<th>AS3 –</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>NOAC</td>
<td>Normally Open, 1 A @ 240 VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCAC</td>
<td>Normally Closed, 1 A @ 240 VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOOD</td>
<td>Normally Open, 0.15 A @ 30 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCDD</td>
<td>Normally Closed, 0.15 A @ 30 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D3A</td>
<td>Dual, Normally Open, 30 VDC (1 FT only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3A</td>
<td>T.N.O, T.N.C, Solid State, 0.15 A @ 30 VDC (1 FT only)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF</td>
<td>Solid-core, front terminal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FT</td>
<td>Solid-core, top terminal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>No LED</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BS</td>
<td>3 A @ 120 VAC (FF only)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BS</td>
<td>15 A @ 120 VAC (FF only)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**AS3 Series Version 4**

The AS3 series current sensing switches are the go-to models for a huge variety of applications. The models designed to control AC circuits can be manufactured with 1, 3 or 15 A capacities. The models with DC capabilities can be manufactured with dual contacts, adjustable between the selected ranges. NK Technologies’ original designs are refined to a wide range of application.

### Current Sensing Switch Dimensions

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

**AC Current Sensing Switches**

The ASL Series Current Sensing Switches provide a current operated solid-state contact powered from the monitored circuit. The trip point adjustment uses a single turn potentiometer. By turning the adjustment arrow to the current magnitude needed, the installer can set the point where the output changes state when the monitored circuit is not energized. With the split-core case option, installation is just a matter of placing the sensor over the conductor. It couldn’t be easier.

### Current Sensing Switch Applications

**AC Motor Loads**
- Set a normally open contact over the normal running current level and it will open if the drive belt breaks or comes off the sheaves.
- Set a normally closed contact below the normal running current level and it will open on overload conditions.
- Monitor up to 150 A loads.

**Critical Lighting Loads**
- Monitor security lighting and water navigational indicators.

**Heating Loads**
- Receive independent verification that an element is working properly.
- Monitor drying and curing processes remotely.

### Current Sensing Switch Features

**Easily Established Contact Actuation Point**
- Patented potentiometer setpoint selection.
- Trip point indicated on the labeling.
- Trip point can be set without energizing the monitored load, allowing a large measure of safety.
- Two-second delay before contact action upon initial energization allows the output to ignore motor inrush current.

**Isolation**
- Output is magnetically isolated from the input for safety.
- Eliminates insertion losses, no added burden.

**Solid-state Reliability**
- No moving components for switching.
- No need for periodic maintenance or calibration.

**Panel Mounted Solid- or Split-core Case**
- Split-core case allows installation without disturbing existing wiring and can be mounted in any position. Either case can be attached to a panel, hung on the conductor or on a DIN rail adapter (included). *
- Both solid- or split-core cases provide windows large enough for 150 A loads, non-contact design provides complete isolation between monitored load and control circuitry.

**No External Power Needed**
- Sensor is powered from the monitored AC circuit.
- Choose normally open (closing on current increase) or normally closed (opening on current increase).
- Fast action contact reacts quicker than RTD, thermocouples, or bimetallic thermal elements.

**UL/cUL and CE Approved**
- Accepted worldwide.
- Not polarity sensitive.

*For information on the DIN rail accessories kit, see page 144.

---

**Current Sensing Switch Specifications**

- **Power Supply**: None, self-powered
- **Input Range**: 1–150 A (adjustable)
- **Output Description**: Isolated solid-state relay (AC/DC)
- **Output Rating**: 150 mA @ 240 VAC/DC N.O.
- **Response Time**: 2 seconds on initial energization
- **Isolation Voltage**: UL listed to 127VAC, listed to 5 kV
- **Frequency Range**: 50–60 Hz (AC), 0–55 Hz (DC)
- **Environmental**
  - UL/cUL, CE
  - 0 to 122°F (-20 to 50°C)
  - 0–95% RH, non-condensing

---

**Current Sensing Switch Ordering Information**

Sample Model Number: ASL1-NOU-FF
Solid-core AC current sensing switch with single turn setpoint adjustment, Smart LED standard (DIN rail adapters are included)

**Current Sensing Switch Connections**

![Connection Diagram](connection_diagram.png)

Notes:
- Zinc plated screw terminals solid-core case.
- Deadfront enclosed terminals split-core case.
- 12–22 AWG solid or stranded.
- Not polarity sensitive.
ASM SERIES
Self-calibrating Smart-Switches

The patented design of the ASM Series Self-calibrating Smart-Switch is more accurate and easier to use than previous models. This Smart-Switch uses the actual load current to set the trip point. It takes just a couple of seconds of steady running conditions before the sensor locks onto the normal current level. The ASM Series is designed for overload, underload, or operating window applications. Upon sensing an average operating current, the ASM self-learns and establishes a limit-alarm trip point based on 85–125% of normal current (over/underload model only). Available in a solid- or split-core case.

Current Sensing Switch Specifications

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>None, self-powered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setpoint Range</td>
<td>Solid-core: 1.5–150 A</td>
</tr>
<tr>
<td></td>
<td>Split-core: 2.8–150 A (self-calibrating)</td>
</tr>
<tr>
<td>Output Description</td>
<td>Isolated solid-state relay</td>
</tr>
<tr>
<td>Setpoint Calibration</td>
<td>Output changes with AC current between 85%</td>
</tr>
<tr>
<td></td>
<td>and 125% of normal running current</td>
</tr>
<tr>
<td>Output Rating</td>
<td>Normally Open</td>
</tr>
<tr>
<td></td>
<td>Normally Closed</td>
</tr>
<tr>
<td></td>
<td>Self-Calibrating</td>
</tr>
<tr>
<td>Off-state Leakage</td>
<td>&lt;10 μA</td>
</tr>
<tr>
<td>Response Time</td>
<td>200 ms</td>
</tr>
<tr>
<td>Time Delay</td>
<td>None</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>5%</td>
</tr>
<tr>
<td>Overload</td>
<td>500 A @ 6 sec., 1000 A @ 1 sec.</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>UL listed to 1270 VAC, tested to 5 KV</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>6–100 Hz</td>
</tr>
<tr>
<td>Case</td>
<td>UL94 V-0 Flammability Rated</td>
</tr>
<tr>
<td>Environmental</td>
<td>-4 to 122°F (-20 to 50°C)</td>
</tr>
<tr>
<td></td>
<td>0–95% RH, non-condensing</td>
</tr>
<tr>
<td>Listings</td>
<td>UL/cUL, CE</td>
</tr>
</tbody>
</table>

Current Sensing Switch Dimensions

FT Case

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload trip point</td>
<td>0.93''</td>
</tr>
<tr>
<td>Underload trip point</td>
<td>0.75''</td>
</tr>
<tr>
<td>Minimum operation level</td>
<td>0.19''</td>
</tr>
</tbody>
</table>

SP Case

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload trip point</td>
<td>0.93''</td>
</tr>
<tr>
<td>Underload trip point</td>
<td>0.75''</td>
</tr>
<tr>
<td>Minimum operation level</td>
<td>0.19''</td>
</tr>
</tbody>
</table>

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

AS1M SERIES
Self-powered and Self-calibrating
\* Speeds startup, cuts installation costs.

Status Monitoring, Overload, and Operating Window Options

\* Choose the operating style that matches your application.

Universal Output

\* AC or DC compatibility with any automation system.

UL/cUL and CE Approved

\* Accepted worldwide.
**ASC SERIES**

**Factory-calibrated Current Sensing Switches**

ASC Series Current Sensing Switches are precision calibrated at the factory per customers’ specifications and guaranteed within 1% accuracy. Because the switch is factory-calibrated eliminating the need to turn the potentiometer to the correct position in the field, installation time is substantially reduced resulting in a significant cost savings. The ASC combines a current transformer, signal conditioner and limit alarm into a single package for use in status monitoring or proof of operation applications and is perfect for OEM applications where the need for a limit alarm is required. Available in a solid-core or a split-core case to maximize ease of installation.

### Current Sensing Switch Features

**Universal Output**
- N.O. or N.C. solid-state switch for control circuits up to 135 VAC/DC.
- Compatible with most automation systems.

**Self-powered**
- Cuts installation and operating costs.

**Precision-calibrated Factory Set Trip Point**
- Speeds startup.
- Improves safety.

**Solid- or Split-core Case**
- Versions tailored for each installation.

**LED Indication**
- Provides quick visual indication of contact status.

**Built-in Mounting Feet**
- Simple, two-screw panel mounting or attach with DIN rail adapters (included).

**Designed for UL/cUL and CE Approval**
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

### Current Sensing Switch Applications

**Electronic Proof of Flow**
- Current operated switches eliminate the need for multiple pipe or duct penetrations and are more reliable than electromechanical pressure or flow switches.

**Conveyors**
- Detects jams and overloads.
- Interlocks multiple conveyor sections.

**Lighting Circuits**
- Easier to install and more accurate than photocells.

**Electrical Heaters**
- Faster response than temperature sensors.

**Air Handling Fan Protection**
- Factory-set trip points are ideal when there are several loads, all using the same motor to drive the fan blades.

### Current Sensing Switch Specifications

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>None, self-powered</th>
</tr>
</thead>
</table>
| Setpoint Range | • Solid-core: 2–150 A (factory set)  
• Split-core: 3–150 A (factory set) |
| Output Description | Isolated solid-state relay |
| Output Rating | • N.O. Version: 0.3 A @ 135 VAC or VDC  
• N.C. Version: 0.3 A @ 135 VAC or VDC  
• Not polarity sensitive |
| Off-state Leakage | ≤10 μA |
| Response Time | 120 ms |
| Time Delay | None |
| Hysteresis | 5% |
| Overload | 400 A @ 6 sec., 1000 A @ 1 sec. |
| Isolation Voltage | Tested to 5 KV |
| Frequency | 6 - 100 Hz |
| Case | UL94 V-0 Flammability Rated  
• Solid-core: 4 to 122°F (-20 to 50°C)  
• Split-core: 0-95% RH, non-condensing |
| Listings | Designed for UL/cUL and CE approval |

### Current Sensing Switch Ordering Information

Sample Model Number: ASC-NOU-6-SP-090

Factory-set AC current operated switch, normally open, 60 Hz frequency, solid-case, 90 A trip point. DIN rail adapters are included.

### Current Sensing Switch Ordering Information

<table>
<thead>
<tr>
<th>Output</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.O.</td>
<td>Normally Open</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N.C.</td>
<td>Normally Closed</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Case Style**
- Solid-core: 10-72°F (–20 to 50°C)
- Split-core: 0-95% RH, non-condensing

**Factory Set Trip Point**
- 002 to 150 A
- Solid-core model: factory-set trip point in amps.
- Split-core model: factory-set trip point in amps.
ASD SERIES

Current Sensing Switches

ASD Series Current Sensing Switches provide a limit alarm contact with the easiest adjustment method ever designed. The single turn potentiometer allows the trip point to be set before the sensor is installed, or before the monitored circuit is energized. The LED display provides a quick visual indication of where the contact changes.

Current Sensing Switch Applications

Electronic Proof of Operation
- Current operated switches eliminate the need for multiple pipe or duct penetrations and are more reliable than electromechanical pressure or flow switches.

Conveyor
- Detects jams and overloads.
- Interlocks multiple conveyor sections.

Pump Control
- Output contact is adjusted so it is closed during normal operation, opening if the pump runs dry or there is a loss of head pressure for any reason.

Cooling Towers
- Monitor for overcurrent conditions caused by open duct access doors or undervoltage from a broken drive belt or coupling.

Conveyor Protection
- If the conveyor jams, the solid-state contact opens to stop the infeed or drive motor.

Current Sensing Switch Features

Solid-state Output
- N.O. or N.C. solid-state switch for control circuits up to 240 VAC.
- Compatible with most automation systems.

External Powered
- Allows for higher accuracy.
- Easily Adjustable and Precise Setpoint
- Speeds startup.
- Improves the safety by allowing the trip point adjustment with no power through the sensing window.

LED Display
- Provides quick visual indication of where the contact changes. When current exceeds the setpoint, the display flashes on and off.
- Easiest and most accurate setpoint adjustment available.

Built-in Mounting Feet
- Simple, two-screw panel mounting or attach with DIN rail adapters (included).*

UL/cUL and CE Approved
- Accepted worldwide.
- For information on the DIN rail accessories kit, see page 144.

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.

ASD SERIES

ASD SERIES

Current Sensing Switch Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>24 VAC/DC (18–28 V)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>70 mA max.</td>
</tr>
<tr>
<td>Setpoint Range</td>
<td>• ASD1: 1–50 A (adjustable)</td>
</tr>
<tr>
<td></td>
<td>• ASD2: 4–200 A (adjustable)</td>
</tr>
<tr>
<td>Output Description</td>
<td>Isolated solid-state relay</td>
</tr>
<tr>
<td>Output Rating</td>
<td>Max: 1.0 A @ 240 VAC</td>
</tr>
<tr>
<td>Off-state Leakage</td>
<td>+&lt;10 μA normally open</td>
</tr>
<tr>
<td></td>
<td>+2.5 mA normally closed</td>
</tr>
<tr>
<td>Response Time</td>
<td>120 ms max.</td>
</tr>
<tr>
<td>Time Delay</td>
<td>None</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>3%</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>Tested to 5 KV</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>6–100 Hz</td>
</tr>
<tr>
<td>Case</td>
<td>UL94 V-0 Flammability Rated</td>
</tr>
<tr>
<td>Environmental</td>
<td>-4 to 127°F (-20 to 50°C)</td>
</tr>
<tr>
<td></td>
<td>0–95% RH, non-condensing</td>
</tr>
<tr>
<td>Listings</td>
<td>UL/cUL, CE</td>
</tr>
</tbody>
</table>

Current Sensing Switch Dimensions

Current Sensing Switch Connections

Display: Shows trip point in amps so 15 A displays 015.

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

Current Sensing Switch Ordering Information

Sample Model Number: ASD1-NONAC-24U-FL
Adjustable AC current operated switch, normally open, solid-core case. DIN rail adapters are included.

(1) Range
- 1: 1–50 A switch adjustment
- 2: 4–200 A switch adjustment

(2) Output Contact
- N.O.: Normally Open, closes on current rise, AC, control only
- N.C.: Normally Closed, opens on current rise, AC, control only

(3) Power Supply
- 24VAC or DC

(4) Case Style
- FL: Solid-core
ASO SERIES
Current Sensing Switches

ASO Series Current Sensing Switches are designed to detect very low AC current, and provide a solid-state contact to open or close at a setpoint adjustable from 3 mA to 350 mA across two ranges. Useful for signal or lamp status monitoring, detecting low level fault currents or fan status proofing, the ASO Series features solid-state outputs and jumper-selectable ranges, which make it a versatile choice for low-current status indication applications.

Current Sensing Switch Features

- **Wide Range of Output Options**
  - Dependable, solid-state relay N.O. or N.C. contacts rated at 240 VAC or 30 VDC.
  - Compatible with most automation controllers.
- **Isolated Inputs and Outputs**
  - Inductive sensing eliminates insertion loads on monitored circuits, effectively isolating it from the unit.
  - Isolated outputs simplify wiring and enhance safety.
- **Adjustable Setpoints**
  - Setpoints are field-adjustable from 3 mA to 350 mA, speeding installation and allowing for tailored applications.
- **UL/cUL and CE Approved**
  - Accepted worldwide.

Current Sensing Switch Applications

- **Fan Monitoring**
  - Fan status in heating and drying applications.
  - Identify lamp outages or other malfunctions through changes in current consumption.
- **Fractional HP Motors**
  - Ideal for monitoring small motors used in critical applications, for example, fan status proofing on a crucial cooling fan.
- **LED Lamp Operation**
  - Switch can detect LED light sources drawing less than one half watt at 120 VAC.

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

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

- **Status Alarming**
  - AC Connections
- **Current Sensing Switch Connections**
  - DC Connections

Current Sensing Switch Ordering Information

Sample Model Number: ASO-NODC-120
Ultra low current sensing switch, normally open solid-state DC output and 120 VAC power supply. (DIN rail adapters are included)

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASO</td>
<td></td>
</tr>
</tbody>
</table>

(1) **Output Type**
- N/O/DC: Normally Open; DC @ 120 VAC
- N/C/DC: Normally Closed; DC @ 120 VAC
- N/O/BVDC: Normally Open; 0.15 A @ 30 VDC
- N/C/BVDC: Normally Closed; 0.15 A @ 30 VDC

(2) **Power Supply**
- 24V: 24 VAC/DC
- 120: 120 VAC

Notes:
- Terminals are #6 screws.
- Use up to 14 AWG solid or stranded.
- Power connections are not polarity sensitive.
- DC output connections are polarity sensitive.

Current Sensing Switch Dimensions

- Case
- 0.20" (5.1 mm)
- 1.38" (35.6 mm)
- 2.90" (73.7 mm)
- 0.75" (19.0 mm)
- 3.38" (86.0 mm)
- 0.75" (19.0 mm)
- 2.50" (63.0 mm)
- 3.38" (86.0 mm)

- Power Status
- Setpoint
- Range Jumper
- Low
- High

Current Sensing Switch Specifications

- **Power Supply**
  - 120 VAC (96–144 V)
  - 24 VAC/DC (19–29 V)
- **Power Consumption**
  - 2.5 mA
- **Setpoint Range**
  - Low Range: 3–15 mA (adjustable)
  - High Range: 15–350 mA (adjustable)
- **Input**
  - 10 A max.
- **Output Rating**
  - AC Version: 1 A @ 240 VAC
  - DC Version: 0.15 A @ 30 VDC
- **Response Time**
  - 100 ms @ 5% above setpoint
  - 100 ms @ 50% above setpoint
- **Time Delay**
  - None
- **Hysteresis**
  - 5% of setpoint
- **Overload**
  - 10 A continuous
- **Frequency Range**
  - 50–400 Hz
- **Isolated Output**
  - Available N.O. or N.C., DC Version
- **Monitored Conductor**
  - 120 VAC or 24 VAC/DC
- **Power Status**
  - Low
  - High
  - Range Jumper
  - 0.75" (19.0 mm)
  - 0.75" (19.0 mm)

- **Input**
  - 10 A max.
- **Output Rating**
  - AC Version: 1 A @ 240 VAC
  - DC Version: 0.15 A @ 30 VDC
- **Response Time**
  - 150 ms @ 5% above setpoint
  - 100 ms @ 50% above setpoint
- **Time Delay**
  - None
- **Hysteresis**
  - <5%
- **Overload**
  - 10 A continuous
- **Isolation Voltage**
  - 1270 VAC, tested to 5 kV
- **Frequency Range**
  - 50–400 Hz
- **Case**
  - UL94 V-0 Flammability Rated
- **Environmental**
  - -4 to 122°F (-20 to 50°C)
  - 0–95% RH, non-condensing
- **Listings**
  - UL/cUL, CE

ASO SERIES
Current Sensing Switches

Current Sensing Switches

3511 Charter Park Drive  •  San Jose, CA  95136
800.959.4014  •  www.nktechnologies.com   •  sales@nktechnologies.com

3511 Charter Park Drive  •  San Jose, CA  95136
800.959.4014  •  www.nktechnologies.com   •  sales@nktechnologies.com
ASX SERIES
Current Sensing Switches

ASX Series Current Sensing Switches are high performance current sensing switches with field-adjustable time delay to help minimize nuisance trips during startup and operation. Designed for motor status applications where setpoint accuracy and repeatability are critical, the ASX Series offers a linear setpoint characteristic and constant hysteresis. Standard features include self-powering, jumper-selectable ranges and a choice of outputs and cases.

Current Sensing Switch Applications

Motor Protection
- Serves as an electronic proof-of-operation; detects current draw changes in motors when they encounter problems such as pumps running dry or pending bearing failure.
- Non-intrusive, less expensive to install than differential pressure flow sensors or thermal switches.
- Much quicker response time than Class 10 overload switches.

High Inrush or Temporary Overload Current
- Adjustable startup/delay timer allows 0.2–15 second delay to eliminate nuisance trips from high inrush or short overload conditions.

Current Sensing Switch Features

Adjustable Startup/Delay Timer
- Field adjustable from 0.12 to 15 seconds to eliminate nuisance alarms due to startup inrush or temporary overcurrent conditions.

Choice of N.O./N.C. AC or Universal Outputs
- Contact ratings of 1.0 A @ 240 VAC or universal outputs of 0.15 A @ 240 VAC/DC (N.O. models) and 0.2 A @ 135 VAC/DC (N.C. models) for use with most standard motor control systems.

Improved Ease of Installation and Use
- 1.0 A AC rating eliminates need for time delay relay.
- Self-powered, split-core models simplify installation.
- Status LED provides visual indication of setpoint trip and contact action.

Industrial Grade Performance
- Constant hysteresis, linear response characteristics enhance setpoint accuracy.

UL/cUL and CE Approved
- Accepted worldwide.

Current Sensing Switch Specifications

| Power Supply | None, self-powered |
| Setpoint Range | - FT: 1.5–12, 12–55 & 50–175 A |
|               | - SP: 2–12, 12–55 & 50–200 A |
| Output Description | Isolated solid-state relay |
| Output Rating | - N.O.: 0.15 A @ 240 VAC or VDC |
|               | - N.C.: 0.2 A @ 135 VAC or VDC |
| Off-state Leakage | N.O.: <0.5 micro A |
|               | N.C.: 2.5 mA |
| Response Time | 0.12–15 sec. |
| Time Delay | Adjustable |
| Hysteresis | 5% |
| Overload | - 1.5–12 A range: 600 A max. |
|               | - 12–55 A range: 1200 A max. |
|               | - 50–200 A range: 2400 A max. |
| Isolation Voltage | UL listed to 1270 VAC, tested to 5 KV |
| Frequency Range | 50–100 Hz |
| Case | UL94 V-0 Flammability Rated |
| Environmental | -4 to 122°F (-20 to 50°C) |
|               | 0–95% RH, non-condensing |
| Listings | UL/cUL, CE |

Current Sensing Switch Dimensions

FT Case

SP Case

Current Sensing Switch Connections

For additional Application Examples, go to www.nktechnologies.com/applications
ASP-FD SERIES

Current Sensing Switches

ASP-FD Series Current Sensing Switches allow two separate trip points to detect overcurrent and undercurrent conditions. The sensor outputs are dual, single-pole, double-throw relays, so they can control either AC or DC circuits and provide an alarm if the monitored circuit draws too little or too much current. One sensor means less installation time and less panel space required. The Status LEDs indicate if the monitored circuit current is under or over each of the trip points.

Series Current Sensing Switch Applications

Electronic Proof of Operation
- Current operated switches eliminate the need for multiple pipe or duct penetrations and are more reliable than electromechanical pressure or flow switches.

Conveyors
- Detect jams and overloads.
- Interlocks with safety equipment.

Pump Control
- Output contact is adjusted so it is closed during normal operation, opening if the pump runs dry or there is a loss of head pressure for any reason.

Cooling Towers
- Monitor for overcurrent conditions caused by open duct access doors or undercurrent from a broken drive belt or coupling.

Pump Protection
- Detect seizing bearings or obstructed impellers, and draw less current when the intake suction is blocked or the discharge is not connected.

Series Current Sensing Switch Features

Two Electromechanical Relay Outputs
- Access to both the N.O. and N.C. contacts at independent setpoints.
-Because relay outputs are floating they can be wired in parallel or in series for a two-wire over/under switch.

Externally Powered
- Allows for higher accuracy.

Easily Adjustable and Precise Setpoint
- Single turn potentiometer: point the arrow at the current value where you need the output to change, and you are done.
- Improves the safety by allowing the trip point adjustment with no setpoint power through the sensing window.
- Easiest setpoint adjustment available.

Solid-core Case
- Sensing window provides ample space for bus bar, single or multiple conductors.

Mounting Options
- Sensor can snap onto a DIN rail or be mounted to a back panel with screws.
- “Finger-safe” terminals are located on the sensor top.
- UL/cUL and CE Approved
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

*For information on the DIN rail accessories kit, see page 144.

Current Sensing Switch Specifications

- **Power Supply**: 24 VAC/DC (±2% variation)
- **Output**: Dual single-pole, double-throw relays
- **Output Rating**: Maximum 10 A up to 120 VAC, 2 A to 30 VDC
- **Off-State Leakage**: None
- **Response Time**: 40–120 ms
- **Hysteresis**: 4% of range
- **Overload**: 6 sec: 3 x range
- **Disarming Time**: 1 sec: 5 x range
- **Isolation Voltage**: Tested to 5000 VAC
- **Frequency Range**: 40–65 Hz
- **Environmental**: UL94 V0 Flammability Rated
- **Power Supply**: 24VAC/DC, solid-core case
- **Case**: UL/cUL, CE

Current Sensing Switch Ordering Information

Sample Model Number: ASP1-DPT-24U-FD
Dual adjustable AC current operated relay, 1–20 A range, 24 VAC or DC power supply, solid-core case.

**Model Number Format**

ASP - D P T - 2 4 U - F D

(1) Range
(2) Power Supply
(3) Case Style
(4) Output Contact

- **Range**
  - 1: 1–20 A
  - 2: 2–35 A
  - 3: 4–65 A
  - 4: 8–120 A
  - 5: 15–220 A
  - 6: 25–400 A

- **Power Supply**
  - DPT: Two independent SPDT relays
  - DC/AC: Single SPDT relay

- **Case Style**
  - FD: Solid-core, DIN rail, or panel-mounting

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

Current Sensing Switches

ASXP Series Current Sensing Switches are powered versions of our popular current switches with integral time delay. A fixed two-second delay upon initial energization of monitored load minimizes nuisance alarms during startup and operation in motor or heater status applications. After startup a separate 0–20 second delay can be set. For use with 24 VAC/DC or 120 VAC power supplies, this high performance product offers OEM-caliber accuracy, precision tolerances, low hysteresis and an operation range between 40 and 100 Hz. Available with status LED and solid-core case as standard.

Current Sensing Switch Applications

Motor Protection
- Serves as an electronic proof-of-operation; detects current draw changes in motors when they encounter problems such as pumps running dry or impending bearing failure.
- Non-intrusive, less expensive to install than differential pressure flow sensors or thermal switches.
- Much quicker response time than Class 10 overload switches.

High Inrush or Temporary Overload Current
- Factory-set two-second delay on startup eliminates nuisance trips from high inrush or short overload conditions. After startup, a second 0.2–20 second user-adjustable delay is available.

Safety Interlocks

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

Current Sensing Switch Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>24 VAC/DC or 120 VAC</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>&lt;2 VA</td>
</tr>
<tr>
<td>Setpoint Range Type</td>
<td>ASXP1: 1–20 A (adjustable) ASXP2: 20–50 A (adjustable) ASXP3: 50–80 A (adjustable)</td>
</tr>
<tr>
<td>Output Description</td>
<td>Electromechanical SPDT relay</td>
</tr>
<tr>
<td>Output Rating</td>
<td>1 A @ 120 VAC, 2 A @ 380 VAC</td>
</tr>
<tr>
<td>Time Delay</td>
<td>2.0 sec. (fixed on startup) 0.2–20 sec. (adjustable after startup)</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>5%</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>UL listed to 1270 VAC, tested to 5 kV</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>40–100 Hz</td>
</tr>
<tr>
<td>Case Style</td>
<td>UL94 V-0 Flammability Rated</td>
</tr>
<tr>
<td>Environmental</td>
<td>-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing</td>
</tr>
<tr>
<td>Listings</td>
<td>UL/cUL, CE</td>
</tr>
</tbody>
</table>

ASXP SERIES

Current Sensing Switch Features

Fixed Startup/Delay Timer
- Factory-calibrated trip timer set to 2 seconds to eliminate nuisance alarms due to startup inrush or temporary overcurrent conditions.

Form C Electromechanical Relay Output
- Contact rating of 1 A, up to 120 VAC, provides adequate switching capacity for use with most motor control systems.

Improved Ease of Installation and Use
- Eliminates need for separate time delay relay.
- Choice of 24 VAC/DC or 120 VAC power supply models.
- LED provides indication of trip point contact status.
- Setpoint adjustable from 1–80 A.

Industrial Grade Performance
- Repeatability performance, precise time delay setpoint, constant hysteresis and linear trip point adjustment.
- UL/cUL and CE Approved
- Accepted worldwide.

ASXP SERIES

Current Sensing Switch Dimensions

FL Case

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>3.87” 98.3mm</td>
</tr>
<tr>
<td>Height</td>
<td>1.50” 38.1mm</td>
</tr>
<tr>
<td>Depth</td>
<td>2.90” 73.7mm</td>
</tr>
<tr>
<td>Probe Diameter</td>
<td>0.45” 11.4mm</td>
</tr>
<tr>
<td>Probe Length</td>
<td>0.75” dia. 19.0mm</td>
</tr>
</tbody>
</table>

Current Sensing Switch Connections

120 VAC
(or 24 VAC or DC)

Stop LED
power indicator weighted
Probe

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.
ASXP-MS SERIES
Current Sensing Switches

ASXP-MS Series Current Sensing Switches combine a current transformer and signal conditioner into a single package. The large, easy-to-install split-core design allows for installation over existing conductors without the need to disconnect the load, even in applications where there are multiple conductors per phase. For new installations, the installation is just as easy. Just remove the top portion of the sensing ring, place the conductors inside, and snap the top back in place. The output relay energizes when the AC current through the sensing ring exceeds the adjustable setpoint, providing one contact to close and the other to open on current rise.

Current Sensing Switch Applications

Monitor Large Machines

• Detect over or undercurrent conditions before they cause break downs, or interlock one process with another.

Water Delivery and Treatment

• Detect clogged filters or blocked intake to pumps.

Generators

• Shed noncritical loads when demand reaches a set level.

Crusher Monitoring

• If the crusher drive draws to much current, the infeed belt can be stopped automatically, allowing the crusher to clear before restarting. The ASXP-MS also has a set of relay contacts for alarm of over or undercurrent conditions.

Test & Evaluation Units for OEMs

• Test program expedites evaluation process. See page 3 for details.

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

Current Sensing Switch Features

Electromechanical Relay Output
• Provides both normally open and normally closed contacts.
• Compatible with most automation and control systems.

Externally Powered
• Complete isolation between the sensor power and the controlled circuit.
• Provides a choice of failsafe* or standard operation.

Simple Field Setpoint Adjustment
• Single turn potentiometer with setpoint shown on label.
• Adjustable start delay to bypass inrush current.

Split-core Case
• Sensing window provides ample space for bus bar, single or multiple conductors.

DIN Rail** or Panel Mounted Case
• Simply snap onto DIN rail or attach with screws to a panel for secure mounting.

UL/cUL and CE Approved
• Accepted worldwide.

ASXP-MS SERIES

Current Sensing Switch Specifications

- Power Supply: 120 VAC or 24 VAC/DC (22-36 V)
- Power Consumption: <4 VA
- Input Range: +250–200 A
- Output Description: Electromechanical SPDT relay
- Output Rating: 1 A @ 120 VAC, 2 A @ 30 VDC max.
- Indicating Bi-color LED: Green Power on, current within range
- Red: Power off or current over setpoint
- OFF: Power off or current less than 20% of range
- Output Operation: Selectable: Normal or failsafe*
- Response Time: 900 ms max.
- Time Delay: 0.1 to 16 sec. (adjustable)
- Hysteresis: 5%
- Isolation Voltage: UL listed to 1270 VAC, tested to 5 KV
- Frequency Range: 6–100 Hz
- Case: UL94 V-0 Flammability Rated
- Environmental: -40 to 122°F (-20 to 50°C), 0–95% RH, non-condensing
- Listings: UL/cUL, CE

Current Sensing Switch Dimensions

<table>
<thead>
<tr>
<th>Case</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS Case</td>
<td>3.10&quot;</td>
<td>78.7mm</td>
</tr>
</tbody>
</table>

Note: Drawings are not to scale.

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.

Current Sensing Switch Ordering Information

Sample Model Number: ASXP8-SDT-120-MS

- AC current switch, 200–800 A range, SPDT relay output, 120 VAC powered, medium split-core case, DIN rail mounting.

<table>
<thead>
<tr>
<th>(1) Range</th>
<th>(2) Type</th>
<th>(3) Output</th>
<th>(4) Power Supply</th>
<th>(5) Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>100–200 A</td>
<td>SDT</td>
<td>24 VAC/DC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>4</td>
<td>200–400 A</td>
<td>SDT</td>
<td>120 VAC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>6</td>
<td>400–600 A</td>
<td>SDT</td>
<td>24 VAC/DC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>8</td>
<td>600–800 A</td>
<td>SDT</td>
<td>120 VAC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
</tbody>
</table>

For a description of failsafe operation, see the installation instructions.

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

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.

Current Sensing Switch Connections

<table>
<thead>
<tr>
<th>Output Type</th>
<th>(1) Range</th>
<th>(2) Output</th>
<th>(3) Power Supply</th>
<th>(4) Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDT</td>
<td>100–200 A</td>
<td>SDT</td>
<td>24 VAC/DC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>200–400 A</td>
<td>SDT</td>
<td>120 VAC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>400–600 A</td>
<td>SDT</td>
<td>24 VAC/DC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>600–800 A</td>
<td>SDT</td>
<td>120 VAC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
</tbody>
</table>

For a description of failsafe operation, see the installation instructions.

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

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.

Current Sensing Switch Connections

<table>
<thead>
<tr>
<th>Output Type</th>
<th>(1) Range</th>
<th>(2) Output</th>
<th>(3) Power Supply</th>
<th>(4) Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDT</td>
<td>100–200 A</td>
<td>SDT</td>
<td>24 VAC/DC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>200–400 A</td>
<td>SDT</td>
<td>120 VAC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>400–600 A</td>
<td>SDT</td>
<td>24 VAC/DC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>600–800 A</td>
<td>SDT</td>
<td>120 VAC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
</tbody>
</table>

For a description of failsafe operation, see the installation instructions.

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

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.

Current Sensing Switch Connections

<table>
<thead>
<tr>
<th>Output Type</th>
<th>(1) Range</th>
<th>(2) Output</th>
<th>(3) Power Supply</th>
<th>(4) Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDT</td>
<td>100–200 A</td>
<td>SDT</td>
<td>24 VAC/DC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>200–400 A</td>
<td>SDT</td>
<td>120 VAC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>400–600 A</td>
<td>SDT</td>
<td>24 VAC/DC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>600–800 A</td>
<td>SDT</td>
<td>120 VAC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
</tbody>
</table>

For a description of failsafe operation, see the installation instructions.

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

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.

Current Sensing Switch Connections

<table>
<thead>
<tr>
<th>Output Type</th>
<th>(1) Range</th>
<th>(2) Output</th>
<th>(3) Power Supply</th>
<th>(4) Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDT</td>
<td>100–200 A</td>
<td>SDT</td>
<td>24 VAC/DC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>200–400 A</td>
<td>SDT</td>
<td>120 VAC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>400–600 A</td>
<td>SDT</td>
<td>24 VAC/DC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
<tr>
<td>SDT</td>
<td>600–800 A</td>
<td>SDT</td>
<td>120 VAC</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
</tbody>
</table>

For a description of failsafe operation, see the installation instructions.

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

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.
**ASXP-LS SERIES**

**Current Sensing Switches**

ASXP-LS Series Current Switches combine a current transformer and signal conditioner into a single package. The large, easy-to-install, split-core design allows for installation over existing conductors without the need to disconnect the load, even in applications where there are multiple conductors per phase. For new installations, the installation is just as easy. Just remove the top portion of the sensing ring, place the conductors inside, and snap the top back in place. The switch output is externally powered, and the setpoint is adjustable between a very wide range. The mechanical relay contact provides a trouble free, long lasting, and very durable alarm or interlock, improving safety and overall system reliability.

**Current Sensing Switch Applications**

Monitor Large Machines
- Detect over or undercurrent conditions before they cause break downs, or interlock one process with another.

Water Delivery and Treatment
- Detect open discharge lines.
- Sense clogged filters or blocked intake to pumps.

Generators
- Shed noncritical loads when demand reaches a set level.

Interlock Infeed Conveyor with Main Crusher

**Current Sensing Switch Features**

**Electromechanical Relay Output**
- Provides both normally open and normally closed contacts.
- Compatible with most automation and control systems.

**Externally Powered**
- Provides a choice of failsafe* or standard operation.

**Simple Field Setpoint Adjustment**
- Single turn potentiometer with setpoint shown on label.
- Adjustable start delay to bypass inrush current.

**Split-core Case**
- Sensing window provides ample space for bus bar, single or multiple conductors.

**DIN Rail** or Panel Mounted Case
- Simple snap onto DIN rail or attach with screws to a panel for secure mounting.

UL/cUL and CE Approved
- Accepted worldwide.

*For a description of failsafe operation, see the installation instructions.

**Current Sensing Switch Connections**

External Power Supply
- Provides a choice of failsafe* or standard operation.

Simple Field Setpoint Adjustment
- Single turn potentiometer with setpoint shown on label.
- Adjustable start delay to bypass inrush current.

Split-core Case
- Sensing window provides ample space for bus bar, single or multiple conductors.

**Current Sensing Switch Specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>+120 VAC (108–132 V)</td>
</tr>
<tr>
<td></td>
<td>+24 VAC/DC (22–36 V)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>&lt;4 VA</td>
</tr>
<tr>
<td>Input Range</td>
<td>8: 200–800 A</td>
</tr>
<tr>
<td></td>
<td>10: 400–1000 A</td>
</tr>
<tr>
<td></td>
<td>12: 600–1200 A</td>
</tr>
<tr>
<td></td>
<td>16: 1000–1600 A</td>
</tr>
<tr>
<td>Output Description</td>
<td>Electromechanical SPDT relay</td>
</tr>
<tr>
<td>Output Rating</td>
<td>1 A @ 120 V, 2 A @ 30 V/DC, max.</td>
</tr>
<tr>
<td>Indicating Bi-color LED</td>
<td>Green: Power on, current within range</td>
</tr>
<tr>
<td></td>
<td>Red: Power on, current over setpoint</td>
</tr>
<tr>
<td></td>
<td>Off: Power off or current less than 20% of range</td>
</tr>
<tr>
<td>Output Operation</td>
<td>Selectable: Normal or failsafe*</td>
</tr>
<tr>
<td>Response Time</td>
<td>900 ms max.</td>
</tr>
<tr>
<td>Time Delay</td>
<td>0.5 to 16 sec (adjustable)</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>5%</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>UL listed to 1270 VAC, tested to 5 KV</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>10–100 Hz</td>
</tr>
<tr>
<td>Case</td>
<td>UL94 V-0 Flammability Rated</td>
</tr>
<tr>
<td>Environmental</td>
<td>-4 to 127°F (-20 to 50°C)</td>
</tr>
<tr>
<td></td>
<td>0–95% RH, non-condensing</td>
</tr>
<tr>
<td>Listings</td>
<td>UL/cUL, CE</td>
</tr>
</tbody>
</table>

*For a description of failsafe operation, see the installation instructions.

**Current Sensing Switch Connections**

For additional Application Examples, go to www.nktechnologies.com/applications
DS1 SERIES
DC Current Sensing Switches

The DS1 Series Current Sensing Switches are designed to trip a solid-state contact when there is DC current through the sensor window. The sensor can be used to interlock two operations for safety. When one load is energized, the contact will keep another from also energizing. The power supply voltage and the controlled circuit voltage can be derived from a single source or separate sources. The monitored circuit can be any DC voltage and any amount of current as long as the conductor will pass through the window. The monitored circuit is completely isolated from the control circuit. If there is ¾ of one amp through the aperture, the output will change state.

Current Sensing Switch Applications
- As a safety interlock, it is a non-intrusive method to keep personnel safe.
- Alarm contact when a load is operating or when it is not energized.
- Detect PV system earth leakage by monitoring the earth bond conductor.
- Use the contact to turn on a lighting circuit when a load is energized.
- Instant indication of equipment status.

Current Sensing Switch Features
- Compact, One-piece Design
  - Fits in easily amongst motor starters and power supplies in crowded control cabinets.
- Input Isolation
  - Safer than shunt/relay combinations.
- Unique Power Supply Connection
  - Sensor power and switched load share a common point making installation easy.
- Built-in Mounting Feet
  - Simple, two-screw installation allows for secure mounting, or attach to a DIN rail with the supplied adaptors*.
- Designed for UL/cUL and CE Approval
  - Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

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

Current Sensing Switch Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>10–28 VDC</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>0.75 VA</td>
</tr>
<tr>
<td>Setpoint Range</td>
<td>0.75 A (Factory set)</td>
</tr>
<tr>
<td>Output Description</td>
<td>Isolated solid-state relay</td>
</tr>
<tr>
<td>Off-state Leakage</td>
<td>&lt;1 μA</td>
</tr>
<tr>
<td>Response Time</td>
<td>600 ms max.</td>
</tr>
<tr>
<td>Time Delay</td>
<td>None, after 5 seconds when first powered up</td>
</tr>
<tr>
<td>Output Rating</td>
<td>1 A up to 30 VDC</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>0%</td>
</tr>
<tr>
<td>Overload</td>
<td>500 A continuous, 1000 A @ 5 sec.</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>Tested to 3 KV</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>DC</td>
</tr>
<tr>
<td>Case</td>
<td>UL94 V-0 Flammability Rated</td>
</tr>
<tr>
<td>Environmental</td>
<td>-4 to 122°F, (20 to 50°C) 0.05% ft. non-condensing</td>
</tr>
<tr>
<td>Listings</td>
<td>Designed to meet UL/cUL and CE approval</td>
</tr>
</tbody>
</table>

Current Sensing Switch Ordering Information

Sample Model Number: DS1-NODC-FF
Solid-core DC current sensing switch closes with 0.75 ADC, normally open, front terminal solid-core case. (DIN rail adapters are included)

DS1 SERIES

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

Test & Evaluation Units for OEMs
Pre-program evaluation available. See page 3 for details.
DS3 SERIES

Current Sensing Switches

DS3 Series Current Sensing Switches combine a Hall effect sensor, signal conditioner and a limit alarm into a single package. The DS3 Series offers three jumper-selected current input ranges and frequency response from DC to 400 Hz. Available in a solid-core case with choice of relay or a universal solid-state output.

Current Sensing Switch Applications

- **Welders and Platers**
  - Instant indication of equipment status.
- **Large Drive Motors**
  - Provides enhanced field loss protection.
- **Power Supplies**
  - Signals overcurrent before equipment fails.
- **Machine Operation**
  - Instant status of motors, lamps and other loads.
- **Telecom Sites**
  - Monitors battery output.

Current Sensing Switch Features

- **Compact, One-piece Design**
  - Fits in easily amongst motor starters and power supplies in crowded control panels.
- **Input Isolation**
  - Safer than shunt/relay combinations.
- **Output Installation**
  - Isolated output greatly simplifies wiring.
- **Pluggable Terminals**
  - Speed installation.
- **Tough**
  - Designed to handle a wide range of temperatures found in industrial environments.
- **Adaptive Hysteresis**
  - Hysteresis is 5% of setpoint, allowing closer control than fixed hysteresis switches.
- **Built-in Mounting Feet**
  - Simple, two-screw installation allows for secure mounting.
- **UL/cUL and CE Approved**
  - Accepted worldwide.

Current Sensing Switch Specifications

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>10–28 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>&lt;2 VA</td>
</tr>
<tr>
<td>Setpoint Range</td>
<td>2–20, 10–50 and 20–100 A DC adjustable (2–14, 10–35, 20–70 A AC)</td>
</tr>
<tr>
<td>Output Description</td>
<td>Isolated solid-state or relay contacts</td>
</tr>
<tr>
<td>Output Rating</td>
<td>Relays: 5.0 A @ 240 VAC, 5.0 A @ 10 VDC (SPDT)</td>
</tr>
<tr>
<td>Off-state Leakage</td>
<td>&lt;10 μA (solid-state), none (relay)</td>
</tr>
<tr>
<td>Response Time</td>
<td>80 ms max</td>
</tr>
<tr>
<td>Time Delay</td>
<td>None</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>5%</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>UL listed to 1270 VAC, tested to 3 KV</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>DC to 400 Hz</td>
</tr>
<tr>
<td>Case</td>
<td>UL94 V-0 Flammability Rated</td>
</tr>
<tr>
<td>Environmental</td>
<td>-4 to 127°F (-20 to 50°C)</td>
</tr>
<tr>
<td></td>
<td>5–95% RH, non-condensing</td>
</tr>
<tr>
<td>Listings</td>
<td>UL/cUL, CE</td>
</tr>
</tbody>
</table>

DS3 Series Current Sensing Switches combine a Hall effect sensor, signal conditioner and a limit alarm into a single package. The DS3 Series offers three jumper-selected current input ranges and frequency response from DC to 400 Hz. Available in a solid-core case with choice of relay or a universal solid-state output.

Current Sensing Switch Connections

- **Power Supply**
  - UL or UMAT-DC
- **Isolated Relay Output**
  - (Shown De-Energized)
- **Isolated Solid-state Output**
  - (Shown De-Energized)

Notes:
- Pressure plate screw terminals.
- 12–22 AWG solid or stranded.
- Field-adjustable setpoint.

DS3 Series Sample Output/Power Supply

- **DS3 Series Sample Output/Power Supply**
  - Contact Energized
  - 100%
  - Contact De-energized
  - 0%

Current Sensing Switch Dimensions

- **Case**
  - 0.40” 10.2mm dia.
  - 0.75” 19.0mm dia.
  - dia. 2.50” 63.5mm
  - 3.88” 98.4mm
  - 1.50” 38.1mm
  - 3.38” 85.9mm
  - dia. 0.20” 5.0mm

Current Sensing Switch Specifications

- **Power Supply**
  - 10–28 VDC
- **Power Consumption**
  - <2 VA
- **Setpoint Range**
  - 2–20, 10–50 and 20–100 A DC adjustable (2–14, 10–35, 20–70 A AC)
- **Output Description**
  - Isolated solid-state or relay contacts
- **Output Rating**
  - Relays: 5.0 A @ 240 VAC, 5.0 A @ 10 VDC (SPDT)
- **Off-state Leakage**
  - <10 μA (solid-state), none (relay)
- **Response Time**
  - 80 ms max
- **Time Delay**
  - None
- **Hysteresis**
  - 5%
- **Isolation Voltage**
  - UL listed to 1270 VAC, tested to 3 KV
- **Frequency Range**
  - DC to 400 Hz
- **Case**
  - UL94 V-0 Flammability Rated
- **Environmental**
  - -4 to 127°F (-20 to 50°C)
  - 5–95% RH, non-condensing
- **Listings**
  - UL/cUL, CE
Current Sensing Switches

AC or DC Current Relay

DS1-FD Current Relays monitor AC or DC loads: motor, crane, or welding equipment. The relay features a large aperture and solid-core design that allows for quick installation, just thread the conductor through the sensing window (aperture) and reconnect on the other side. The relay output is isolated from the monitored circuit and can switch up to two amps to 125 VAC, or two amps to 30 VDC. The output contacts can reset to original condition on current fall or latch in the tripped condition. The trip point (where the output relay changes state) can be adjusted between 20 and 400 amps by adjusting two potentiometers. One provides a ‘coarse’ adjustment; the second allows for fine tuning of the trip point. The sensor mounts on a back panel or a DIN rail, and is designed to accommodate wire sizes for loads up to 400 amps or higher. The maximum current is unlimited, so current higher than the highest adjustment point will keep the relay in the tripped condition.

Current Relay Applications

Welding Processes
• Detect time of use using the normally open contact, which is closed with DC current over the trip point.

Under Current Detection
• If the power to the field of a shunt wound DC motor is lost, the speed will be uncontrollable. The normally closed contact will keep the relay in the tripped condition. The trip point (where the output relay changes state) can be adjusted between 20 and 400 amps by adjusting two potentiometers. One provides a ‘coarse’ adjustment; the second allows for fine tuning of the trip point. The sensor mounts on a back panel or a DIN rail, and is designed to accommodate wire sizes for loads up to 400 amps or higher. The maximum current is unlimited, so current higher than the highest adjustment point will keep the relay in the tripped condition.

DC Motors

• Safety Interlock: Contact is closed when DC motor field is energized

• Supply Power

• Load

• Contact is closed when DC motor field is energized

Current Relay Features

Factory Calibrated and Warranted For Five Years
• Trip point to 400 ADC or 338 AAC
• Sensor is not polarity sensitive with regard to the monitored circuit.
• Designed for longest life and reliability.

Single Pole, Double Throw Relay Output
• Can control an AC or DC circuit.
• Compatible with most automation and control systems.
• Both NO contact for alarm (closing on current rise) and NC contact (opening on current rise) for disconnecting applications.
• Automatic reset or latching output available.
• Dual potentiometers allow for accurate trip point adjustment.

Externally Powered
• Simple and reliable connection.

Solid-core Case
• Sensor is not polarity sensitive with regard to the monitored circuit.

DIN Rail or Panel Mount
• Simply snap onto a DIN rail* or attach with screws to a panel for secure mounting.

UL listed, CE pending
• Accepted worldwide.

For information on the DIN rail accessories kit, see page 144.

Current Relay Ordering Information

Sample Model Number: DS1-SDTA-24U-FD
DC current operated relay, 20–400 ADC adjustment range, SPDT relay output, 24 VAC/DC powered, panel or DIN rail mounting.

(1) Range 20–400 ADC (17-338 AAC 60Hz)
(2) Case Style Solid-core, DIN rail or panel mount
(3) Power Supply 24V-28VAC or DC, externally powered
(4) Latching Auto Reset
(5) Output Auto Reset

(1) Adjustment range 20 to 400 ADC (17-338 AAC 60Hz)
(2) Single Pole, double throw relay 2 A @ 120 VAC Auto Reset
(3) Single Pole, double throw relay 2 A @ 120 VAC Latching
(4) 24 U: 24 VAC/DC (20–28 V)

Current Relay Dimensions

Current Relay Connections

Current Relay Specifications

Power Supply 24V, 24 VAC/DC, (20–28 V)
Consumption <0.5 A
Output SPDT relay, 2 A @ 125 VAC, 2 A @ 30 VDC
(max., general duty)
Maximum Monitored Current >1000 ADC (unlimited)
Response Time 80 ms (max.)
Hysteresis 5%
Range 20–400 ADC (17–338 AAC 60 Hz)
Diode Resistance Working voltage to 1500 VDC
Frequency Range DC to 400 Hz
Case 51L040 (Flammability Rated)
Environmental -4 to 122°F (-20 to 50°C)
Markings UL listed, CE pending

*For information on the DIN rail accessories kit, see page 144.
AC Current Transducers

Current Transducers are designed to provide an analog signal proportional to the AC current for monitoring, data logging and panel meter applications. NK Technologies’ current transducers offer a choice of 0–5 VDC, 0–10 VDC or 4–20 mA average responding or True RMS outputs. Self-powered and split-core options make these a cost-effective choice as a PLC input in motor status applications or where VFDs are involved.

Features:
- Average responding or True RMS output
- Jumper-selectable ranges
- Solid-core, split-core and large aperture models

Current Transducers are designed to provide an analog signal proportional to the AC current for monitoring, data logging and panel meter applications. NK Technologies’ current transducers offer a choice of 0–5 VDC, 0–10 VDC or 4–20 mA average responding or True RMS outputs. Self-powered and split-core options make these a cost-effective choice as a PLC input in motor status applications or where VFDs are involved.

Features:
- Average responding or True RMS output
- Jumper-selectable ranges
- Solid-core, split-core and large aperture models

- AT SERIES AC Current Transducers ................. page 42
- ATR SERIES AC Current Transducers ................. page 44
- AT/ATR-TH SERIES AC Current Transducers ........ page 46
- AT/ATR-FD SERIES AC Current Transducers ........ page 48
- AT/ATR-FL SERIES AC Current Transducers ........ page 50
- AT/ATR-MS SERIES AC Current Transducers ........ page 52
- AT/ATR-LS SERIES AC Current Transducers ........ page 54
- ATCR SERIES AC Current Transducers ............... page 56
- ATP SERIES AC Current Transducers ................. page 58
- ATP/ATPR-FL SERIES AC Current Transducers ........ page 60
- ATH SERIES AC Current Transducer with Time Integration ... page 62
- ATQ SERIES Frequency Output AC Current Transducers .......... page 64
- ATS SERIES WITH DIGITAL SETPOINT DISPLAY AC Current Transducer/Switch ............ page 66
- ATS SERIES WITH ROTARY SWITCH SETPOINT AC Current Transducer/Switch ............ page 68
- ATP/ATPR-FL SERIES AC Current Transducer/Switch ............ page 70

- AT SERIES – p. 42
  Analog Output, 2-wire, Average Responding
- ATR SERIES – p. 44
  Analog Output, 2-wire, True RMS
- AT/ATR-TH SERIES – p. 46
  Analog Output, 4-wire, Average or RMS Responding
- ATP SERIES – p. 58
  Analog Output, 4-wire, Average Responding
- ATPR SERIES – p. 60
  Analog Output, Voltage Output, True RMS
- ATH SERIES – p. 64
  Time Integrated for Burst Fired Circuits
- ATQ SERIES – p. 66
  Frequency Output
- ATS SERIES WITH DIGITAL SETPOINT DISPLAY – p. 68
  Current Transducer/Switch
- ATP/ATPR-FL SERIES – p. 70
  Analog Output, 4-wire

Load 200 A or lower

Load 400 A or lower

Load 800 A or lower

Load 1200 A or lower

Load 1600 A or lower

Load 2000 A or lower

Load 4000 A or lower

Load 8000 A or lower
AT SERIES
AC Current Transducers

AT Series AC Current Transducers combine a current transformer and signal conditioner into a single package. These current transducers have jumper-selectable current ranges and industry standard 4–20 mA, 0–5 VDC or 0–10 VDC outputs. The AT Series AC Current Transducers are designed for application on linear or sinusoidal AC loads and are available in a split-core case or two types of solid-core cases.

AC Current Transducer Applications

Automation Systems
• Analog current reading for remote monitoring and software alarms.

Data Loggers
• Self-powered transducer helps conserve data logger batteries.

Panel Meters
• Simple connection displays power consumption.

AC Current Transducer Features

Accurate
• Factory matched and calibrated single piece transducer is more accurate than traditional two-piece field installed solutions.

Average Responding
• “Average Responding” algorithm gives an RMS output on pure sine waves. Perfect for constant speed (linear) loads.

Jumper-selectable Ranges
• Reduces inventory.
• Eliminates zero and span pots.

Isolation
• Output is magnetically isolated from the input for safety.
• Eliminates insertion loss (voltage drop).

UL/cUL and CE Approved
• Accepted worldwide.

AC Current Transducer Specifications

Power Supply
Non-powered
500 mA loop-powered
5–40 VDC loop-powered

Output Signal
0–1 VDC
0–5 VDC
4–20 mA

Output Limit
0–100 mA
0–50 mA
20–100 mA

Output Impedance
5 kΩ for 5 VDC
2 kΩ for 4–20 mA

Accuracy
±0.2% FS

Response Time (90% step change)
AT Series
0.1 ms

Frequency Range
50–60 Hz
20–100 Hz

Isolation Voltage
500 VAC
3000 VAC

Input Range
0–200 A field-selectable; custom ranges available, consult factory

Case
UL94 V-0 Flammability rated

Environmental
-4 to 122°F (-20 to 50°C)
0–95% RH, non-condensing

Listing
UL/cUL, CE

Notes: Pressure plate screw terminals.
12–22 AWG solid or stranded.
Field-adjustable setpoint.

AC Current Transducer Dimensions

AT Series Power Supply

AC Current Transducer Applications

Automation Systems
• Analog current reading for remote monitoring and software alarms.

Data Loggers
• Self-powered transducer helps conserve data logger batteries.

Panel Meters
• Simple connection displays power consumption.

AC Current Transducer Connections

AT Series Power Supply

AC Current Transducer Ordering Information

Sample Model Number: AT-005-000-SP
AC current transducer, 10/20/50 A range, self-powered with a 0–5 VDC output in a split-core case. (DIN rail adapters are included)

(1) Full Scale Range
(2) Power Supply
(3) Case Style
(4) Output Signal

AC Current Transducer Ordering Information

Sample Model Number: AT-005-000-SP
AC current transducer, 10/20/50 A range, self-powered with a 0–5 VDC output in a split-core case. (DIN rail adapters are included)

AT SERIES
AC Current Transducers

Preventative Maintenance of a Critical Lighting System

For additional Application Examples, go to www.nktechnologies.com/applications
**AC Current Transducers**

ATR Series AC Current Transducers combine a current transformer and a True RMS signal conditioner into a single package. These current transducers provide True RMS output on distorted waveforms found on VFD or SCR outputs, and on linear loads in "noisy" power environments. The ATR Series AC Current Transducers are available in a solid- or split-core case.

### AC Current Transducer Applications

**VFD Controlled Loads**
- Monitoring VFD output indicates how the motor and attached load are operating.

**SCR Controlled Loads**
- Accurate measurement of phase angle fired (time proportioned) SCRs.
- Current measurement gives faster response than temperature measurement.

**Switching Power Supplies and Electronic Ballasts**
- True RMS sensing is the most accurate way to measure power supply or ballast input power.

### AC Current Transducer Features

**True RMS Output**
- True RMS technology is accurate on distorted waveforms like VFD or SCR outputs.

**Jumper-selectable Ranges**
- Reduces inventory.
- Eliminates zero and span pots.

**Isolation**
- Output is magnetically isolated from the input for safety.
- Eliminates insertion loss (voltage drop).

**UL/cUL and CE Approved**
- Accepted worldwide.

### Selecting the right transducer:

The current waveforms of a typical linear load is a pure sine wave. In VFD and phase angle fired SCR applications, however, output waveforms are rough approximations of a sine wave. There are numerous spikes and dips in each cycle. ATR transducers use a mathematical algorithm called "True RMS" which integrates the actual waveforms over time. The output is the amperage component of the true power (heating value) of the AC current waveforms. True RMS is the only way to accurately measure distorted AC waveforms. Select ATR transducers for nonlinear loads in "noisy" power environments.

### AC Current Transducer Specifications

- **Power Supply**: 24 VDC (12–48 VDC)
- **Output Signal**: 4–20 mA loop-powered, average or True RMS
- **Output Limit**: 23 mA
- **Accuracy**: ±1.0% FS
- **Response Time**: 600 ms (to 90% step change)
- **Frequency Range**: 10–400 Hz
- **Isolation Voltage**: UL listed to 1270 VAC, tested to 5 kV
- **Input Range**: 0–200 A adjustable, consult factory for custom ranges
- **Case**: UL4.0 V0/Terminated Rated

- **Environmental**: 4 to 122°F (-20 to 50°C), 0–95% RH, non-condensing

### AC Current Transducer Ordering Information

Sample Model Number: ATR1-420-24L-SP

- True RMS AC current transducer, 10/20/50 A ranges, 4–20 mA output, 24 VDC loop-powered in a split-core case. (DIN rail adapters are included)

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATR</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>(1) Full Scale Range</td>
<td>2, 4, 10, 20, 50, 100, 150, 200 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Output Signal</td>
<td>4–20 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Power Supply</td>
<td>24 VDC, loop-powered (4–20 mA output ONLY)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Case Style</td>
<td>FT, Split-core</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### AC Current Transducer Connections

**Notes:**
- Deadfront captive screw terminals (SP case). 12–22 AWG solid or stranded.
- Observe polarity.
**AT/ATR-TH SERIES**

**AC Current Transducers**

AT/ATR-TH Series AC Current Transducers are the latest innovation for monitoring three-phase loads, motors, machines or buildings. The large triple-aperture solid-core design allows for a quick and easy installation. Just thread the conductors through the sensing windows (apertures) and reconnect on the other side. The transducer outputs are powered from an excitation voltage of 24 VAC or DC, or optionally 120 VAC, isolated from the monitored circuit. Three outputs are proportional to the AC current in each phase and a fourth represents the average of the three. Each are available at any time. The sensor mounts on a back panel or a DIN rail and is designed to accommodate wire sizes for loads up to 200 amps.

**Current Transducer Applications**

**Monitor Large Machines**
- Detect over or undercurrent conditions before they cause break downs or interlock one process with another.

**Water Delivery and Treatment**
- Detect open discharge lines.
- Monitor motor current draw which should be nearly equal in all three phases. A difference of 10% signifies trouble.
- Shed noncritical loads when demand reaches a set level.
- Detect increased current to show failing bearings or pump impeller cavitation.

**Generators**
- Measure increased current to show failing bearings or pump impeller cavitation.

**Submersible Pump Application**
- Detect clogged filters or blocked intake to pumps.
- Detect over or undercurrent conditions before they cause break downs or interlock one process with another.

**Current Transducer Features**

- **Analog Signal Proportional to AC Current**
  - Both average responding and True RMS models available.
  - Compatible with most automation and control systems.
  - One output represents the current in each phase. A fourth produces a signal proportional to the average of the current in all three phases.

- **Externally Powered**
  - Simple and reliable connection.

- **Factory Calibrated and Warranted For Five Years**
  - Choice of ranges: 0–10 to 0–200 amps.
  - Designed for longest life and reliability.

- **Solid-core Case**
  - Sensing windows provide ample space for single or multiple conductors per phase.

- **DIN Rail or Panel Mount**
  - Snap onto DIN rail or attach with screws to a panel for secure mounting.*

- **UL/UL and CE Approved**
  - Accepted worldwide.*

  *For information on the DIN rail accessories kit, see page 144.

**Ordering Information**

Sample Model Number: ATR2-420-24U-TH, AC RMS current transducer, 0–100 A range, 4–20 mA output, 24 VAC/DC, 3 hole solid-core case, DIN rail mount.

**Current Transducer Dimensions**

**Current Transducer Specifications**

- **Power Supply**
  - 24 VAC/DC (22–28 V)
  - 120 VAC (108–132 VAC)

- **Power Consumption**
  - 5 VA

- **Output**
  - Three Individual analogs proportional to current in each phase; one analog proportional to the average of the three current levels.

- **Signal Impedance**
  - 4–20 mA, <100 Ω
  - 0–5 VDC, >2K Ω

- **Response Time**
  - 220 ms (90% step change)

- **Ranges**
  - 1: 0–10, 15, and 30 A
  - 2: 0–30, 50, 100 A
  - 3: 0–100, 150, 200 A

- **Working Voltage**
  - 120 VAC (108–132 VAC)

- **Frequency Range**
  - 50–60 Hz (Avg.), 30–100 Hz (RMS)

- **Case**
  - UL/cUL/CE (Flammability Rated)

- **Environmental**
  - 4 to 122°F (-20 to 50°C), 0–95% RH, non-condensing

- **Listings**
  - UL/cUL/CE

**Current Transducer Connections**

**AT/ATR-TH SERIES**

**AC Current Transducers**

3511 Charter Park Drive • San Jose, CA  95136
800.959.4014  •  www.nktechnologies.com   •  sales@nktechnologies.com
3511 Charter Park Drive • San Jose, CA  95136
800.959.4014  •  www.nktechnologies.com   •  sales@nktechnologies.com
AC Current Transducers

AT/ATR-FD Series

AT/ATR-FD Series AC Current Transducers provide a current sensor and analog output signal conditioning in a single package. The large, easy-to-install solid-core design allows for quick installation even in applications where there are multiple conductors per phase. Just thread the conductor through the extra large aperture and reconnect on the other side. The transducer output is powered from excitation voltage of around 24 VDC, using just two wires. The sensor mounts on a back panel or a DIN rail, and is designed to accommodate wire sizes for loads up to 400 A.

AC Current Transducer Applications

Monitor Large Machines
- Detect over or undercurrent conditions before they cause breakdowns or interlock one process with another.

Water Delivery and Treatment
- Detect open discharge lines.
- Sense clogged filters or blocked intake to pumps.
- Measure increased current to show failing bearings or pump imopper cavitation.

Generators
- Shunt noncritical loads when demand reaches a set level.

Shredders

Monitor a shredding operation to measure current usage, enabling automatic shut down if the blades become jammed or overloaded.

AC Current Transducer Features

4–20 mA Analog Signal Proportional to AC Current
- Both average responding and True RMS models available.
- Compatible with most automation and control systems.

2-Wire Loop Powered
- Simple and reliable connection.

Factory Calibrated with Five Year Warranty
- Choice of three ranges: 0–200, 300 or 400 A.
- Designed for longest life and reliability.

Solid-core Case
- Sensing window provides ample space for a bus bar, a single conductor or multiple conductors.

DIN Rail or Panel Mount
- Simply snap onto DIN rail* or attach with screws to a panel for secure mounting.

UL/cUL and CE Approved
- Accepted worldwide.
* For information on the DIN rail accessories kit, see page 144.

AC Current Transducer Specifications

Input Voltage
- 24 VDC loop-powered, average or True RMS
- Max. 28 mA

Output Current
- 4–20 mA

Accuracy
- 1.0% FS

Response Time
- AT: 300 ms
- ATR: 1.4 sec.

Range
- AT2: 0–200 A
- AT3: 0–300 A
- AT4: 0–400 A

Frequency Range
- AT: 40–400 Hz
- ATR: 20–400 Hz

Isolation Voltage
- UL listed to 1270 VAC, tested to 5 kV

Case
- UL94 V-0 Flammability Rated

Environmental
- -4 to 122°F (-20 to 50°C)
- 0–95% RH, non-condensing

Listings
- UL/cUL, CE

AC Current Transducer Dimensions

AC Current Transducer Specifications

Power Supply
- Loop-powered

Power Consumption
- < 3 VA

Output Signal
- 4–20 mA loop-powered, average or True RMS

Output Impedance
- AT2: 0–200 A
- AT3: 0–300 A
- AT4: 0–400 A

Accuracy
- 1.0% FS

Response Time
- AT: 300 ms
- ATR: 1.4 sec.

Range
- AT2: 0–200 A
- AT3: 0–300 A
- AT4: 0–400 A

Frequency Range
- AT: 40–400 Hz
- ATR: 20–400 Hz

Isolation Voltage
- UL listed to 1270 VAC, tested to 5 kV

Case
- UL94 V-0 Flammability Rated

Environmental
- -4 to 122°F (-20 to 50°C)
- 0–95% RH, non-condensing

Listings
- UL/cUL, CE

AC Current Transducer Ordering Information

Sample Model Number: ATR2-420-24L-FD
AC True RMS current transducer, 0–200 A range, 4–20 mA output, 24 VDC loop-powered, solid-core case, DIN rail mounting.

AC Current Transducer Applications

Monitor Large Machines
- Detect over or undercurrent conditions before they cause breakdowns or interlock one process with another.

Water Delivery and Treatment
- Detect open discharge lines.
- Sense clogged filters or blocked intake to pumps.
- Measure increased current to show failing bearings or pump imopper cavitation.

Generators
- Shunt noncritical loads when demand reaches a set level.

Shredders

Monitor a shredding operation to measure current usage, enabling automatic shut down if the blades become jammed or overloaded.

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

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

AC Current Transducer Features

4–20 mA Analog Signal Proportional to AC Current
- Both average responding and True RMS models available.
- Compatible with most automation and control systems.

2-Wire Loop Powered
- Simple and reliable connection.

Factory Calibrated with Five Year Warranty
- Choice of three ranges: 0–200, 300 or 400 A.
- Designed for longest life and reliability.

Solid-core Case
- Sensing window provides ample space for a bus bar, a single conductor or multiple conductors.

DIN Rail or Panel Mount
- Simply snap onto DIN rail* or attach with screws to a panel for secure mounting.

UL/cUL and CE Approved
- Accepted worldwide.
* For information on the DIN rail accessories kit, see page 144.

AC Current Transducer Specifications

Input Voltage
- 24 VDC loop-powered, average or True RMS
- Max. 28 mA

Output Current
- 4–20 mA

Accuracy
- 1.0% FS

Response Time
- AT: 300 ms
- ATR: 1.4 sec.

Range
- AT2: 0–200 A
- AT3: 0–300 A
- AT4: 0–400 A

Frequency Range
- AT: 40–400 Hz
- ATR: 20–400 Hz

Isolation Voltage
- UL listed to 1270 VAC, tested to 5 kV

Case
- UL94 V-0 Flammability Rated

Environmental
- -4 to 122°F (-20 to 50°C)
- 0–95% RH, non-condensing

Listings
- UL/cUL, CE

AC Current Transducer Ordering Information

Sample Model Number: ATR2-420-24L-FD
AC True RMS current transducer, 0–200 A range, 4–20 mA output, 24 VDC loop-powered, solid-core case, DIN rail mounting.

AC Current Transducer Applications

Monitor Large Machines
- Detect over or undercurrent conditions before they cause breakdowns or interlock one process with another.

Water Delivery and Treatment
- Detect open discharge lines.
- Sense clogged filters or blocked intake to pumps.
- Measure increased current to show failing bearings or pump imopper cavitation.

Generators
- Shunt noncritical loads when demand reaches a set level.

Shredders

Monitor a shredding operation to measure current usage, enabling automatic shut down if the blades become jammed or overloaded.

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

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

AC Current Transducer Features

4–20 mA Analog Signal Proportional to AC Current
- Both average responding and True RMS models available.
- Compatible with most automation and control systems.

2-Wire Loop Powered
- Simple and reliable connection.

Factory Calibrated with Five Year Warranty
- Choice of three ranges: 0–200, 300 or 400 A.
- Designed for longest life and reliability.

Solid-core Case
- Sensing window provides ample space for a bus bar, a single conductor or multiple conductors.

DIN Rail or Panel Mount
- Simply snap onto DIN rail* or attach with screws to a panel for secure mounting.

UL/cUL and CE Approved
- Accepted worldwide.
* For information on the DIN rail accessories kit, see page 144.

AC Current Transducer Specifications

Input Voltage
- 24 VDC loop-powered, average or True RMS
- Max. 28 mA

Output Current
- 4–20 mA

Accuracy
- 1.0% FS

Response Time
- AT: 300 ms
- ATR: 1.4 sec.

Range
- AT2: 0–200 A
- AT3: 0–300 A
- AT4: 0–400 A

Frequency Range
- AT: 40–400 Hz
- ATR: 20–400 Hz

Isolation Voltage
- UL listed to 1270 VAC, tested to 5 kV

Case
- UL94 V-0 Flammability Rated

Environmental
- -4 to 122°F (-20 to 50°C)
- 0–95% RH, non-condensing

Listings
- UL/cUL, CE

AC Current Transducer Ordering Information

Sample Model Number: ATR2-420-24L-FD
AC True RMS current transducer, 0–200 A range, 4–20 mA output, 24 VDC loop-powered, solid-core case, DIN rail mounting.

AC Current Transducer Applications

Monitor Large Machines
- Detect over or undercurrent conditions before they cause breakdowns or interlock one process with another.

Water Delivery and Treatment
- Detect open discharge lines.
- Sense clogged filters or blocked intake to pumps.
- Measure increased current to show failing bearings or pump imopper cavitation.

Generators
- Shunt noncritical loads when demand reaches a set level.

Shredders

Monitor a shredding operation to measure current usage, enabling automatic shut down if the blades become jammed or overloaded.

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

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

AC Current Transducer Features

4–20 mA Analog Signal Proportional to AC Current
- Both average responding and True RMS models available.
- Compatible with most automation and control systems.

2-Wire Loop Powered
- Simple and reliable connection.

Factory Calibrated with Five Year Warranty
- Choice of three ranges: 0–200, 300 or 400 A.
- Designed for longest life and reliability.

Solid-core Case
- Sensing window provides ample space for a bus bar, a single conductor or multiple conductors.

DIN Rail or Panel Mount
- Simply snap onto DIN rail* or attach with screws to a panel for secure mounting.

UL/cUL and CE Approved
- Accepted worldwide.
* For information on the DIN rail accessories kit, see page 144.
AC Current Transducers

AT/ATR-FL SERIES

AC Current Transducers

AT/ATR-FL Series AC Current Transducers combine a current transformer and a signal conditioner into a single package for applications from 100 A to 2000 A. The AT version is Average Responding for use on linear (sinusoidal) loads. The ATR version is True RMS for use on distorted waveforms found in VFD or SCR outputs. The AT/ATR-FL Series AC Current Transducers are available in a solid-core case.

AC Current Transducer Specifications

- **Power Supply**: 24 VDC
- **Output Signal**: 4–20 mA loop-powered, average or True RMS
- **Output Limit**: 23 mA
- **Output Impedance**: <20 Ohm RMS
- **Accuracy**: ±1% FS, True RMS
- **Measurement**: True RMS or average responding (see ordering information)
- **Response Time**: 600 ms (to 90% step change)
- **Frequency Range**: 10–400 Hz
- **Isolation Voltage**: UL listed to 600 VAC, tested to 5 KV
- **Input Range**: 100, 133, 200 A
- **True RMS Ranges**: 375, 500, 750 A
- **Linear Ranges**: 1000, 1333, 2000 A
- **Case**: UL4X (Flammable-Rated)
- **Environmental**: -4 to 122°F (-20 to 50°C)
- **Humidity**: 0–95% RH, non-condensing
- **Listings**: UL/cUL, CE

AC Current Transducer Ordering Information

Sample Model Number: ATR3-420-24L-FL

- **True RMS AC current transducer**, 24 VDC, powered with a 4–20 mA output, 375/500/750 A ranges in a solid-core case.

AT Current Transducer Features

- **Large Aperture**
  - Accommodates large conductors or wire bundles.
- **Select the Right Output**
  - True RMS technology is accurate on distorted waveforms like those associated with VFD or SCR outputs.
  - Average Responding for use with linear, sinusoidal waveforms.
- **Jumper-selectable Ranges**
  - Reduces inventory.
  - Eliminates zero and span pots.
- **Isolation**
  - Output is magnetically isolated from the input for safety.
  - Eliminates insertion loss (voltage drop).
- **UL/cUL and CE Approved**
  - Accepted worldwide.

Selecting the right transducer:

- The current waveforms of a typical linear load is a pure sine wave. AT transducers measure the peaks of these sine waves, then calculate the average amperage. This works well on constant speed linear loads in "clean" power environments. Select AT transducers for strictly linear loads on "clean" power.
- VFD and SCR output waveforms are rough approximations of a sine wave. There are numerous spikes and dips in a mathematical algorithm called "True RMS" which integrates the actual waveforms over time. The output is the amperage component of the true power (heating value) of the AC current waveforms. True RMS is the only way to accurately measure distorted AC waveforms. Select ATR transducers for nonlinear loads on "noisy power."

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

Motor Load Monitoring

- Detect dry run electronically.
- Measure the output of generators.
- Monitors heater loads.
- Faster response than temperature sensors.

AC Current Transducer Applications

- **Large Pumps**
- **Power Generation**
- **Electric Heating Elements**
  - Monitors heater loads.
  - Faster response than temperature sensors.

AC Current Transducer Connections

AC Current Transducer Dimensions

- FL Case

AC Current Transducer Specifications

- **Power Supply**: 24 VDC
- **Output Signal**: 4–20 mA loop-powered, average or True RMS
- **Output Limit**: 23 mA
- **Output Impedance**: <20 Ohm RMS
- **Accuracy**: ±1% FS, True RMS
- **Measurement**: True RMS or average responding (see ordering information)
- **Response Time**: 600 ms (to 90% step change)
- **Frequency Range**: 10–400 Hz
- **Isolation Voltage**: UL listed to 600 VAC, tested to 5 KV
- **Input Range**: 100, 133, 200 A
- **True RMS Ranges**: 375, 500, 750 A
- **Linear Ranges**: 1000, 1333, 2000 A
- **Case**: UL4X (Flammable-Rated)
- **Environmental**: -4 to 122°F (-20 to 50°C)
- **Humidity**: 0–95% RH, non-condensing
- **Listings**: UL/cUL, CE
**AT/ATR-MS SERIES**

**AC Current Transducers**

AT/ATR-MS Series Current Transducers combine a current sensing element and signal conditioner into a single package. The large, easy-to-install split-core design allows for installation over existing conductors without the need to disconnect the load, even in applications where there are multiple conductors per phase. Whether installing over existing conductors or in a new control system, installation is very simple and quick. Just remove the top portion of the sensing ring, place the conductors inside, and snap the top back in place. The transducer uses two wires to connect to the power supply or the load (a programmable logic controller, a panel meter, or a data acquisition system).

**AC Current Transducer Applications**

**Monitor Large Machines**
- Measure the current use to detect over or undervoltage conditions before they cause breakdowns.

**Water Delivery and Treatment**
- Detect open discharge lines.
- Locate clogged filters or blocked intake to pumps.

**Grinding and Shredding**
- An analog output will allow the control system designer to allow brief periods of drive overload when the processed product varies in density. If the blades hit something foreign (e.g. steel when the machine is designed to reduce paper), then the control will alarm or shut down the process.

**Shredder Monitoring**

**AC Current Transducer Connections**

**Single Transducer Installation**

**Standard Connection**

**Alternate Connection**

**AC Transducer Specifications**

**Power Supply**
- 24 VDC, nominal (12–32 VDC)

**Output Signal**
- 4–20 mA loop-powered, average or True RMS

**Output Limit**
- 20 mA

**Output Impedance**
- <750 Ω @ 24 VDC, measured at 20 mA

**Accuracy**
- 0.1% from 10% to 100% of range

**Response Time**
- 600 ms (90% step change)

**Range**
- 2: 0–200 A
- 4: 0–400 A
- 6: 0–600 A
- 8: 0–800 A

**Frequency Range**
- AT: 50/60 Hz (average responding)
- ATR: 20–400 Hz (True RMS responding)

**Isolation Voltage**
- UL tested to 2000 VAC isolation, monitored conductor to output terminals

**Case**
- UL94 V-0 Flammability Rated

**Environmental**
- -4 to 122°F (-20 to 50°C)
- 0–95% RH, non-condensing

**Listings**
- UL/cUL, CE

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

**AC Current Transducer Features**

**Industry Standard Output**
- 4–20 mA signal proportional to the AC current.
- Compatible with most automation systems.

**Loop-powered**
- Use the “live zero” output to verify proper connections, where the sensor output is 4 mA with no current through the sensing ring.

**Factory Calibrated**
- Eliminates zero and span potentiometer adjustment.

**Split-core Case**
- Sensing window provides ample space for bus bar, single or multiple conductors.

**DIN Rail Mounted Case**
- Simply snaps onto DIN rail for secure mounting.

**UL/cUL and CE Approved**
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

**AC Current Transducer Ordering Information**

Sample Model Number: ATR6-420-24L-MS
AC current transducer, 0–600 A range, True RMS output 4–20 mA, loop-powered, medium split-core case, DIN rail mounting.

**Dimensions**

**MS Case**

- 4.125 in (104.1 mm)
- 5.6 in (142.2 mm)
- 1.48 in (37.6 mm)
- 3.75 in (95.1 mm)

**Note: Drawings are not to scale**

**AC Current Transducer Dimensions**

**MS Case**

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

Test & Evaluation Units for OEMs
Free program expedites evaluation process. See page 3 for details.
**AT/ATR-LS SERIES**

**AC Current Transducers**

AT/ATR-LS Series Current Transducers combine a current transformer and signal conditioner into a single package. The large, easy-to-install, split-core design allows for installation over existing conductors without the need to disconnect the monitored load, even in applications where there are multiple conductors per phase. For new installations, the process is just as easy. Just remove the top portion of the sensing ring, place the conductors inside, and snap the top back in place. The transducer uses two wires to connect to the power supply and the load (a programmable logic controller, a panel meter or a data acquisition system).

## AC Current Transducer Specifications

- **Power Supply**: 24 VDC, nominal (12–32 VDC)
- **Output Signal**: 4–20 mA loop-powered, average or True RMS
- **Output Limit**: 23 mA
- **Accuracy**: ±0.1% FS
- **Response Time**: 600 ms (90% step change)
- **Range**:
  - 8: 0–800 A
  - 10: 0–1000 A
  - 12: 0–1200 A
  - 16: 0–1600 A
- **Frequency Range**:
  - AT: 50/60 Hz (average responding)
  - ATR: 20–400 Hz (True RMS responding)
- **Isolation Voltage**: UL tested to 2000 VAC isolation, monitored conductor to output terminals
- **Case**: UL94 V-0 Flammability Rated
- **Environmental**: -4 to 122°F (-20 to 50°C)
  - 0–95% RH, non-condensing
- **Listings**: UL/cUL, CE

## AC Current Transducer Dimensions

**LS Case**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Average responding (blank)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>8: 0–800 A</td>
</tr>
<tr>
<td></td>
<td>10: 0–1000 A</td>
</tr>
<tr>
<td></td>
<td>12: 0–1200 A</td>
</tr>
<tr>
<td></td>
<td>16: 0–1600 A</td>
</tr>
<tr>
<td>Power Supply</td>
<td>24 VDC, loop-powered</td>
</tr>
<tr>
<td>Case Style</td>
<td>Split-core, base terminals, DIN rail mounting</td>
</tr>
</tbody>
</table>

## AC Current Transducer Features

- **Industry Standard Output**
  - 4–20 mA signal proportional to the AC current.
  - Compatible with most automation systems.
- **Loop-powered**
  - Use the “live zero” output to verify proper connections (sensor output with no current flowing confirms the system is ready to go).
- **Factory Calibrated**
  - Eliminates zero and span potentiometer adjustment.
- **Split-core Case**
  - Sensing window provides ample space for bus bar, single or multiple conductors.
- **DIN Rail Mounted Case**
  - Simple snap onto DIN rail for secure mounting.
- **UL/cUL and CE Approved**
  - Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

## AC Current Transducer Applications

- **Monitor Large Machines**
  - Measure the current use to detect over or undercurrent conditions before they cause break downs.
- **Water Delivery and Treatment**
  - Detect open discharge lines.
  - See clogged filters or blocked intake to pumps.
- **Generators**
  - Keep the power system running by monitoring the output.

## AC Current Transducer Connections

**Standard Connection**

- 24 VDC Power (+) – (-)
- Output (+) – (-)

**Alternate Connection**

- 24 VDC Power (+) – (-)
- Output (+) – (-)

## Test & Evaluation Units for OEMs

For program expeditation evaluation process, see page 3 for details.
ATCR SERIES
AC Current Transducers

ATCR Series AC Current Transducers combine a sensing coil and a True RMS signal conditioner as a matched, factory-calibrated set. The ATCR Series AC Current Transducers are designed to produce an analog 4–20 mA signal proportional to AC current up to 2000 A. The coil opens to pass over the installed conductors. When connected to a controller or data logger, the sensor output is directly proportional to the primary current.

AC Current Transducer Applications

- Monitor large machines
  - Monitoring resistive or inductive load to detect current.
  - Industry standard 4–20 mA output for connection to PLC or data loggers.
- Flexible coil surrounds conductors
  - Without disturbing wiring
  - Install over bus bars, or single or multiple conductors easily.
  - Fast response to changes in operating conditions.
- Two-Wire Loop-powered Output
  - Fast response to changes in operating conditions.
  - Install over bus bars, or single or multiple conductors easily.
- Without Disturbing Wiring
  - Flexible coil surrounds conductors
  - Install over bus bars, or single or multiple conductors easily.
- Monitor large machines
  - Industry standard 4–20 mA output for connection to PLC or data loggers.

AC Current Transducer Features

- True RMS Output
  - True RMS technology is accurate on distorted waveforms like VFD or phase angle-fired SC outputs.
- Single Range
  - No chance of field range selection errors.
  - Eliminates zero and span pots.
- Isolation
  - Output is magnetically isolated from the input for safety.
  - Eliminates insertion loss (voltage drop).
- Compact DIN Rail Mounted Case*
  - Space saving 35 mm wide enclosure mounts quickly.
  - Eliminates zero and span pots.
  - No chance of field range selection errors.

AC Current Transducer Specifications

- Input Range
  - Single range, custom ranges available;
  - UL listed to 1270 VAC, tested to 5 KV
- Isolation Voltage
  - 40–400 Hz
- Frequency Range
  - 600 ms (90% step change)
- Response Time
  - 1.0% from 10–100% of range
- Output Impedance
  - <750 Ω @ 24 VDC
- Output Limit
  - 23 mA
- Output Signal
  - 4–20 mA loop-powered, True RMS
- Power Supply
  - 24 VDC nominal (12–36 VDC)

AC Current Transducer Ordering Information

Sample Model Number: ATCR1-420-24L-D
True RMS AC current transducer, 500 A range, 4–20 mA output, 24 VDC loop-powered, coil sensor connected to DIN rail mounting case.

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.

AC Current Transducer Dimensions

- ATCR SERIES
  - C  US
  - R
  - US

OEMs

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

Notes:

- Finger safe captive screw terminals.
- 14–22 AWG solid or stranded.
- Observe polarity.
ATP SERIES
AC Current Transducers

ATP Series AC Current Transducers sense currents from 0–200 A and provide a proportional analog VDC or mA output. Externally powered by 120 VAC/DC or 24 VAC/DC, the ATP Series AC Current Transducers eliminate the need for costly power supplies or voltage rectifiers inside the control panel. Designed for motor control applications with standard sinusoidal waveforms, these transducers feature user-selectable input ranges, a choice of outputs and split-core or solid-core cases.

AC Current Transducer Applications

Commercial and Industrial Motor Control Centers
- 120 VAC/DC power supply option allows for powering off of readily available supplies; ideal for pumping, water/wastewater, boiler and other industrial applications.
- Eliminates the need for 24 VDC power supply or AC rectifiers within the control panel, saves space, material and labor associated with power supplies.

Heater Failure Detection

AC Current Transducer Features

Fast, Accurate RMS Measurement
- Unique average responding algorithm provides RMS output on pure sine wave and constant speed loads, offering improved accuracy over two-piece solutions.

Jumper-selectable Input Ranges
- Each unit has multiple input range capability and can be used for a variety of applications, reducing the need for separate models.

Isolation Output
- Output is magnetically isolated from the input for enhanced safety and elimination of insertion losses.

Designed for UL/cUL and CE Approval
- Accepted worldwide.

AC Current Transducer Connections

Notes:
Terminals are deadfront captive screw terminals.
Use 12–22 AWG solid or stranded.

AC Current Transducer Specifications

Power Supply
- 120 VAC/DC (108–132 V)
- 24 VAC/DC (22–26 V)

Power Consumption
- <2 VA

Output Signal
- -005 Model: 0–5 VDC
- -010 Model: 0–10 VDC
- -420 Model: 4–20 mA

Output Limit
- -005 Model: 112% (5.6 V)
- -010 Model: 112% (11.2 V)
- -420 Model: 112% (22.4 mA)

Output Impedance
350 Ω min., VDC models
500 Ω max., 4–20 mA models

Accuracy
1.0% FS

Response Time
100 ms (10–90% step change)

Frequency Range
40–100 Hz standard

Isolation Voltage
UL listed to 1270 VAC, tested to 5 KV

Input Range
0–200 A jumper-selectable

Case
- Solid-core (FF)
- Split-core (SP)

Environmental
- 4 to 127°F (-20 to 50°C)
- 0–95% RH, non-condensing

Listings
- Designed for UL/cUL and CE approval

AC Current Transducer Ordering Information

Sample Model Number: ATP-420-120-SP
Powered AC current transducer, jumper-selectable 0–10/20/50 A range, 4–20 mA output, 120 VAC/DC power supply, split-core case.

(DIN rail adapters are included)

(1) Full Scale Range
- 0 2, 5 A
- 1 10, 20, 50 A
- 2 100, 150, 200 A

(2) Output Signal
- 005 Model: 0–5 VDC
- 010 Model: 0–10 VDC
- 420 Model: 4–20 mA

(3) Power Supply
- 120 120 VAC/DC
- 24 24 VAC/DC, with isolated output

(4) Case Style
- FF Solid-core
- SP Split-core

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

Test & Evaluation Units for OEMs
Free program expedites evaluation process. See page 3 for details.
ATPR VOLTAGE OUTPUT SERIES
AC Current Transducers

ATPR AC Current Transducers combine a current transformer with a True RMS signal conditioner in a single package. These current transducers produce a 0–5 or 0–10 VDC True RMS output on distorted waveforms found in the output of variable frequency drives, phase angle fired heating controls and on linear loads in "noisy" power environments. The ATPR Series AC Current Transducers are available in split-core case only.

AC Current Transducer Applications

VFD Controlled Loads
- Monitor the output of variable frequency driven loads, even when the unit is in bypass mode.

SCR Controlled Loads
- Accurate measurement of phase angle fired heating controls.
- Current measurement produces a quicker response to element failure than temperature controls.

Switching Power Supplies and Electronic Ballasts
- True RMS sensing is the most accurate way to measure power supply and ballast input power.

Monitoring a Variable Frequency Drive

Use the ATPR current transducer on the line or load side of the drive and the signal will be accurate in either position.

AC Current Transducer Features

True RMS Sensing
- Sensor output is proportional to the current flowing in the circuit, even with high distortion or harmonic loads.
- Compatible with most automation systems.

External Powered
- Provides the highest degree of accuracy and response.

Range-selectable
- One sensor covers a wide variety of loads.
- Field-selectable ranges keep spare part inventory at a minimum and allow for changes in load conditions.

Split-core Case
- Simple installation, release the latch and snap over the conductor.

DC Voltage Output
- Perfect for data acquisition systems, panel meters or controllers with only voltage inputs available.

Built-in Mounting Feet
- Simple, two-screw panel mounting or attach with DIN rail brackets (included).*

Designed for UL/cUL, CE Approval
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

AC Current Transducer Specifications

- Power Supply: 24 VDC (20–28 VDC)
- Power Consumption: <3 mA
- Output Signal: 0–5 VDC, proportional to True RMS current
  or 0–10 VDC, proportional to True RMS current
- Output Impedance: 10 kΩ
- Frequency Range: 10–400 Hz
- Isolation Voltage: 500 VAC, tested to 5 kV
- Case: UL94 V-0 Flammability Rated
- Environmental: -4 to 122°F (-20 to 50°C)

Listings: Designed for UL/cUL and CE approval

AC Current Transducer Ordering Information

Sample Model Number: ATPR1-010-24D-SP
True RMS AC current transducer, 10/20/50 A FS input ranges, 0–10 VDC output, 24 VDC power supply, split-core case. (DIN rail adapters are included)

ATPR  – – 2 4 D – S P
(1) (2) (3) (4)
(1) Full Scale Range
0 2.5 mA
1 10, 20, 50 A
2 100, 150, 200 A
(2) Output Type
005 0–5 VDC, True RMS
010 0–10 VDC, True RMS
(3) Power Supply
24D 24 VDC
(4) Case Style
SP Split-core

For additional Application Examples, go to www.nktechnologies.com/applications
ATP/ATPR-FL SERIES
AC Current Transducers

ATP/ATPR-FL Series AC Current Transducers are large-format solid-core transducers designed for high current applications from 200 A to 2000 A. Powered by 120 VAC or 24 VAC/DC, the ATP/ATPR-FL Series takes advantage of available power supplies and eliminates the need for costly control power transformers. Options include average responding and True RMS versions, 0–5/10 VDC or 4–20 mA analog outputs and switch-selectable input ranges.

AC Current Transducer Applications

Commercial and Industrial MCC’s
- Fits conveniently in motor control centers, senses current on industrial motors and provides analog inputs back to PLC or controller.

VFD or SCR Controlled Loads, Electronic Ballasts
- Helpful in monitoring VFD-controlled motors to provide operational status. Provides accurate measurement of ballast input power and phase angle fed SCRs.

Large Pumping Applications
- Ideal for proof-of-flow in water/wastewater, boiler and other industrial pumping applications 150 HP and over. 120 VAC/DC or 24 VAC/DC supply options allow for powering off of readily available supply, eliminating need for CPTs.

Power Distribution Centers (PDCs)
- Monitors current output on commercial generation equipment and serves as a current input for use in power consumption calculations.

AC Current Transducer Features

Large Aperture
- Accommodates large conductors or wire bundles.

Select the Right Output
- True RMS technology is accurate on distorted waveforms like those associated with VFD or SCR outputs.
- Average responding for use with linear, sinusoidal waveforms.

Jumper-selectable Ranges
- Reduces inventory.
- Eliminates zero and span pots.

Isolation
- Output is magnetically isolated from the input for safety.
- Eliminates insertion loss (voltage drop).

Designed for UL/cUL, CE Approval
- Accepted worldwide.

AC Current Transducer Specifications

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>+120 VAC/DC (108–132 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+24 VAC/DC (22–26 V)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>&lt;2 VA</td>
</tr>
<tr>
<td>Output Signal</td>
<td>005 Model: 0–5 VDC</td>
</tr>
<tr>
<td></td>
<td>010 Model: 0–10 VDC</td>
</tr>
<tr>
<td></td>
<td>420 Model: 4–20 mA</td>
</tr>
<tr>
<td>Output Limit</td>
<td>005 Model: 112% (5.6 V)</td>
</tr>
<tr>
<td></td>
<td>010 Model: 112% (11.2 V)</td>
</tr>
<tr>
<td></td>
<td>420 Model: 112% (22.4 mA)</td>
</tr>
<tr>
<td>Output Impedence</td>
<td>25 kΩ min. VDC models</td>
</tr>
<tr>
<td></td>
<td>500 Ω min. 4–20 mA models</td>
</tr>
<tr>
<td>Accuracy</td>
<td>1.0% FS</td>
</tr>
<tr>
<td>Response Time</td>
<td>ATP: 100 ms (10–90% step change)</td>
</tr>
<tr>
<td></td>
<td>ATPR: 600 ms (30–90% step change)</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>ATP: 40–1000 Hz, sinusoidal</td>
</tr>
<tr>
<td></td>
<td>ATPR (1–4000 Hz)</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>UL listed to 600 VAC, tested to 5 KV</td>
</tr>
<tr>
<td>Input Range (switch-selectable)</td>
<td>ATP/ATPR: 0–375 A/500 A/750 A</td>
</tr>
<tr>
<td></td>
<td>ATP/ATPR: 0–1000 A/1333 A/2000 A</td>
</tr>
<tr>
<td>Case</td>
<td>UL94 V-0 Flammability Rated</td>
</tr>
<tr>
<td>Environmental</td>
<td>4 to 127°F (-20 to 50°C)</td>
</tr>
<tr>
<td></td>
<td>0–95% RH, non-condensing</td>
</tr>
<tr>
<td>Listings</td>
<td>Designed for UL/cUL, CE approval</td>
</tr>
</tbody>
</table>

AC Current Transducer Ordering Information

Sample Model Number: ATP-3–420-120-FL
True RMS AC current transducer, 120 VAC/DC, powered with a 4–20 mA output, 375/500/750 A ranges in a solid-core case.

ATP/ATPR-FL SERIES
AC Current Transducers

AC Current Transducer Dimensions

**FL Case**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.94”</td>
<td>Overall Length</td>
</tr>
<tr>
<td>4.00”</td>
<td>Overall Width</td>
</tr>
<tr>
<td>3.50”</td>
<td>Overall Height</td>
</tr>
<tr>
<td>0.50”</td>
<td>Terminal Diameter</td>
</tr>
<tr>
<td>0.25”</td>
<td>Terminal Height</td>
</tr>
</tbody>
</table>

AC Current Transducer Connections

**4–20mA Option**

**0–5/10 VDC**

<table>
<thead>
<tr>
<th>Load Impedance</th>
<th>Recommended 25 D min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Impedance</td>
<td>25 D min</td>
</tr>
</tbody>
</table>

**Notes:** Terminals are deadfront captive screw terminals. Use 12–22 AWG solid or stranded.

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

AC Current Transducers with Time Integration

ATH Series (patented) AC Current Transducers are the latest innovation from NK Technologies. Monitoring the current or power controlled by silicon-controlled rectifiers (SCRs) can be a challenge, especially the current used by heaters. When used to monitor zero-crossing (burst) fired SCRs, the ATH will provide an output signal directly proportional to the RMS ampereage. Zero-crossing fired controls allow current to flow to the circuit for as short of a time period as one cycle, and off for several cycles. Most current sensors will not work well when there is no current present. This capability is important in case a heating element fails but the process continues operating, which could result in scrapped material.

AC Current Transducer Features

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

External Powered
- Split-core models powered with 24 VAC or DC.
- Solid-core models powered with 24 VAC or DC or 120 VAC.

Factory Calibrated
- No need for zero and span adjustment potentiometers.

RMS Output
- Accurate measurement of sinusoidal or pulsed current wave shapes.

Built-in Mounting Feet
- Simple, two-screw panel mounting or attach with DIN rail brackets (included).

UL/CUL and CE Approved
- Accepted worldwide.

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

ATH AC current transducers will produce a signal proportional to the current used even when the controller is supplying power in one cycle increments. This is quite common as the "burst-fired" zero-crossing switching method produces less harmonic distortion than phase-angle fired control.

ATH Current Transducer Dimensions

<table>
<thead>
<tr>
<th>SP Case</th>
<th>FL Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.19&quot; dia.</td>
<td>0.19&quot; dia.</td>
</tr>
<tr>
<td>1.18&quot; 30.0mm</td>
<td>1.18&quot; 30.0mm</td>
</tr>
<tr>
<td>2.90&quot; 73.7mm</td>
<td>2.90&quot; 73.7mm</td>
</tr>
<tr>
<td>2.40&quot; 61.0mm</td>
<td>2.40&quot; 61.0mm</td>
</tr>
<tr>
<td>0.45&quot; 11.4mm</td>
<td>0.45&quot; 11.4mm</td>
</tr>
<tr>
<td>0.75&quot; 19.0mm dia</td>
<td>0.75&quot; 19.0mm dia</td>
</tr>
</tbody>
</table>

AC Current Transducer Connections

Output loop is powered by Transducer. No loop power supply required.

AC Current Transducer Specifications

- Power Supply:
  - 120VAC (108–132V) solid case only
  - 24 VAC/DC (22–26V) solid or split-core
- Consumption: <1 VA
- Output Signal:
  - 4–20 mA (20 mA maximum)
  - 0–10 VDC (10 VDC maximum)
- Output Impedance:
  - 0–5 or 0–10 VDC: 10 KΩ min.
  - 4–20 mA: 500 Ω max.
- Accuracy: 1% FS
- Response Time:
  - 600 ms max., 250 ms at 100% power
  - PWM Cycle Period: 12 ms (minimum), 54 sec (maximum)
- Isolation Voltage:
  - UL listed to 1270 VAC, tested to 5 KV
- Environmental:
  - -4 to 122°F (-20 to 50°C)
  - 0–95% RH, non-condensing

ATH Series (patented) AC Current Transducers are the latest innovation from NK Technologies. Monitoring the current or power controlled by silicon-controlled rectifiers (SCRs) can be a challenge, especially the current used by heaters. When used to monitor zero-crossing (burst) fired SCRs, the ATH will provide an output signal directly proportional to the RMS ampereage. Zero-crossing fired controls allow current to flow to the circuit for as short of a time period as one cycle, and off for several cycles. Most current sensors will not work well when there is no current present. This capability is important in case a heating element fails but the process continues operating, which could result in scrapped material.

AC Current Transducer Features

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

External Powered
- Split-core models powered with 24 VAC or DC.
- Solid-core models powered with 24 VAC or DC or 120 VAC.

Factory Calibrated
- No need for zero and span adjustment potentiometers.

RMS Output
- Accurate measurement of sinusoidal or pulsed current wave shapes.

Built-in Mounting Feet
- Simple, two-screw panel mounting or attach with DIN rail brackets (included).

UL/CUL and CE Approved
- Accepted worldwide.

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

ATH AC current transducers will produce a signal proportional to the current used even when the controller is supplying power in one cycle increments. This is quite common as the “burst-fired” zero-crossing switching method produces less harmonic distortion than phase-angle fired control.

ATH Current Transducer Dimensions

<table>
<thead>
<tr>
<th>SP Case</th>
<th>FL Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.19&quot; dia.</td>
<td>0.19&quot; dia.</td>
</tr>
<tr>
<td>1.18&quot; 30.0mm</td>
<td>1.18&quot; 30.0mm</td>
</tr>
<tr>
<td>2.90&quot; 73.7mm</td>
<td>2.90&quot; 73.7mm</td>
</tr>
<tr>
<td>2.40&quot; 61.0mm</td>
<td>2.40&quot; 61.0mm</td>
</tr>
<tr>
<td>0.45&quot; 11.4mm</td>
<td>0.45&quot; 11.4mm</td>
</tr>
<tr>
<td>0.75&quot; 19.0mm dia</td>
<td>0.75&quot; 19.0mm dia</td>
</tr>
</tbody>
</table>

AC Current Transducer Connections

Output loop is powered by Transducer. No loop power supply required.

AC Current Transducer Specifications

- Power Supply:
  - 120VAC (108–132V) solid case only
  - 24 VAC/DC (22–26V) solid or split-core
- Consumption: <1 VA
- Output Signal:
  - 4–20 mA (20 mA maximum)
  - 0–10 VDC (10 VDC maximum)
- Output Impedance:
  - 0–5 or 0–10 VDC: 10 KΩ min.
  - 4–20 mA: 500 Ω max.
- Accuracy: 1% FS
- Response Time:
  - 600 ms max., 250 ms at 100% power
  - PWM Cycle Period: 12 ms (minimum), 54 sec (maximum)
- Isolation Voltage:
  - UL listed to 1270 VAC, tested to 5 KV
- Environmental:
  - -4 to 122°F (-20 to 50°C)
  - 0–95% RH, non-condensing

ATH Series (patented) AC Current Transducers are the latest innovation from NK Technologies. Monitoring the current or power controlled by silicon-controlled rectifiers (SCRs) can be a challenge, especially the current used by heaters. When used to monitor zero-crossing (burst) fired SCRs, the ATH will provide an output signal directly proportional to the RMS ampereage. Zero-crossing fired controls allow current to flow to the circuit for as short of a time period as one cycle, and off for several cycles. Most current sensors will not work well when there is no current present. This capability is important in case a heating element fails but the process continues operating, which could result in scrapped material.

AC Current Transducer Features

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

External Powered
- Split-core models powered with 24 VAC or DC.
- Solid-core models powered with 24 VAC or DC or 120 VAC.

Factory Calibrated
- No need for zero and span adjustment potentiometers.

RMS Output
- Accurate measurement of sinusoidal or pulsed current wave shapes.

Built-in Mounting Feet
- Simple, two-screw panel mounting or attach with DIN rail brackets (included).

UL/CUL and CE Approved
- Accepted worldwide.

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

ATH AC current transducers will produce a signal proportional to the current used even when the controller is supplying power in one cycle increments. This is quite common as the “burst-fired” zero-crossing switching method produces less harmonic distortion than phase-angle fired control.

ATH Current Transducer Dimensions

<table>
<thead>
<tr>
<th>SP Case</th>
<th>FL Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.19&quot; dia.</td>
<td>0.19&quot; dia.</td>
</tr>
<tr>
<td>1.18&quot; 30.0mm</td>
<td>1.18&quot; 30.0mm</td>
</tr>
<tr>
<td>2.90&quot; 73.7mm</td>
<td>2.90&quot; 73.7mm</td>
</tr>
<tr>
<td>2.40&quot; 61.0mm</td>
<td>2.40&quot; 61.0mm</td>
</tr>
<tr>
<td>0.45&quot; 11.4mm</td>
<td>0.45&quot; 11.4mm</td>
</tr>
<tr>
<td>0.75&quot; 19.0mm dia</td>
<td>0.75&quot; 19.0mm dia</td>
</tr>
</tbody>
</table>

AC Current Transducer Connections

Output loop is powered by Transducer. No loop power supply required.
ATQ SERIES
Frequency Output AC Current Transducers

ATQ Series AC Current Transducers have a patented frequency output design used as an input to high-speed counter or frequency PLC modules, panel meters or programmable relays. Use where no analog inputs are available. Eight ranges, from 0–2 to 0–200 A, across three models provide the best available resolution. The ATQ Series AC Current Transducers are designed with a split-core case for easy installation.

AC Current Transducer Applications
Motion and Motor Control
- Pump, grinder, and fan motor status monitoring.
- Belt arm sensing in conveyor applications.
- Motor control in deburring/brush operations.
- Detect strain, acts as an electronic shear pin.

Current Measurement
- Measure current use in machine tools, polishing, and cutting operations where a small PLC has sufficient capacity to accept the sensor inputs measuring speed, time of use and electrical demands of the equipment.

AC Current Transducer Features
True RMS Output
- True RMS technology is accurate on distorted waveforms like VFD or SCR outputs.

Jumper-selectable Ranges
- Reduces inventory.
- Eliminates zero and span pots.

Isolation
- Output is magnetically isolated from the input for safety.
- Eliminates insertion loss (voltage drop).

Easy Installation
- Split-core case means the monitored conductor does not need to be disconnected to install the sensor.

Frequency Output Control
- For additional Application Examples, go to www.nktechnologies.com/applications.

AC Current Transducer Specifications

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>24 VAC/DC (19–26 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>&lt;1 VA</td>
</tr>
<tr>
<td>Output Signal</td>
<td>5 KHz at full-range current</td>
</tr>
<tr>
<td>Response Time</td>
<td>100 ms (to 90% step-change)</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>6–100 Hz</td>
</tr>
<tr>
<td>Input Frequency</td>
<td>40–400 Hz</td>
</tr>
<tr>
<td>Pulse Width</td>
<td>On: 40 microseconds Off: Variable</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>Tested to 5 KV</td>
</tr>
<tr>
<td>Case</td>
<td>UL94 V-0 Flammability-Rated</td>
</tr>
<tr>
<td>Environmental</td>
<td>-4 to 122°F (-20 to 50°C)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>≤1 VA</td>
</tr>
<tr>
<td>Power Supply</td>
<td>24 VAC/DC (19–26 V)</td>
</tr>
<tr>
<td>Output Signal</td>
<td>5 KHz at full-range current</td>
</tr>
<tr>
<td>Response Time</td>
<td>100 ms (to 90% step-change)</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>6–100 Hz</td>
</tr>
<tr>
<td>Input Frequency</td>
<td>40–400 Hz</td>
</tr>
<tr>
<td>Pulse Width</td>
<td>On: 40 microseconds Off: Variable</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>Tested to 5 KV</td>
</tr>
<tr>
<td>Case</td>
<td>UL94 V-0 Flammability-Rated</td>
</tr>
<tr>
<td>Environmental</td>
<td>-4 to 122°F (-20 to 50°C)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>≤1 VA</td>
</tr>
</tbody>
</table>

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

For more information, visit us at www.nktechnologies.com or call 1-800-959-4014.
**AC Current Transducers**

ATS Series AC Current Sensors combine a current operated switch and transducer into a single package. The Model features a digital display that gives visual indication of the setpoint for greater accuracy. The sensor provides a solid-state contact which will change state when the current exceeds an adjustable level or falls below the normal running current. This means reduced installation time, plus the option to have local control of a starter coil while at the same time sending the analog signal back to a controller housed in a separate cabinet.

### AC Transducer/Switch Applications

**Electronic Proof of Operation**
- Current operated switches eliminate the need for multiple pipe or duct penetrations and are more reliable than electromechanical pressure or flow switches.

**Conveyors**
- Detect jams and overloads.
- Interlock multiple conveyor sections.

**Pump Control**
-Provides signal to measure current and shuts down the pump if the current rises over the setpoint.

**Cooling Towers**
- Analog monitors time of use and contact opens if a filter clogs.

**Pump Jam & Suction Loss Protection**
- Measures the current used at all times.
- Provides quick visual indication of where the contact changes. Display flashes on and off when current has exceeded that value. A trip point of 15 A is displayed as 015.

**Acoustic Proof of Operation**
- Allows for higher accuracy.

**Solid-state Output**
- N.O. or N.C. solid-state switch for control circuits up to 240 VAC.
- Compatible with most automation systems.

### AC Transducer/Switch Features

**External Powered**
- Easiest and most accurate setpoint adjustment available.

**Built-in Mounting Feet**
- Simple, two-screw panel mounting or attach with DIN rail adapters (included).*

**Digital Setpoint Display**
- US Patent 9747776

**AC Current Transducer/Switch Specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>40–400 Hz</td>
</tr>
<tr>
<td>Power Supply</td>
<td>24 VDC (18–28 V)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>40–70 mA</td>
</tr>
<tr>
<td>Input Range</td>
<td>ATS1: 0–50 A</td>
</tr>
<tr>
<td></td>
<td>ATS2: 0–200 A</td>
</tr>
<tr>
<td>Output Signal</td>
<td>4–20 mA–50 A (max)</td>
</tr>
<tr>
<td>Output Impedance</td>
<td>0–5 or 0–10 VDC</td>
</tr>
<tr>
<td>Output Rating</td>
<td>1.0 A @ 240 VAC</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>Tested to 5 KV</td>
</tr>
<tr>
<td>Case</td>
<td>UL94 V-0 Flammability Rated</td>
</tr>
<tr>
<td>Environmental</td>
<td>4 to 122°F (-20 to 50°C)</td>
</tr>
<tr>
<td>Humidity</td>
<td>0–95% RH, non-condensing</td>
</tr>
<tr>
<td>UL/cUL, CE</td>
<td></td>
</tr>
<tr>
<td>Output Signal Type</td>
<td>External Powered</td>
</tr>
<tr>
<td>Output Rating</td>
<td>0–50 Analog</td>
</tr>
<tr>
<td>Output Limit</td>
<td>5/10 VDC; 20 mA</td>
</tr>
<tr>
<td>Power Supply</td>
<td>240 VAC or DC</td>
</tr>
<tr>
<td>Case Style</td>
<td>Solid-core</td>
</tr>
<tr>
<td>Power Supply</td>
<td>120 VAC or 240 VAC</td>
</tr>
</tbody>
</table>

**AC Current Transducer/Switch Ordering Information**

Sample Model Number: ATS1-120-NOAC-24U-FL
Adjustable AC current operated switch/transducer, normally open, solid-core case (DIN rail accessories are included). For additional Application Examples, go to www.nktechnologies.com/applications.

**AC Current Transducer/Switch Connections**

<table>
<thead>
<tr>
<th>Power Input</th>
<th>Contact Output</th>
<th>Analog Output</th>
</tr>
</thead>
</table>

Display shows the trip point, and flashes when AC current exceeds that value. A trip point of 15 A is displayed as 015.
The ATS Series AC Current Sensors combine a current operated switch and transducer into a single package for use in AC current applications up to 1200 A. The large sensing window provides complete isolation between the primary circuit and the controls. The DIN rail mounting makes installation a breeze, and provides a very secure mounting that is resistant to conductor movement.

### AC Current Transducer/Switch Applications

**Large AC Motor Loads**
- Produces an analog signal at all times to detect increases or decreases in current.
- Provides limit alarm contacts for over and undercurrent conditions.
- Extra large aperture allows for single or multiple conductor passage.

**Generators**
- Allows a viewer to see the amount of current used at any time.
- Single pole double throw relay adjustable from 10 to 1200 A.

**Main Service Entrance**
- Extra-large aperture allows for single or multiple conductor passage.
- Provides limit alarm contacts for over or undercurrent conditions.
- Produces an analog signal at all times to detect increases or decreases in current.

**Large AC Motor Loads**
- Produces an analog signal at all times to detect increases or decreases in current.

### AC Transducer/Switch Features

**Rotation Switch Setpoint Selection**
- Patented rotary switch setpoint selection.

**Isolation**
- Output is magnetically isolated from the input for safety.
- Eliminates insertion losses, no added burden.

**Analog Signal Available At All Times**
- 4–20 mA signal proportional to 0–1200 A.
- Reduces components by combining transducer and limit alarm (current switch).
- Analog signal powered from the sensor; no loop powered required.

**DIN Rail Mounted Case**
- Integral DIN rail mount with spring loaded mounting clips.
- Makes installation a snap.

**Failsafe Relay Action**
- Single Pole Double Throw Relay changes state with power to the sensor.
- LED indication if power is removed from the sensor or primary current exceeds the adjustable trip point.
- Field-adjustable time delay from 0.5 to 12 seconds.
- UL/cUL Approved, CE Pending

**Acceptance Worldwide**
- For information on the DIN rail accessories kit, see page 144.

### AC Current Transducer/Switch Specifications

- Power Supply: 120 VAC (108–132 V), 24 VAC/DC (22–26 V)
- Power Consumption: 2 VA
- Input Range: 0–1200 A
- Output Signal: 4–20 mA 560 mV max.
- Output Limit: 25 mA
- Output Impedance: 500 Ω maximum
- Accuracy: ±1% FS
- Analog Response Time: 600 ms to 90% step change
- Relay Response: 200 ms to 90% step change
- Hysteresis: 4%
- Frequency Range: 10–100 Hz
- Setpoint Range: 10–1200 A
- Output: Electromechanical SPDT relay
- Output Rating: 10 A at 125 VAC, 2 A at 30 VDC
- Isolation Voltage: UL listed to 1270 VAC, tested to 5 kV
- Case: UL/CSA, UL V-0 Flammability Rated
- Environmental: 0 to 122°F (-20 to 50°C), 0–95% RH, non-condensing
- Listings: UL/CSA, CE pending

### AC Current Transducer/Switch Ordering Information

Sample Model Number: ATS-420-SDT-24D-DL
Solid-core AC current operated switch/transducer combination, 0–1200 A range, 4–20 mA analog output, 24 VDC powered, adjustable relay trip point.

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>5</td>
<td>4</td>
<td>J</td>
<td>0</td>
</tr>
</tbody>
</table>

(1) Full Scale Range
(2) Output Signal
(3) Contact Type
(4) Power Supply
(5) Case Style

- Combination (switch and transducer)
- Output Signal
- SPD-2 SPDT Relay
- Power Supply
- Solid-core, DIN rail mounting

### AC Current Transducer/Switch Dimensions

- Analog Signal: 1.43” dia. 36.32 mm
- Power Supply: 3.25” dia. 82.69 mm
- 12–22 AWG solid or stranded
- 120 120 VAC
- 24D 24 VDC
- SDT SPDT Relay
- 420 4–20 mA  Note: maximum output depends on setpoint

### Analog Response Time

- 600 ms to 90% step change

### Relay Response Time

- 200 ms to 90% step change

### Hysteresis

- 4%

### Frequency Range

- 10–100 Hz

### Setpoint Range

- 10–1200 A

### Output

- Electromechanical SPDT relay

### Output Rating

- 10 A at 125 VAC, 2 A at 30 VDC

### Isolation Voltage

- UL listed to 1270 VAC, tested to 5 kV

### Case

- UL/CSA, UL V-0 Flammability Rated

### Environmental

- 0 to 122°F (-20 to 50°C), 0–95% RH, non-condensing

### Listings

- UL/CSA, CE pending

### Notes

- Dead front captive screw terminals, 12–22 AWG solid or stranded
- Observe polarity

**For additional Application Examples**, go to go to www.nktechnologies.com/applications.
DC Current Transducers

Current Transducers are designed to provide an analog current reading for monitoring, data logging and panel meter applications. NK Technologies’ current transducers offer a choice of 0–5 VDC, 0–10 VDC or 4–20 mA outputs common to PLC and energy management system controllers for monitoring of DC motor conditions, solar panel installations, welding processes and transportation applications.

Features:
- Jumper-selectable ranges
- Solid-core, split-core and large aperture models

### DC Current Transducers

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT SERIES, 4-WIRE Split-Core</td>
<td>DC Current Transducers.</td>
<td>73</td>
</tr>
<tr>
<td>DT SERIES, 4-WIRE Solid-Core</td>
<td>DC Current Transducers.</td>
<td>76</td>
</tr>
<tr>
<td>DT SERIES, 3-WIRE</td>
<td>DC Current Transducers.</td>
<td>78</td>
</tr>
<tr>
<td>DT SERIES, 5 &amp; 12 VDC POWERED</td>
<td>DC Current Transducers.</td>
<td>80</td>
</tr>
<tr>
<td>DT-FD SERIES, HIGH VOLTAGE</td>
<td>DC Current Transducers.</td>
<td>82</td>
</tr>
<tr>
<td>DT-BB SERIES, Bus Bar or Panel Mounted</td>
<td>DC Current Transducers.</td>
<td>84</td>
</tr>
<tr>
<td>DT-DL SERIES, LARGE APERTURE</td>
<td>DC Current Transducers.</td>
<td>86</td>
</tr>
<tr>
<td>DLT SERIES, 2-WIRE Looped Power</td>
<td>DC Current Transducers.</td>
<td>88</td>
</tr>
</tbody>
</table>

### DC CURRENT TRANSDUCERS Selection Chart

**MONITOR DC CIRCUITS**

- DT SERIES p. 73
- 4-wire Split-core (24 VAC or DC Powered)
- 3-wire Solid-core (24 V or 120 V Powered)
- DT SERIES p. 76
- 4-wire Solid-core (24 V or 120 V Powered)
- DT SERIES p. 78
- 3-wire (24 VDC Powered)
- DT SERIES p. 82
- Split-core (24 VAC or DC Powered)
- DT-FD SERIES p. 82
- High Voltage (24 VAC/DC Powered)
- DT-BB SERIES p. 84
- HV Bus Bar or Panel Mounted
- DT-DL SERIES p. 86
- Large Apertures Measures up to 1200 A
- DLT SERIES p. 88
- 2-wire (Loops-powered)

### Battery Charging System - Bipolar Output

```
-10V - +10V

Charge 0
Load 20VA 5V
Discharge
```

### Battery Charging System - Bidirectional Output

```
-10V - 0 +10V

Charge 0
Load 20VA 5V
Discharge
```

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

### DT SERIES, 4-WIRE

#### DC Current Transducers

- **Split-core Models**
- **DC Current Transducers** combine a Hall effect sensor and signal conditioner into a single package for use in DC current applications up to 400 A. The DT Series DC Current Transducers unipolar and bipolar models have jumper-selectable current input ranges and industry standard 0–20 mA, 4–20 mA, 0–5 VDC or 0–10 VDC outputs. Bidirectional output models provide a single range. These transducers are available in a split-core case.

#### DC Current Transducer Features

- **Single Range or Three Jumper-selectable Ranges**
  - Reduces set-up time.
  - Reduces inventory.
  - Eliminates zero and span pots.
- **Isolation**
  - Output is magnetically isolated from the input for safety.
  - Eliminates insertion loss (voltage drop).
- **Internal Power Regulation**
  - Works well, even with unregulated power.
  - Cuts installation cost.
- **Split-core Design/Built-in Mounting Brackets**
  - Makes installation a snap.
- **UL/cUL and CE Approved**
  - Accepted worldwide.

### Battery Charging System - Bipolar Output

```
-10V - +10V

Charge 0
Load 20VA 5V
Discharge
```

### Battery Charging System - Bidirectional Output

```
-10V 0 +10V

Charge 0
Load 20VA 5V
Discharge
```

#### DC Current Transducer Applications

- **Battery Banks**
  - Monitor load current.
  - Monitor charging current.
  - Verify operation.
- **Transportation**
  - Measure traction power or auxiliary loads.
  - Log processing time and number of operations.
- **Welding Processes**
  - Measure the current used while welding.
  - Log processing time and number of operations.
- **Photovoltaic Panels**
  - Monitor panel or string current output.
  - Monitor combiner box output.

### Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.
DC Current Transducers

**DT Series, 4-Wire**

**DC Current Transducer Dimensions**

- SP Case
  - 1.18" x 1.40mm dia.
  - 3.53" x 7.72mm
  - 3.04" x 7.72mm

**DC Current Transducer Output**

- Split-core Unipolar Output
  - 7.2 V (100% Full Scale Range)
  - 0.19" dia.

**DC Current Transducer Specifications**

- **Power Supply**: +24 VAC/DC (20–45 VDC, 22–38 VAC)
- **Power Consumption**: 2 W
- **Output Signal**: 0–20 mA, 4–20 mA, 0–5 VDC, 0–10 VDC
- **Output Limit**: 0–20 mA, 4–20 mA: 23 mA
  - 0–5 VDC: 5.75 VDC
  - 0–10 VDC: 11.5 VDC
- **Output Impedance**: 0–20 mA, 4–20 mA: 500 max.
  - 0–5 VDC: 25 KΩ min.
  - 0–10 VDC: 50 KΩ min.
- **Accuracy**: 2.0% FS
- **Repeatability**: 1.0% FS
- **Response Time**: 50 ms max.
- **Isolation Voltage**: UL listed to 1270 VAC, tested to 3 KV
- **Input Range**: 0–200 A max. (solid-core)
  - 0–50 A min., 0–400 A max. (split-core)
- **Case**: UL94 V-0 Flammability Rated
- **Environmental**: -4 to 122°F (-20 to 50°C)
  - 0–95% RH, non-condensing
- **Listings**: UL/cUL, CE

**DC Current Transducer Ordering Information**

DT Series Unipolar and Bipolar Output Models

**Sample Model Number**: DT2-420-24U-U-SP

- DC current transducer, 0–100/150/200 A range, 4–20 mA output, 24 VAC/DC powered, unipolar polarity, split-core case. (DIN rail adapters are included)

**DT Series Bidirectional Output Models**

**Sample Model Number**: DT2-010-24D-BD-SP

- DC current transducer, 0–200 A range, ±10 VDC output signal, 24 VDC powered, split-core case. (DIN rail adapters are included)

**DC Current Transducer Connections**

- DT Series Unipolar and Bipolar Output Models

**Notes:**

- Deadfront captive screw terminals
- 12–22 AWG solid or stranded
- Observe polarity

**DC Current Transducer Output**

- Solid-core Unipolar Output
  - Primary Current (range percentage)
  - DC Voltage Output
  - mA Output

**Bipolar Output**

- Primary Current (range percentage)
- DC Voltage Output
- mA Output

**Bidirectional Output**

- Primary Current (range percentage)
- DC Voltage Output
- mA Output

**Monitored Current Range**

- +10V
- 0V
- -10V
- +5V
- 0V
- -5V
- 0V

Notes:

- Deadfront captive screw terminals
- 12–22 AWG solid or stranded
- Observe polarity

**DC Current Transducer Specifications**

- **Power Supply**: +24 VAC/DC (20–45 VDC, 22–38 VAC)
- **Power Consumption**: 2 W
- **Output Signal**: 0–20 mA, 4–20 mA, 0–5 VDC, 0–10 VDC
- **Output Limit**: 0–20 mA, 4–20 mA: 23 mA
  - 0–5 VDC: 5.75 VDC
  - 0–10 VDC: 11.5 VDC
- **Output Impedance**: 0–20 mA, 4–20 mA: 500 max.
  - 0–5 VDC: 25 KΩ min.
  - 0–10 VDC: 50 KΩ min.
- **Accuracy**: 2.0% FS
- **Repeatability**: 1.0% FS
- **Response Time**: 50 ms max.
- **Isolation Voltage**: UL listed to 1270 VAC, tested to 3 KV
- **Input Range**: 0–200 A max. (solid-core)
  - 0–50 A min., 0–400 A max. (split-core)
- **Case**: UL94 V-0 Flammability Rated
- **Environmental**: -4 to 122°F (-20 to 50°C)
  - 0–95% RH, non-condensing
- **Listings**: UL/cUL, CE

**DC Current Transducer Ordering Information**

DT Series Unipolar and Bipolar Output Models

**Sample Model Number**: DT2-420-24U-U-SP

- DC current transducer, 0–100/150/200 A range, 4–20 mA output, 24 VAC/DC powered, unipolar polarity, split-core case. (DIN rail adapters are included)

**DT Series Bidirectional Output Models**

**Sample Model Number**: DT2-010-24D-BD-SP

- DC current transducer, 0–200 A range, ±10 VDC output signal, 24 VDC powered, split-core case. (DIN rail adapters are included)
DC Current Transducers

Solid-core Models

DT Solid-core Series DC Current Transducers combine a Hall effect sensor and signal conditioner into a single package for use in DC current applications up to 200 A. The DT Series DC Current Transducers unipolar and bipolar models have jumper-selectable current input ranges and industry standard 0–20 mA, 4–20 mA, 0–5 VDC or 0–10 VDC outputs. Solid-core models are offered with ranges as low as 0–5 amps, and up to 0–200 amps.

DC Current Transducer Applications

- Battery Banks
- Monitor load current.
- Monitor charging current.
- Verify operation.

- Transportation
- Measure traction power or auxiliary loads.
- Log processing time and number of operations.

- Photovoltaic Panels
- Monitor panel or string current output.
- Monitor combiner box output.

- Use a DT sensor over one lead to a DC motor to measure the current used. Over normal readings mean a jam or a bearing failure, and under normal current means a belt or coupling may have broken. The output can also be used to measure time of use to help with maintenance scheduling.

DC Current Transducer Features

- Three Jumper-selectable Ranges
  - Reduces set-up time.
  - Reduces inventory.
  - Eliminates zero and span pots.

- Internal Power Regulation
  - Works well, even with unregulated power.
  - Cuts installation cost.

- Solid-core Design/Built-in Mounting Brackets
  - Makes installation a snap.

- UL/cUL and CE Approved
  - Accepted worldwide.

DC Current Transducer Applications

- Battery Banks
  - Monitor load current.
  - Monitor charging current.
  - Verify operation.

- Transportation
  - Measure traction power or auxiliary loads.

- Welding Processes
  - Measure the current used while welding.

- Solar Panels
  - Monitor panel or string current output.

- Photovoltaic Panels
  - Monitor panel or string current output.
  - Monitor combiner box output.

- Battery Banks
  - Monitor load current.
  - Monitor charging current.
  - Verify operation.

- Transportation
  - Measure traction power or auxiliary loads.

- Photovoltaic Panels
  - Monitor panel or string current output.

- Photovoltaic Panels
  - Monitor combiner box output.

DC Current Transducer Output

- Solid-core Unipolar Output
  - Primary Current (range percentage)
  - DC Current Direction

DC Current Transducer Specifications

- Power Supply
  - 120 VAC (108–132 V)
  - 24 VAC/DC (22–26 V)

- Power Consumption
  - 2 VA

- Output Signal
  - 0–20 mA, 4–20 mA, 0–5 VDC

- Output Limit
  - 0–20 mA, 4–20 mA: 23 mA
  - 0–5 VDC: 5.75 VDC
  - 0–10 VDC: 11.5 VDC

- Output Impedence
  - 0–20 mA, 4–20 mA: 500 max.
  - 0–5 VDC: 25 KΩ min.
  - 0–10 VDC: 50 KΩ min.

- Accuracy
  - 1.0% FS

- Repeatability
  - 1.0% FS

- Response Time
  - 100 ms average

- Frequency Range
  - DC

- Isolation Voltage
  - UL listed to 1270 VAC, tested to 3 KV

- Input Range
  - 0–200 A max

- Case
  - UL94 V-0 Flammability Rated

- Environmental
  - -4 to 122°F (-20 to 50°C)

- 0–95% RH, non-condensing

- Listings
  - UL/cUL, CE

DC Current Transducer Ordering Information

Sample Model Number: DT2-420-24U-U-FL
- DC current transducer, 0–100/150/200 A range, 4–20 mA output, 24 VAC/DC powered, unipolar polarity, solid-core case. (DIN rail adapters are included)

- (1) Full Scale Range
  - 0, 5, 10, 15, 20 A

- (2) Output Signal
  - 0, 20 mA

- (3) Power Supply
  - 24U, 120 VAC

- (4) Output Polarity
  - U, Bipolar

- (5) Case Style
  - FL, Solid-core

Notes:
- Deadfront captive screw terminals.
- 12–22 AWG solid or stranded.
- Observe polarity.
DT SERIES, 3–WIRE

DC Current Transducers

DT Series DC Current Transducers provide a low cost way of measuring DC current in a small and easy-to-install case. The series is stable at a wide range of temperatures. The single range design and the use of a common for the power supply and output signal provide a price competitive option in an international market. Similar in concept to the DLT current output sensors, this design produces a choice of 0–5 or 0–10 VDC to interface with controllers or data acquisition systems lacking the current signal capacity.

DC Current Transducer Applications

Photovoltaic Panel Monitoring
- Accurate and reliable indication of how much power is produced by a single panel or a string of panels.

Hoists
- Detect overloads and jams.
- Detect undercurrent conditions from coupling slip or breakage.

DC Motor Protection
- Detect imminent bearing failures.

Wind Driven Generators
- Measure and monitor power production from alternative sources.

Monitoring a Photovoltaic Panel Power Output

DC Current Transducer Features

Industry Standard Outputs
- 0–5 or 0–10 VDC proportional to the DC current.
- Compatible with most automation systems.

24 VDC Powered
- Power supply and output share common.

No Span or Zero Adjustments Needed
- Reduces field calibration errors.
- Factory calibrated without potentiometers.

Solid-core Case
- Compact size requiring very little panel space.

Built-in Mounting Feet
- Simple, two-screw panel mounting or attach with DIN rail brackets (included).*

Designed for UL/cUL and CE Approval
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

DC Current Transducer Specifications

Power Supply
- 24 VDC (19–30 V)

Response Time
- 500 ms

Range
- 0–10 A
- 0–100 A

Frequency Range
- DC

Isolation Voltage
- UL listed to 1270 VAC, tested to 5 KV

Case
- UL94 V-0 Flammability Rated

Environmental
- -4 to 122°F (-20 to 50°C)
- 95% RH, non-condensing

Listings
- Designed for UL/cUL and CE approval

DC Current Transducer Connections

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

*For information on the DIN rail accessories kit, see page 144.
DT SERIES, 5 & 12 VDC POWERED
DC Current Transducers

The DT Series of Temperature Compensated DC Current Transducers is ideal for energy management system inputs where the controller is designed to accept 333 mV signals, commonly found in many power monitoring applications. Other output options available are a 0–5 VDC signal used in building energy management systems or a 0–10 VDC signal seen more often in industrial controllers. Additionally, this series features a patented method that improves the sensor accuracy as the ambient temperature changes. The sensor output is automatically adjusted as the temperature increases or decreases, eliminating one of the biggest issues with Hall effect based products.

DC Current Transducer Applications

Photovoltaic Panel Output Measurement
- The sensor output rises and falls as the panel produces more or less power.

DC Motors
- Detect jams and overloads.
- Provide early notification of impending bearing failure.

Electrical Heaters
- Detect open or shorted elements quickly.

Photovoltaic Panel Output Measurement

The DT sensor will produce a signal directly proportional to the current produced by the panel or string of panels, with an output to match the controller being used.

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

DC Current Transducer Features

Voltage Output
- 333 mV/DC, 5 or 10 VDC proportional to DC current.
- Compatible with many monitoring systems.

5 VDC Powered
- Use with data collection systems.
- Available with 333 mVDC output.

12 VDC Powered
- Available with 0.333, 5 or 10 VDC output.

Ranges to Suit Your Needs
- 0–50 A DC
- 0–100 A DC

Temperature Compensated
- Remains accurate with rise or fall of ambient temperature.

Built-in Mounting Feet
- Simple, two-screw panel mounting or attach with DIN rail brackets (included)*.

Split-core Case
- Open to snap the sensor over existing conductor; no need to disconnect the load to install.

Designed for UL/cUL Approval
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

Patented temperature compensation design
US Patent 9618541

DC Current Transducer Dimensions

DC Current Transducer Specifications

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>5 VDC (0.5–5.9 V)</th>
<th>12 VDC (11.5–13.2 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>&lt;8.5 mA (no load)</td>
<td>&lt;2 VA</td>
</tr>
<tr>
<td>Output Signal</td>
<td>0–333 mVDC</td>
<td>0–5 VDC or 0–10 VDC</td>
</tr>
<tr>
<td>Output Impedance</td>
<td>50 Ω minimum, 20 mA maximum (333 mVDC)</td>
<td>10 kΩ minimum (0–5 or 0–10 VDC output)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±1% full scale across temperature range</td>
<td></td>
</tr>
<tr>
<td>Response Time</td>
<td>400 ms (10% step change)</td>
<td></td>
</tr>
<tr>
<td>Frequency Range</td>
<td>DC</td>
<td></td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>UL listed to 1270 VAC, tested to 5 KV</td>
<td></td>
</tr>
<tr>
<td>Case</td>
<td>UL94 V-0 Flammability Rated</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>-4 to 122°F (-20 to 50°C)</td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>0–95% RH, non-condensing</td>
<td></td>
</tr>
<tr>
<td>Listings</td>
<td>Designed for UL/cUL approval</td>
<td></td>
</tr>
</tbody>
</table>

Sample Model Number: DTB-333-05D-U-SP
Split-core DC current transducer, 0–50 A range, 0–333 mVDC, 5 VDC powered, unipolar output. (DIN rail adapters are included)

(1) Range
(2) Output Signal
(3) Power Supply
(4) Signal Response Type
(5) Case Style

Output remains accurate even as the temperature rises and falls from -20°C to +50°C (-4 to +122 °F) with our patent pending design.
DC Current Transducer Applications

Monitor Large Solar Panel Installations
- Large utility connected photovoltaic generation systems will often produce DC power at higher voltages as the wire can be smaller for the same amount of power produced.

Monitor DC Motors
- Traction and drilling equipment use higher voltage DC motors to produce high torque output at low speeds.

Solar Array Application

Commercial and industrial ground mounted solar arrays are connected in series to combiner boxes, developing higher voltage and lower current to feed into the grid. This is contrasted to how PV systems operate, which are connected in parallel for more power at lower voltage. DC Current Transducers deliver the same power as with a lower voltage system.

Solar Array Application

Monitor Large Solar Panel Installations
- Large utility connected photovoltaic generation systems will often produce DC power at higher voltages as the wire can be smaller for the same amount of power produced.

Monitor DC Motors
- Traction and drilling equipment use higher voltage DC motors to produce high torque output at low speeds.

Solar Array Application

Commercial and industrial ground mounted solar arrays are connected in series to combiner boxes, developing higher voltage and lower current to feed into the grid. This is contrasted to how PV systems operate, which are connected in parallel for more power at lower voltage. DC Current Transducers deliver the same power as with a lower voltage system.
**DC Current Transducers**

The newest DC current transducers provide several features not previously available. This innovative design allows a split-core transducer to be installed over existing bus bars or wire, it can be mounted on a panel or DIN rail and is rated to measure DC current working voltage to 1500 VDC. The power supply and output signal wires are connected to the sensor with a terminal block which plugs into the header on the top of the sensor. Four ranges are available from 0–100 to 0–400 amps; three output types: unipolar, bipolar and bidirectional; and three industry standard outputs: 4–20 mA, 0–5 and 0–10 VDC. The innovative design puts the current sensing components in one housing with the signal conditioning, reducing installation time and improving both accuracy and safety.

**Current Transducer Features**

**Standard Signal Outputs**
- 4–20 mA unipolar or 4–12–20 mA bipolar output.
- 0–5/10 VDC unipolar or 0–2.5–5 VDC or 0–5–10 VDC bipolar output.
- +/-5 or +/-10 VDC bidirectional output also available.

**Externally Powered**
- Low voltage 24 VAC/DC is safe and readily available.

**Split-core Case**
- Sensing window provides ample space for bus bar, single or multiple conductors.

**DIN Rail or Panel Mount**
- Attach to a bus assembly, snap onto DIN rail* (using available adapters) or attach with screws to a panel for secure mounting.

**Designed for UL, cUL and CE Approval**
- Accepted worldwide.

**Current Transducer Applications**

**Grid Connected PV Solar Generation**
- Measure the power produced by a number of panels connected together, at voltages to 1500 VDC.

**DC Motor Monitoring**
- Spot overcurrent conditions before the machine fails.
- Sense clogged filters or blocked intake to DC driven pumps.

**Solar Panel Grid**

Power supply and output wires connect to the sensor with pluggable terminals, making installation even easier. Panel mounting bracket snaps on if needed.

---

**OEMs**

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.

*For information on the DIN rail accessories kit, see page 144.
**DT-DL SERIES, LARGE APERTURE**

**DC Current Transducers**

DT Series Large Aperture DC Current Transducers combine a Hall effect sensor and signal conditioner into a single package for use in DC current applications up to 1200 A. The DT Series Large Aperture Transducers have factory set and calibrated ranges, industry standard 4–20 mA, 0–5 VDC or 0–10 VDC outputs, and are available in solid-core DIN rail mount case.

### DC Current Transducer Applications

- **Battery Banks**
  - Monitor load and charging currents.
  - Verify operation.

- **Transportation**
  - Measure traction power or auxiliary loads.

- **Wind and Solar Generated Power**
  - Measure the current produced or consumed.
  - Detect mechanical problems before failure occurs.

- **Monitor DC Powered Motors**
  - Monitor current of cranes, saws, sorters and positioning equipment.

### Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.

### DT Series Large Aperture DC Current Transducers

#### DC Current Transducer Connections

**SUPPLY POWER**

24V or 120V

**OUTPUT SIGNAL**

DT5-420-24U-U-DL

+- Not Polarity Sensitive

Current Direction

+  

-  

**DC Current Transducer Specifications**

- **Power Supply:** +120 VAC (108–132 V)  
  +24 VAC/DC (22–26 V)

- **Output Signal:** 4–20 mA, 0–5 VDC, 0–10 VDC

- **Output Limit:**
  - 4–20 mA: 23 mA
  - 0–5 VDC: 5.75 VDC
  - 0–10 VDC: 5.00 VDC

- **Output Impedance:**
  - 4–20 mA: 650 Ω max.
  - 0–5 VDC: 25 KΩ min.
  - 0–10 VDC: 50 KΩ min.

- **Accuracy:** 2.0% FS

- **Repeatability:** 1.0% FS

- **Response Time:** 100 μs to 99% of step change

- **Range:** 0–1200 A DC

- **Frequency Range:** DC

- **Isolation Voltage:** UL listed to 1270 VAC, tested to 3 KV (monitored line to output)

- **Case:** UL94 V-0 Flammability Rated

- **Environmental:** 4–127°F (-20 to 50°C), 0–95% RH, non-condensing

- **Listings:** UL/cUL, CE

---

**Battery Charging System**

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

---

**DC Current Transducer Output**

Notes:
- Deadfront captive screw terminals
- 12–22 AWG solid or stranded
- Observe polarity
- Unipolar Output: Signal With Current flowing in one direction only.
**DC Current Transducers**

**DC Current Transducer Features**

**4–20 mA Loop-powered Output**
- Industry-standard connections, positive indication of correct field wiring.

**Single Range**
- No chance of field range selection errors.
- Eliminates zero and span pots.

**Isolation**
- Output is magnetically isolated from the primary circuit for safety.
- Eliminates insertion loss (voltage drop).

**UL/cUL and CE Approved**
- Accepted worldwide.

**DLT Series DC Current Transducers** combine a Hall effect sensor and a signal conditioner into a single package. The DLT Series DC Current Transducers are designed to produce an analog 4–20 mA signal proportional to the DC current in the primary conductor. These transducers are available in a solid-core or split-core case design. Lower current ranges make this sensor ideal for use in photovoltaic panel combiner boxes.

**DC Current Transducer Applications**

- **PV Array combiner boxes.**
- **Wind generators.**
- **DC heating applications.**
- **UPS system monitoring.**

**Photovoltaic Arrays**

**Monitoring PV Arrays:**

The current produced by a photovoltaic module or array can be easily monitored by using the DLT series current sensors over the conductor exiting the collectors. Using a simple two-wire connection powered by 24 VDC nominal in series with the sensor output, the sensor will produce a signal in real time that is directly proportional to the current being produced by the PV module.

If a single cell fails, or a module quits operating properly, the current output will drop, and the current sensor will reflect the change.

Safer and more stable than shunts, non-contact current sensors are a simple answer to measuring DC current at any point in the PV system.

**DC Current Transducer Dimensions**

**FF Case**

**SP Case**

**DC Current Transducer Specifications**

- **Power Supply:** 24 VDC (12–40 V)
- **Output Signal:** 4–20 mA, loop-powered
- **Output Limit:** 23 mA
- **Accuracy:** ±0.5% FS
- **Response Time:** 100 ms (to 90% step change)
- **Range:** 0–20 to 0–400 DC, see ordering information
- **Frequency Range:** DC
- **Isolation Voltage:** UL listed to 127 VAC, tested to 5 kV
- **Case:** UL94 V-0 Flammability Rated
- **Environmental:** -4 to 122°F (-20 to 50°C), 0–95% RH, non-condensing
- **Listings:** UL/cUL, CE

**DC Current Transducer Ordering Information**

Sample Model Number: DLTB-420-24L-BP-FF

DC current transducer, 50 A range, 4–20 mA output, 24 VDC loop-powered in a solid-core case. (DIN rail adapters are included)

(1) (2) (3) (4) (5)

<table>
<thead>
<tr>
<th>DLT</th>
<th>Full Scale Range</th>
<th>Output Signal</th>
<th>Power Supply</th>
<th>Output Polarity</th>
<th>Case Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0–20 A</td>
<td>4–20 mA</td>
<td>24 VDC</td>
<td>Unipolar</td>
<td>Solid-core</td>
</tr>
<tr>
<td>B</td>
<td>0–50 A</td>
<td></td>
<td></td>
<td>Bipolar</td>
<td>Front terminals</td>
</tr>
<tr>
<td>C</td>
<td>0–100 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>0–200 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>0–300 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>0–400 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

- Finger-safe captive screw terminals.
- 12–14 AWG solid or stranded.
- Observe polarity.

**Test & Evaluation Units for OEMs**

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

Detecting ground fault conditions and protecting sensitive equipment or personnel from harm are where AG Series sensors can help. A compact design eliminates two-piece solutions while options include factory-set or field-adjustable trip point; N.O. or N.C. latching or auto-reset relays, 24/120/240 V power supply and noise immunity.

Features:
- N.O./N.C. solid-state switch or mechanical relay outputs
- Field-selectable 5 mA, 10 mA or 30 mA set points
- Noise immunity option for EMI/RFI sensitive environments
- UL, CE approved

Noise immunity.

N.C. latching or auto-reset relays, 24/120/240 V power supply and options include factory-set or field-adjustable trip point; N.O. or N.C. fault relay.

Ground Fault Protection

Earth Fault Detection Requirements

In North America, most people are familiar with ground fault circuit interrupters (GFCI) since they have been required by the National Electric Code (NEC) since the late 1960s. As the technology became more reliable, ground fault circuit interrupters were required in many more applications. The primary purpose was to reduce the number of deaths caused by electrical shock. Any place where a human body might become the best path to ground is a candidate for ground fault circuit protection. The number of fatalities reduced significantly.

GFCI receptacles and circuit breakers were a huge step forward. With the success in protecting people from shock the interest in ground fault protection increased. A GFCI is designed to disconnect a circuit if current to earth exceeds 6 mA at 120 VAC in locales where the NEC sets the standard for wiring practices. At this low level of fault current it may take a few seconds (UL943A states just under six seconds maximum) before the circuit is de-energized, but if the fault becomes more dangerous, at 20 mA or higher, the circuit is disconnected much faster.

Underwriters Laboratories has established standards under UL943 for personnel protection (avoiding shock to humans) and also for equipment protection at various fault levels and reaction time limits. The point of equipment protection is to keep a fault from damaging the machine more than protecting the operator. Circuits supplying heating loads (heat strips, heat trace and snow melting equipment) are usually not disconnected until the fault current exceeds 30 mA or more. Electric vehicle charging stations have GFCI protection required, but the fault level is somewhere between standard personnel protection and the various levels of equipment protection, and not specified in the NEC.

The NEC states the following:

NEC section 427.22: Ground fault protection of equipment shall be provided for electric heat tracing and heating panels. This requirement shall not apply in industrial establishments where there is alarm indication of ground faults and the following conditions apply: (1) Conditions of maintenance and supervision ensure that only qualified persons service the installed systems. (2) Continued circuit operation is necessary for safe operation of equipment or processes.

NEC section 426.28: Ground fault protection of equipment shall be provided for fixed outdoor electric deicing and snow-melting equipment.

NEC section 555.3: The overcurrent protective devices that supply the marina, boat yards, and commercial and noncommercial docking facilities shall have ground-fault protection not exceeding 30 mA.

There is no stated fault current limit in section 427.22 for heating equipment or in 426.28 covering snow melt systems, but section 555.3 for protection at docks clearly shows that the monitored circuit must be disconnected from the load if there is a fault over 30 mA.

The NEC calls for ground fault protection for high current supplies too. Sections 215.10 and 230.95 deal with current of 1000 amps and voltages of 480 or higher. Section 517.17 stipulates where fault detection is required in hospitals and other health care facilities. The importance of protecting an electrical system against faults to earth cannot be overstated. The NEC sections referred to above are just the beginning of equipment protection. This type of fault sensing is not overcurrent detection, so fusing or circuit breakers will keep the conductors or their insulation from being damaged. There are a wide range of applications where ground fault detection is required, but if circuit size is reviewed, most personnel protection is needed for 15 or 20 amp circuits supplied at 120 volts. The requirements for equipment protection vary widely.

NEC section 427.22. The importance of protecting an electrical system against faults to earth cannot be overstated. The NEC sections referred to above are just the beginning of equipment protection. This type of fault sensing is not overcurrent detection, so fusing or circuit breakers will keep the conductors or their insulation from being damaged. There are a wide range of applications where ground fault detection is required, but if circuit size is reviewed, most personnel protection is needed for 15 or 20 amp circuits supplied at 120 volts. The requirements for equipment protection vary widely.

The importance of protecting an electrical system against faults to earth cannot be overstated. The NEC sections referred to above are just the beginning of equipment protection. This type of fault sensing is not overcurrent detection, so fusing or circuit breakers will keep the conductors or their insulation from being damaged. There are a wide range of applications where ground fault detection is required, but if circuit size is reviewed, most personnel protection is needed for 15 or 20 amp circuits supplied at 120 volts. The requirements for equipment protection vary widely.

The NEC sections referred to above are just the beginning of equipment protection. This type of fault sensing is not overcurrent detection, so fusing or circuit breakers will keep the conductors or their insulation from being damaged. There are a wide range of applications where ground fault detection is required, but if circuit size is reviewed, most personnel protection is needed for 15 or 20 amp circuits supplied at 120 volts. The requirements for equipment protection vary widely.
AG SERIES
Ground Fault (Earth Leakage) Relay

AG Series Ground Fault Detectors help protect people, products, and processes from damage by ground fault conditions by monitoring all current-carrying conductors in grounded single- and three-phase delta or wye systems.

Ground Fault Protection Applications

Personnel Protection (typically 5 mA)
• Detects sensitive ground fault conditions, which may be injurious to personnel and processes.
• Functions as sensor and alarm trigger when part of an overall ground fault protection system.

Equipment Protection (typically 10 mA or 30 mA)
• For applications where personal protection is not the primary concern, higher setpoint capability helps eliminate nuisance tripping while still providing adequate ground fault detection to protect machine electronics.

Regulatory
• Meets requirements as stipulated by governmental and industrial regulatory groups for ground fault sensing.

Ground Fault Protection Features

Broad Range of Options to Match Application Needs
• N.O./N.C. solid-state switch or mechanical relay outputs.
• Normally energized or normally de-energized contacts.
• Noise Immunity option for use in EMI/RFI sensitive environments.

Setpoint Options Maximize Ease-of-Use
• Field-selectable 5 mA, 10 mA or 30 mA setpoints on the AG3 “Tri-set” model makes user adjustments fast, sure and convenient.
• Single factory-calibrated setpoints available form 5 mA to 950 mA.

Compatible with Standard Equipment
• Applicable on single- and three-phase systems.
• Ideal for use with shunt trip breakers.
• Magnetically isolated from monitored circuit and control power.

UR/cUR and CE Approved
• Accepted worldwide.

“Zero Sum” Operating Principle:
In single- and three-phase AC systems, under normal conditions current flows from the power source to the load and back to the source. As a result, the electromagnetic fields surrounding the conductors cancel, producing a “zero sum current” even when the current in each phase are not equal. As soon as current leaks to ground (fault condition) the current become imbalanced and a net magnetic field results. AG Series detectors monitor this field and trip alarm contacts when the leakage rises above the setpoint.

Output Tables

<table>
<thead>
<tr>
<th>Control Power Applied</th>
<th>No Power</th>
<th>No Fault</th>
<th>Fault</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.C. Normally Closed</td>
<td>closed</td>
<td>open</td>
<td>closed</td>
</tr>
<tr>
<td>N.O. Normally Open</td>
<td>open</td>
<td>closed</td>
<td>open</td>
</tr>
</tbody>
</table>

Normally Energized Models (-FS Option and -ENE Option)
Protection from faults and control power loss.

Normally De-energized Models (-NF and -DEN Options)
Protection from faults only when power is applied.

Latching Models (-LA Option) power up initially in the rest (normal) mode. If there is a fault condition or the test button is pushed, the output contacts will change state and latch. The output will remain latched regardless of whether the fault is cleared or control power is removed. To reset the output apply a momentary contact across “reset” terminals.

AG Series with Solid-state Outputs

Solid-state Outputs offer the benefit of reliable, long-lasting solid-state switches. Solid-state design provides unlimited switch operating life, superior resistance to shock and vibration, zero off-state leakage, high switch speeds and high input-output isolation. Available in solid-core case with screw terminals.

AG Series with Mechanical Outputs

Available Models

AG Series with Solid-state Outputs are available in solid-core cases with a choice between a N.O. or N.C. SPST latching relay and a SPDT Form C relay with auto-reset. All mechanical models can be ordered with factory-set, field-adjustable setpoint or with a “Tri-set” option, which provides three factory-set setpoints. A noise immunity option is available for applications in harsh EMI/RFI environments.

Available Models

OEMs

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

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

AG SERIES
Ground Fault Protection

Insulation Breakdown Monitoring

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

OEMs

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

OEMs

Test & Evaluation Units for OEMs
Free program expedites evaluation process. See page 3 for details.
Ground Fault Protection Specifications

**Power Supply**
- 120VAC (66–132 V)
- 24 VDC (19–29 V)
- Green LED = Power On indication

**Power Consumption**
- Factory-calibrated models (specify when ordering):
  - AG1: 5–100 mA (005–100)
  - AG2: 80–950 mA (080–950)

**Setpoint Range**
- Auto Reset:
  - 0.15 A @ 30 VDC
- Latching:
  - 2 A @ 30 VDC

**Output Rating**
- Solid-state:
  - AC Switch: SPDT Relay
  - DC Switch: Latching SPDT Relay

**Off-state Leakage**
- <10 micro A (N.O.)

**Response Time**
- +200 ms @ 5% above trip point
- +60 ms @ 50% above trip point
- +15 ms @ 100% above trip point

**Time Delay**
- UL listed @ 1270VAC

**Noise Immunity**
- N/A

**Case**
- UL486 V0/flammability Rated

**Environmental**
- 4 to 122°F (-20 to 50°C)
- 0–95% RH, non-condensing

**Listings**
- UL/UR CE

Ground Fault Protection Ordering Information

**Solid-state Output Models**

<table>
<thead>
<tr>
<th>AG</th>
<th>(1) (2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG1</td>
<td>NOAC</td>
<td>120 VAC</td>
<td>0.15 A @ 30 VDC</td>
<td>None</td>
<td>Factory set trip point in mA</td>
</tr>
<tr>
<td>AG2</td>
<td>NOAC</td>
<td>240 VAC</td>
<td>2 A @ 30 VDC</td>
<td>None</td>
<td>Factory set trip point in mA</td>
</tr>
<tr>
<td>AG3</td>
<td>NOAC</td>
<td>5 mA</td>
<td>None</td>
<td>None</td>
<td>Factory set trip point in mA</td>
</tr>
</tbody>
</table>

**Mechanical Output Models**

<table>
<thead>
<tr>
<th>AG</th>
<th>(1) (2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG1</td>
<td>NOR1</td>
<td>120 VAC</td>
<td>0.15 A @ 30 VDC</td>
<td>None</td>
<td>Factory set trip point in mA</td>
</tr>
<tr>
<td>AG2</td>
<td>NOR1</td>
<td>240 VAC</td>
<td>2 A @ 30 VDC</td>
<td>None</td>
<td>Factory set trip point in mA</td>
</tr>
<tr>
<td>AG3</td>
<td>NOR1</td>
<td>5 mA</td>
<td>None</td>
<td>None</td>
<td>Factory set trip point in mA</td>
</tr>
</tbody>
</table>

**Options**

- TR3: Tri-set
- DEN: Normally de-energized auto-reset (SDT1 output only)
- LA: Latching (NOR1 and NOR2)
- TR: Tri-set

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.

OEMs

For program evaluation and evaluation units, please see page 3 of the catalog.
AGL SERIES

Large Aperture Ground Fault Relay

AGL Series Large Aperture Ground Fault Relays offer one of the largest aperture diameters in the industry while maintaining a compact overall profile. Intended for sensing earth leakage in applications up to 300 A, the AGL Series offers a choice of N.O. or N.C. latching relays or an SPDT Form C relay with auto-reset. Case features integral DIN rail mounting as standard and optional noise immunity coatings for applications in harsh EMI/RFI environments.

Ground Fault Relay Features

- **Setpoint Options Maximize Ease-of-Use**
  - Setpoint options include factory-adjustable setpoint from 5 mA – 100 mA or “TR3 Tri-Set” models with field-selectable 5/10/30 mA settings.
  - Finger-safe terminals for worry-free installation and operation.
  - Aperture orientation is perpendicular to DIN rail, allowing for clean and efficient wiring and minimizing space between multiple components.
  - Choice of dependable latching SPST or SPDT (form C) electromechanical relay outputs.
  - Uses “Zero Sum” operating principle to reliably sense imbalance in magnetic fields associated with current leakage to ground.
  - Typical response times from 15 ms to 200 ms.
  - Integral “push-to-test” button with LED indication of contact status.

- **DIN Rail Mount**
  - Integral DIN rail mount with spring loaded mounting clips.
  - UL/cUL and CE Approved.
  - Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

Moisture Ingress on a Submersible Pump Motor

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

Ground Fault Relay Specifications

**Power Supply**
- 120 VAC (86–132 V)
- 24 VAC (19–29 V)

**Power Consumption**
<2 W

**Setpoint Range**
- Normalized models (when specifying order): AGL1, 5–100 mA (005–100)
- AGL2, 80–950 mA (080–950)

**Output**
- Electromechanical SPDT relay

**Output Rating**
- 1 A @ 125 V, 2 A @ 30 V/DC

**LED Display**
- Green LED = Power On indication
- Red LED = Tripped Output Relay indication

**Response Time**
- <200 ms @ 9% above trip point
- <60 ms @ 50% above trip point
- <15 ms @ 100% above trip point

**Time Delay**
- Response time: 15 ms @ 500% above trip point
- 60 ms @ 50% above trip point

**Noise Immunity**
- EMI/RFI Shielding
- Power supply noise filtering

**Environmental**
- UL94 V-0 Flammability Rated
- 0–95% RH, non-condensing

**Frequency Range**
- 50–60 Hz (monitored circuit)
- UL listed to 1270 VAC, tested to 5 KV

**Frequency Response**
- Power supply and 5 mA trip point.
- Factory-calibrated models (specify when ordering):
  - AG3: 5, 10, or 30 mA
  - TR3 "Tri-set" models (field jumper select):
    - AGL2: 80–950 mA (080–950)
    - AGL1: 5–100 mA (005–100)

**Setpoint Range**
- Normally Closed SPST Relay Form B
- Normally Open SPST Relay Form C

**Setpoint Range**
- Normalized Closed SPST Relay Form B
- Normally Open SPST Relay Form C

**Power Consumption**
- 120 V/DC
- 24 VAC/DC

**Options**
- ENE: Normally energized, auto-reset (SDT1 output only)
- DEN: Normally de-energized, auto-reset (SDT1 output only)
- LA: Latching (NOR1 and NCR1)
- TR3: Tri-set
- 005 to: Factory set point trip point in mA
- 950: 950 mA trip point

**Output Contact Action**
- No Power = Closed
- No Fault = Open
- Fault = Open

**No Power Applied**
- Control Power Applied
- N.O. Normally Closed
- N.O. Normally Open

**Fault Detected**
- Control Power Applied
- N.C. Normally Closed
- N.O. Normally Open

**Power Supply**
- 120 VAC (86–132 V)
- 24 VAC (19–29 V)

**Ground Fault Relay Ordering Information**

**Sample Model Number**
AGL1-NOR-120-LA-005

**Ground Fault Relay Specifications**
- Power supply and 5 mA trip point.
- Normalized models (specify when ordering):
  - AG3: 5, 10, or 30 mA
  - TR3 "Tri-set" models (field jumper select):
    - AGL2: 80–950 mA (080–950)
    - AGL1: 5–100 mA (005–100)

**Ground Fault Relay Output Tables**

**Ground Fault Relay Applications**

**Monitor Large Machines**
- Detect leakage to earth before the problem can cause damage.

**Water Delivery and Treatment**
- Keep pumping systems safe and in operation.
- Sense faulting stator windings prior to failure.

**Generators**
- Shut down equipment when leakage current exceeds hazardous levels.

**Ground Fault Sensor Features**

**Electromechanical Relay Output**
- Provides both normally open and normally closed contacts.
- Compatible with most automation and control systems.

**Externally Powered**
- A choice of fail safe or standard operation.

**Simple Field Setpoint Adjustment**
- Single turn potentiometer with setpoint shown on label.
- Adjustable delay to mask out nuisance fault current.

**Large Solid-Core Case**
- Large sensing window provides ample space for multiple conductors.

**DIN Rail Mount**
- Simple snap onto DIN rail or attach with screws to a panel for securing mount.

**UL/cUL Approved, CE Pending**
- Accepted worldwide.
- Conformally coated circuit boards standard.

**Ground Fault Sensor Applications**

**AG-LC SERIES**

**Ground Fault Sensor - Large Solid-Core**

AG-LC series ground fault sensors are the latest design innovation from NK Technologies. The 2011 NEC added section 555.3 to require ground fault protection of the main overcurrent device feeding marinas and boat yards. These services are often carrying up to 800 amps; most sensor designs will not allow the conductors to pass through a single sensing ring. By designing a sensor in a large solid-core housing, the conductors will not have to be passed through a separate sensing device like a zero sequence current transformer. This design makes monitoring of larger circuits a breeze, whether to protect boaters or large equipment like amusement park rides or gantry cranes.

**Ground Fault Sensor Features**

**Electromechanical Relay Output**
- Provides both normally open and normally closed contacts.
- Compatible with most automation and control systems.

**Externally Powered**
- A choice of fail safe or standard operation.

**Simple Field Setpoint Adjustment**
- Single turn potentiometer with setpoint shown on label.
- Adjustable delay to mask out nuisance fault current.

**Large Solid-Core Case**
- Large sensing window provides ample space for multiple conductors.

**DIN Rail Mount**
- Simple snap onto DIN rail or attach with screws to a panel for securing mount.

**UL/cUL Approved, CE Pending**
- Accepted worldwide.
- Conformally coated circuit boards standard.

**Ground Fault Sensor Applications**

**Monitor Large Machines**
- Detect leakage to earth before the problem can cause damage.

**Water Delivery and Treatment**
- Keep pumping systems safe and in operation.
- Sense faulting stator windings prior to failure.

**Generators**
- Shut down equipment when leakage current exceeds hazardous levels.

**Sense Current to Earth in Marinas**

Equipment on board a vessel can pass current to earth through water, causing a dangerous condition to swimmers and boaters in fresh water marinas and boat docking facilities. Use a ground fault sensor with a short trip breaker to shut off the power when excessive current flows to earth.
Ground Fault Sensor Specifications

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>120 VAC or 24 VAC/DC, 12 V–18 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption</td>
<td>&lt;1VA</td>
</tr>
<tr>
<td>Output</td>
<td>Electromechanical relay</td>
</tr>
<tr>
<td></td>
<td>1 A @ 120 VAC, 2 A @ 30 VDC Max</td>
</tr>
<tr>
<td>Indicating Bi-color LED</td>
<td>Green: Power on, fault current below setpoint</td>
</tr>
<tr>
<td></td>
<td>Orange: Power on, fault current over setpoint</td>
</tr>
<tr>
<td></td>
<td>OFF: Power off</td>
</tr>
<tr>
<td>Response Time</td>
<td>100 ms (current time over setpoint)</td>
</tr>
<tr>
<td>Output Operation</td>
<td>Normally de-energized, energized at latching</td>
</tr>
<tr>
<td>Manual Buttons</td>
<td>Automatically timed to simulate a fault (hold longer than trip delay settings)</td>
</tr>
<tr>
<td></td>
<td>Latching Preatched (add an external button)</td>
</tr>
<tr>
<td>Trip Delay</td>
<td>0.1 to 8 seconds</td>
</tr>
<tr>
<td>Ranges</td>
<td>0–150 mA</td>
</tr>
<tr>
<td></td>
<td>2–400 mA</td>
</tr>
<tr>
<td></td>
<td>3–500 mA</td>
</tr>
<tr>
<td></td>
<td>4–1.6 A</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>Rated to 5000 VAC</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>50–60 Hz</td>
</tr>
<tr>
<td>Case</td>
<td>UL 94 V0 Flammability Rated, DIN rail mounting</td>
</tr>
<tr>
<td>Environmental</td>
<td>-4 to 127°F (–20 to 50°C) 0–95% RH, non-condensing</td>
</tr>
<tr>
<td>Listings</td>
<td>UL/cUL Approved, CE Pending</td>
</tr>
</tbody>
</table>

Sample Model Number: AGs-SDT-24U-DEN-100-LC

Ground Fault Sensor Dimensions

- **AG-LC SERIES**
  - **Ground Fault Relay with Digital Display**
  - AGLD Series Ground Fault Sensors keep machinery and their operators safe from accidental shocks. The large, one-piece solid-core design allows for installation over wires feeding heavy loads. The output relay will change state at any point between 5 and 100 mA, or 80 and 950 mA. A delay can be set to allow down stream protection to activate before the sensor, keeping the main circuit protection hot and the equipment energized while the smaller faults are cleared. The large LED display shows the precise trip point and the extra delay clearly, in any light condition. The display flashes when there is current sensed over the trip point.

**Ground Fault Relay Applications**

- **Monitor Large Machines**
  - Detect fault currents before damage can occur. Connect the output to a shunt trip breaker operating solenoid or to the circuit powering a connector coil.
- **Water Delivery and Treatment**
  - Detect moisture ingress in submersible pumps.
- **Ground Fault Relay Features**
  - Electromechanical Relay Output
    - Provides both normally open and normally closed contacts.
    - Compatible with most automation and control systems.
  - **Externally Powered**
    - A choice of fail safe or standard operation.
  - **Simple Field Setpoint Adjustment**
    - Single turn potentiometer with setpoint shown on display.
    - Adjustable delay shown when knob is turned.
  - **Large Solid-core Case**
    - Large sensing window provides ample space for multiple conductors.
  - DIN Rail Mount*
    - Simple snap onto DIN rail.
  - UL/cUL Approved, CE Pending
    - Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

**Ground Fault Sensor Features**

- **Insulation Breakdown**
  - **Circuit Interruption Device Capable of Conducting**
  - **Ground Fault Sensor**

**Test & Evaluation Units for OEMs**

Free program expedites evaluation process. See page 3 for details.

**OEMs**

- Externally Powered
- Simple snap onto DIN rail
- UL/cUL Approved, CE Pending
- Accepted worldwide

Test & Evaluation Units for OEMs

Free program expedites evaluation process. See page 3 for details.
Ground Fault Relay Dimensions

Ground Fault Relay Connections

AGLD SERIES

Ground Fault Relay Specifications

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>+120VAC (108–132V)</th>
<th>+24VAC/DC (22–36V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>&lt;4 VA</td>
<td></td>
</tr>
<tr>
<td>Setpoint Range</td>
<td>AGLD1: 5–100 mA</td>
<td>AGLD2: 80–950 mA</td>
</tr>
<tr>
<td>Output</td>
<td>Electromechanical SPDT relay</td>
<td></td>
</tr>
<tr>
<td>Output Rating</td>
<td>1 A @ 120V AC, 2 A @ 30VDC max</td>
<td></td>
</tr>
<tr>
<td>LED Display</td>
<td>Displays trip point in mA</td>
<td></td>
</tr>
<tr>
<td>Response Time</td>
<td>120 ms</td>
<td></td>
</tr>
<tr>
<td>Output Operation</td>
<td>Normally energized or normally de-energized</td>
<td></td>
</tr>
<tr>
<td>Time Delay</td>
<td>10 sec (adjustable after startup)</td>
<td></td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>Test Kit 5000 V DC</td>
<td></td>
</tr>
<tr>
<td>Frequency Range</td>
<td>50–60 Hz (monitored circuit)</td>
<td></td>
</tr>
<tr>
<td>Case</td>
<td>UL94 V0 Flammability Rated</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>4–12°F (-20 to 50°C) 0–95% RH, non-condensing</td>
<td></td>
</tr>
<tr>
<td>Listings</td>
<td>UL/cUL, CE pending</td>
<td></td>
</tr>
</tbody>
</table>

Ground Fault Relay Ordering Information

Sample Model Number: AGLD1-SDT1-24U-ENE-ADJ
AC ground fault sensor, 5–100 mA range, SPDT relay output, 24 VAC/DC powered, large case, DIN rail mounting.

AGLD [ ] SDT1 [ ] [ ] [ ] [ ] ADJ

(1) Model
   1 5–100 mA
   2 80–950 mA

(2) Output Type
   SDTT Single pole, double throw relay

(3) Power Supply
   24U 24 VAC/DC
   120 120 VAC

(4) Contact Action
   DEN Normally de-energized
   ENE Normally energized
   LA Latching output

(5) Setpoint
   ADJ Adjustable setpoint

Ground Fault Currents

AGT SERIES

Ground Fault Measurement

AGT Series Ground Fault Transducers combine a current transformer and a True RMS signal conditioner into a single package. The AGT Series is designed to produce an analog 4–20 mA signal proportional to earth or ground fault current, or any low consumption AC load. Available in a solid-state case. When connected to a controller or data logger, NEC requirements for alarm can be met.

Ground Fault Transducer Applications

Current Leakage Detection
- Monitor heating or other loads to detect increasing leakage current.
- Pass all current carrying conductors through aperture to sense zero-sum current.

Very Light Loads
- Accurate measurement of very small but critical loads.
- Current measurement gives faster response than temperature measurement.

Ground Fault Transducer Features

True RMS Output
- True RMS technology is accurate on distorted waveforms like VFD or SCR outputs.

Single Range
- No chance of field range selection errors.
- Eliminates zero and span pots.

Isolation
- Output is magnetically isolated from the input for safety.
- Eliminates insertion loss (voltage drop).

UL/cUL Approved
- Accepted worldwide.

Selecting the right ground fault detector:
NEC Article 427-22 requires that fault currents be monitored on industrial equipment. However, where maintenance and supervision ensure that only qualified persons will service the equipment and continued circuit operation is necessary for safe operation and processes, alarm indication is also required. A fault current transducer can send a signal to a panel meter with alarm contacts or a controller. As an example, the alarm points can be configured so one alarm is initiated when fault current reaches 30 mA, and another when it rises above 70 mA. Ground fault protection is required in many applications, and NK Technologies has a sensor that can be coupled with your control system to provide this needed alarm or circuit disconnection.
AGT-FD SERIES

Ground Fault Measurement - Analog Output

AGT-FD Series Ground Fault sensors detect faults to earth from 0 mA to 100 mA and produce an output signal of 0–10 VDC in proportion to the amount of current passing to ground. The output is equal to the RMS value of the earth leakage. The AGT-FD can also be used to measure and monitor any low value AC circuit current by passing just one of the conductors through the sensing window.

Ground Fault Transducers Applications

- **Current Leakage**
  - Monitor residual (earth leakage) current by passing all of the current carrying conductors through the sensing aperture.

- **Very Light Loads**
  - Monitor circuits of varying frequencies or distorted wave shapes, but very low current usage.

Ground Fault Transducers Features

- **Analog Output Signal**
  - 0–5 or 0–10 VDC proportional to 0–100 mA.
  - Sensing window large enough to monitor 100 amp circuits.

- **Externally Powered**
  - Low power consumption (< 2 VA).
  - 24 Volt AC or DC (20–30 V).

- **Factory Calibrated**
  - Warranted to stay accurate for five years minimum.
  - Compatible with most PLCs, panel meters and other controllers.

- **Large Solid-core Case**
  - Large sensing window provides ample space for multiple conductors.

- **DIN Rail® or Panel Mount**
  - Simple snap onto DIN rail.

- **UL, cUL and CE Approved**
  - Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

Notes:

- Finger safe captive screw terminals.
- 12–22 AWG solid or stranded.
- Observe polarity.

**Ground Fault Transducer Dimensions**

**FL Case**

**Ground Fault Transducer Ordering Information**

Sample Model Number: AGT2-420-24L-FL

<table>
<thead>
<tr>
<th>AGT</th>
<th>(1) Full Scale Range</th>
<th>(2) Output Signal</th>
<th>(3) Power Supply</th>
<th>(4) Case Style</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0–50 mA</td>
<td>4–20 mA</td>
<td>24 VDC loop-powered (4–20 mA output ONLY)</td>
<td>FL</td>
</tr>
<tr>
<td></td>
<td>0–100 mA</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Ground Fault Transducer Connections**

**4-20 mA Output**

---

**Power Supply**

24 VDC loop-powered (12–40 VDC)

**Power Consumption**

<2 VA

**Output**

4–20 mA, loop-powered, True RMS

**Output Limit**

23 mA

**Response Time**

600 ms (to 90% step change)

**Input Range**

Single range of 0–50 or 0–100 mA; custom ranges available; consult factory

**Isolation Voltage**

UL listed to 1270 VAC, tested to 5 KV

**Frequency Range**

40–400 Hz

**Case**

UL94 V-0 Flammability Rated

**Environmental**

4 to 122°F (-20 to 50°C)

0–95% RH, non-condensing

**Listings**

UL-cUL

---

**Ground Fault Transducer Specifications**

**Power Supply**

24 VDC loop-powered (12–40 VDC)

**Power Consumption**

<2 VA

**Output**

4–20 mA, loop-powered, True RMS

**Output Limit**

23 mA

**Response Time**

600 ms (to 90% step change)

**Input Range**

Single range of 0–50 or 0–100 mA; custom ranges available; consult factory

**Isolation Voltage**

UL listed to 1270 VAC, tested to 5 KV

**Frequency Range**

40–400 Hz

**Case**

UL94 V-0 Flammability Rated

**Environmental**

4 to 122°F (-20 to 50°C)

0–95% RH, non-condensing

**Listings**

UL-cUL

---

**Ground Fault Transducer Dimensions**

**FL Case**

---

**Notes:**

- Finger safe captive screw terminals.
- 12–22 AWG solid or stranded.
- Observe polarity.

---

**Ground Fault Transducer Specifications**

**Power Supply**

24 VDC loop-powered (12–40 VDC)

**Power Consumption**

<2 VA

**Output**

4–20 mA, loop-powered, True RMS

**Output Limit**

23 mA

**Response Time**

600 ms (to 90% step change)

**Input Range**

Single range of 0–50 or 0–100 mA; custom ranges available; consult factory

**Isolation Voltage**

UL listed to 1270 VAC, tested to 5 KV

**Frequency Range**

40–400 Hz

**Case**

UL94 V-0 Flammability Rated

**Environmental**

4 to 122°F (-20 to 50°C)

0–95% RH, non-condensing

**Listings**

UL-cUL

---

**Ground Fault Transducer Ordering Information**

Sample Model Number: AGT2-420-24L-FL

<table>
<thead>
<tr>
<th>AGT</th>
<th>(1) Full Scale Range</th>
<th>(2) Output Signal</th>
<th>(3) Power Supply</th>
<th>(4) Case Style</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0–50 mA</td>
<td>4–20 mA</td>
<td>24 VDC loop-powered (4–20 mA output ONLY)</td>
<td>FL</td>
</tr>
<tr>
<td></td>
<td>0–100 mA</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Ground Fault Transducer Connections**

**4-20 mA Output**

---

**Power Supply**

24 VDC loop-powered (12–40 VDC)

**Power Consumption**

<2 VA

**Output**

4–20 mA, loop-powered, True RMS

**Output Limit**

23 mA

**Response Time**

600 ms (to 90% step change)

**Input Range**

Single range of 0–50 or 0–100 mA; custom ranges available; consult factory

**Isolation Voltage**

UL listed to 1270 VAC, tested to 5 KV

**Frequency Range**

40–400 Hz

**Case**

UL94 V-0 Flammability Rated

**Environmental**

4 to 122°F (-20 to 50°C)

0–95% RH, non-condensing

**Listings**

UL-cUL

---

**Ground Fault Transducer Specifications**

**Power Supply**

24 VDC loop-powered (12–40 VDC)

**Power Consumption**

<2 VA

**Output**

4–20 mA, loop-powered, True RMS

**Output Limit**

23 mA

**Response Time**

600 ms (to 90% step change)

**Input Range**

Single range of 0–50 or 0–100 mA; custom ranges available; consult factory

**Isolation Voltage**

UL listed to 1270 VAC, tested to 5 KV

**Frequency Range**

40–400 Hz

**Case**

UL94 V-0 Flammability Rated

**Environmental**

4 to 122°F (-20 to 50°C)

0–95% RH, non-condensing

**Listings**

UL-cUL

---

**Ground Fault Transducer Connections**

**4-20 mA Output**

---

**Power Supply**

24 VDC loop-powered (12–40 VDC)

**Power Consumption**

<2 VA

**Output**

4–20 mA, loop-powered, True RMS

**Output Limit**

23 mA

**Response Time**

600 ms (to 90% step change)

**Input Range**

Single range of 0–50 or 0–100 mA; custom ranges available; consult factory

**Isolation Voltage**

UL listed to 1270 VAC, tested to 5 KV

**Frequency Range**

40–400 Hz

**Case**

UL94 V-0 Flammability Rated

**Environmental**

4 to 122°F (-20 to 50°C)

0–95% RH, non-condensing

**Listings**

UL-cUL

---

**Ground Fault Transducer Dimensions**

**FL Case**

---

**Notes:**

- Finger safe captive screw terminals.
- 12–22 AWG solid or stranded.
- Observe polarity.
Ground Fault Relay Applications

- **Monitor Photovoltaic Panels**: Detect fault currents before damage can occur. Connect the output to a shunt trip breaker operating solenoid or to the circuit powering a contactor coil.
- **Water Delivery and Treatment**: Detect moisture ingress in submersible pumps.
- **Heating Processes**: If an element shorts to ground, the sensor will activate to de-energize the circuit, keeping safety at the forefront.
- **Communications Towers**: Notification if a battery powered supply is allowing current to earth.

Ground Fault Relay Features

- **Electromechanical Relay Output**: Auto reset models have both normally open and normally closed contacts. Latching models have one normally open and one normally closed contact. Compatible with most automation and control systems.
- **Externally Powered**: A choice of fail safe or standard auto reset operation, or latching contact.
- **Solid-core Case**: Sensing window provides ample space for multiple conductors. Designed for UL, CUL, and CE Approval.
- **Accepted worldwide.**

Contact Action Table

- **No Power**: Power Status
  - DEN: Off, NC: On
  - ENE: Off, NC: On
  - LA: Off, NC: On
- **Powered**: Power Status
  - DEN: Off, NC: On
  - ENE: Off, NC: On
  - LA: Off, NC: On
- **Fault Detected**: Power Status
  - DEN: Off, NC: On
  - ENE: Off, NC: On
  - LA: Off, NC: On

Note that the Power LED indicates that the sensor is energized and the Status LED indicates that the output contacts have changed state: NO has closed, NC has opened.

DG Series Ground Fault Relays keep machinery and their operators safe from accidental shocks. The one-piece, solid-core design allows for installation over wires feeding loads to about fifty amps. The output relay will change state at factory setpoint between 5 and 50 mA of DC current to earth.

---

**Ground Fault Sensor Specifications**

- **Power Supply**: 24 VAC, or DC, (20–30 V)
- **Power Consumption**: 0.2 W
- **Output**: 0–5 VDC, or 0–10 VDC
- **Input Range**: 0–100 mA
- **Response Time**: 310 ms to 90% step change
- **Isolation Voltage**: UL listed to 1270 VAC, tested to 5 KV
- **Frequency Range**: 50–400 Hz
- **Case**: UL94 V-0 Flammability Rated
- **Environmental**: -4 to 122°F (-20 to 50°C), 0–95% RH, non-condensing
- **Listings**: UL, CUL, CE

**Ground Fault Sensor Dimensions**

- **Power Supply**: 3.18" Dia. x 3.39 mm
- **Power Consumption**: 0.2 W
- **Output**: 0–5 VDC, or 0–10 VDC
- **Input Range**: 0–100 mA
- **Response Time**: 310 ms to 90% step change
- **Isolation Voltage**: UL listed to 1270 VAC, tested to 5 KV
- **Frequency Range**: 50–400 Hz
- **Case**: UL94 V-0 Flammability Rated
- **Environmental**: -4 to 122°F (-20 to 50°C), 0–95% RH, non-condensing
- **Listings**: UL, CUL, CE

**Ground Fault Sensor Connections**

- **Power Supply**: 3.18" Dia. x 3.39 mm
- **Power Consumption**: 0.2 W
- **Output**: 0–5 VDC, or 0–10 VDC
- **Input Range**: 0–100 mA
- **Response Time**: 310 ms to 90% step change
- **Isolation Voltage**: UL listed to 1270 VAC, tested to 5 KV
- **Frequency Range**: 50–400 Hz
- **Case**: UL94 V-0 Flammability Rated
- **Environmental**: -4 to 122°F (-20 to 50°C), 0–95% RH, non-condensing
- **Listings**: UL, CUL, CE

**DC Fault Current Sensing**

- **Sensor Contact**: Controls Contactor Operating Coil
- **Power Supply**: DIN rail or panel mounted
- **Contact Action Table**
- **No Power**: Power Status
  - DEN: Off
  - ENE: Off
  - LA: Off
- **Powered**: Power Status
  - DEN: Off
  - ENE: Off
  - LA: Off
- **Fault Detected**: Power Status
  - DEN: Off
  - ENE: Off
  - LA: Off

Note that the Power LED indicates that the sensor is energized and the Status LED indicates that the output contacts have changed state: NO has closed, NC has opened.
NK Technologies’ voltage transducers are high-performance transducers for sensing voltage in installations. They are available in an AC or DC Series and come in a variety of nominal voltages.

Features:
- AC or DC models
- Standard 4–20 mA powered output
  Industry standard output makes use with existing controllers, data loggers and SCADA equipment easy and reliable
- Input/Output Isolation
  Input and output circuitry electrically isolated for improved safety of use
- Compact DIN rail mount case
  Transducer housing mounts to standard DIN rail or to a flat panel
AC Voltage Transducers

VTR Series AC Voltage Transducers are high-performance True RMS transducers for sensing voltage in single- and three-phase installations. Applicable on circuits of 120 V, 240 V, 480 V and 600 V, the VTR Series voltage transducers provide a fully isolated, 4–20 mA output proportional to rated voltage in sinusoidal situations. Housed in a slim, compact, easy-to-install DIN mounted rail case, the VTR Series comes in a variety of voltage ranges and with four-wire terminal block connection.

Voltage Transducer Specifications

- **Power Supply**: 24 VDC loop-powered (12–40 VDC)
- **Input Range**: 120 V, 150 V, 240 V, 480 V, 500 V, 600 V
- **Output**: 4–20 mA proportional
- **Output Limit**: 24 mA
- **Output Loading**: 500 Ω
- **Input Maximum**: 130% of range
- **Response Time**: 250 ms (to 90% value)
- **Accuracy**: 1.0% FS (25–100% of range), 1.5% (1% at 60 Hz, 2.5% at 50 Hz)
- **Isolation Voltage**: UL listed to 1270 VAC, tested to 5 KV
- **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**: UL/cUL, CE

Voltage Transducer Applications

**True RMS Voltage Monitoring**
- Detect below normal or “brown out” voltage conditions; protect against possible motor overheating.
- Identify phase loss conditions by detecting voltage reduction in one or more phase of three-phase motor.
- Monitor over voltage conditions associated with regenerative voltage to help in diagnosing/avoiding motor drive issues.
- Detect voltage conditions which may cause stress in or damage to soft starter components (SCRs).

**Voltage Transducer Features**

**True RMS Output**
- Allows for use in situations where power supplied is poor power quality or other electrically harsh/challenging environments.

**Standard 4–20 mA Loop-powered Output**
- Industry standard output makes use with existing controllers, data loggers and SCADA equipment easy and reliable.

**Input/Output Isolation**
- Input and output circuitry electrically isolated for improved safety of use.

**Compact DIN Rail Mounted Case**
- Space saving 35 mm wide enclosure mounts quickly for an attractive installation.

**UL/cUL and CE Approved**
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

Voltage Transducer Connections

For additional Application Examples, go to www.nktechnologies.com/applications
VTD SERIES DC Voltage Transducers

VTD Series Voltage Transducers are high-performance transducers for sensing voltage in DC powered installations. Applicable for use on circuits to 600 VDC, VTD voltage transducers provide fully isolated 0–5 VDC, 0–10 VDC, and 4–20 mA outputs proportional to rated nominal voltage in DC circuits. Housed in a slim, compact, easy-to-install DIN rail mounted case, the VTD Series comes in a variety of nominal voltages.

Voltage Transducer Specifications

- **Power Supply**: 24 VAC/DC (20–45 VDC, 22–38 VAC); power supply and output are not isolated.
- **Power Consumption**: <2 VA.
- **Input Range**: 15 V, 25 V, 50 V, 150 V, 300 V, 600 VDC.
- **Output**: 4–20 mA (capped at 24 mA max.), 0–5 VDC (capped at 5.75 VDC), 0–10 VDC (capped at 11.5 VDC).
- **Output Loading**: 4–20 mA output: <500 Ω, 0–10 VDC output: >10 KΩ.
- **Response Time**: 250 ms (90% step change).
- **Accuracy**: ±1%.
- **Isolation Voltage**: UL listed to 1270 VAC, tested to 5 KV.
- **Frequency Range**: DC.
- **Case**: UL94 V-0 Flammability Rated.
- **EMC/Immunity**: EN50081-1, EN50082-2.
- **Ripple**: <1% (peak to peak).
- **Environmental**: -4 to 122°F (-20 to 50°C), 0–95% RH, non-condensing.
- **Listings**: UL/cUL, CE.

Voltage Transducer Applications

Voltage Monitoring
- Detect below normal or “brown out” voltage conditions; protect against possible motor overheating.
- Identify conductor loss conditions by detecting voltage reduction in one motor lead.
- Monitor over voltage conditions associated with regenerative voltage to help in diagnosing/avoiding motor drive issues.
- Detect voltage conditions that may cause stress or damage to soft starter components (SCRs).

Voltage Transducer Connections

Voltage Transducer Features

- **Accurate Output**: Several ranges available for your application, from 0–15 VDC to 0–600 VDC.
- **Standard Current and Voltage Sensor Outputs**: Industry standard outputs makes use with existing controllers, data loggers and SCADA equipment easy and reliable.

Voltage Transducer Control

For additional Application Examples, go to www.nktechnologies.com/applications.
VTD-BD SERIES

DC Voltage Transducers

VTD-BD Series Voltage Transducers are high-performance transducers for sensing voltage in DC powered installations. Applicable for use on circuits to 600 VDC, VTD-BD voltage transducers provide a fully isolated +/-5 VDC or +/-10 VDC output signal in response to DC voltages that change polarity. Housed in an easy-to-install DIN rail or panel mount case, the VTD-BD Series comes in a variety of ranges to suit many primary voltages.

Voltage Transducer Applications

Voltage Monitoring
- Detect below normal or "brown out" voltage conditions; protect against possible motor over-heating.
- Identify conductor loss conditions by detecting voltage reduction in one motor lead.
- Monitor over voltage conditions associated with regenerative voltage to help in diagnosing/avoiding motor drive issues.
- Detect voltage conditions that may cause stress in or damage to soft starter components (SCRs).

Voltage Transducer Features

Wide Input Range Selection
- Six ranges of input voltages to best fit your requirements, from +/- 0–15 VDC to +/- 0–600 VDC.

/+ -5 VDC or +/-10 VDC Sensor Powered Outputs
- Industry standard outputs makes use with existing controllers, data loggers and SCADA equipment easy and reliable.

Input/Output Isolation
- Input and output circuitry electrically isolated for improved safety of use.

DIN Rail or Panel Mount Case
- Enclosure mounts quickly for an attractive installation.

UL/cUL and CE Approved
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

Voltage Transducer Specifications

Power Supply
24 VAC/DC (22–26V); power supply is isolated from output signal

Power Consumption
<2VA

Input Range (+/-)
15 V, 25 V, 50 V, 150 V, 300 V, 600 VDC

Input Impedance
>160K Ω

Output
• +/-5 VDC
• +/-10 VDC

Output Impedance
>10K Ω

Response Time
500 ms (10–90% step change)

Accuracy
1.0% of FS

Isolation Voltage
2500 V

Frequency Range
DC

Case
UL94 V-0 Flammability Rated

Environmental
-4 to 122°F (-20 to 50°C)
0–95% RH, non-condensing

Listings
UL/cUL, CE

Voltage Transducer Ordering Information

Sample Model Number: VTD0-010-24U-BD-OS
DC voltage transducer with 15 V range, +/-10 VDC proportional output; 24 V externally powered, bidirectional output with a DIN rail compatible case.

(1) (2) (3) (4)  (5)
VTD – – 2 4 U – B D – O S
(1) Nominal Range
0 +/-15 V
1 +/-25 V
2 +/-50 V
3 +/-150 V
4 +/-300 V
5 +/-600 V
(2) Output Signal
005 +/-5 VDC
010 +/-10 VDC
(3) Supply Voltage
24U 24 VAC/DC external power supply
(4) Output Type
BD Bidirectional output
(5) Case
OS DIN rail or panel mount

For additional Application Examples, go to www.nktechnologies.com/applications
VTU-OS SERIES

High Voltage DC/AC Voltage Transducers

VTU-OS Series Voltage Transducers provide very high accuracy and safety in a panel or DIN rail mounted case. The one sensor design can measure DC or AC circuit voltages to 1200 volts, and produce an analog signal directly proportional to the voltage connected. This provides a valuable tool to spot issues with power generation (conventional and alternative sources) like brownouts and phase loss. The voltage will be present on the line side of a disconnect even when the breaker or switch is open.

Voltage Transducer Features

Industry Standard Output Options
- 4–20 mA, 0–5 and 0–10 VDC
- Compatible with most automation and control systems.
- Output proportional to RMS voltage.

Externally Powered
- 24 VAC or DC with low power consumption.

Simple Conductor Termination
- Primary circuit uses self-tightening terminals.
- Power supply and output terminals are finger-safe.

Panel or DIN Rail Mount Options*
- If a DIN rail is not available, use the screw mounting option to attach to a back panel.
- Power supply is isolated from input and output.

UL/cUL Approved, CE Pending
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

Voltage Transducer Specifications

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>24 VAC/DC (22–26 VAC or DC) power supply is isolated from output signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>&lt;2 VA</td>
</tr>
<tr>
<td>Input Range</td>
<td>0–800, 1000 or 1200 V AC or DC</td>
</tr>
<tr>
<td>Output</td>
<td>+4–20 mA, +0–5 VDC, +0–10 VDC</td>
</tr>
<tr>
<td>Output Loading</td>
<td>+4–20 mA, +&lt;500 Ω, +&lt;500 Ω</td>
</tr>
<tr>
<td>Response Time</td>
<td>100 ms</td>
</tr>
<tr>
<td>Accuracy</td>
<td>&lt;1% FTS</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>UL listed to 1270 V AC, tested to 5 kV</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>0–400 Hz</td>
</tr>
<tr>
<td>Case</td>
<td>DIN rail or panel mounting case</td>
</tr>
<tr>
<td>Environmental</td>
<td>4 to 122°F (-20 to 50°C), 0–95% RH, non-condensing</td>
</tr>
<tr>
<td>Listings</td>
<td>UL/cUL, CE pending</td>
</tr>
</tbody>
</table>

Voltage Transducer Ordering Information

Sample Model Number: VTU10-420-24U-0S
- AC or DC voltage transducer, 0–1000 V primary, 4–20 mA secondary, 24 VAC/DC power, DIN or panel mount case.

Voltage Transducer Applications

Photovoltaic Panels
- Connecting panel outputs in series increases the voltage sent from the panels to the load up to 1200 volts DC. The VTU is designed to measure this safely.

Water Delivery and Treatment
- Measure the AC voltage to pumps and aerators and shut them down if the supplied voltage falls to a dangerous level.

Cranes and Lifting Apparatus
- DC motors are used to lift, place and position heavy objects, as they have full torque capacity at zero speed. Use a voltage transducer to be sure that the field windings have voltage to keep the motor speed under control.

Photovoltaic Panels
- Connecting panel outputs in series increases the voltage sent from the panels to the load up to 1200 volts DC. The VTU is designed to measure this safely.

Voltage Transducer Dimensions

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>24 VAC/DC (22–26 VAC or DC) power supply is isolated from output signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>&lt;2 VA</td>
</tr>
<tr>
<td>Input Range</td>
<td>0–800, 1000 or 1200 V AC or DC</td>
</tr>
<tr>
<td>Output</td>
<td>+4–20 mA, +0–5 VDC, +0–10 VDC</td>
</tr>
<tr>
<td>Output Loading</td>
<td>+4–20 mA, +&lt;500 Ω, +&lt;500 Ω</td>
</tr>
<tr>
<td>Response Time</td>
<td>100 ms</td>
</tr>
<tr>
<td>Accuracy</td>
<td>&lt;1% FTS</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>UL listed to 1270 V AC, tested to 5 kV</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>0–400 Hz</td>
</tr>
<tr>
<td>Case</td>
<td>DIN rail or panel mounting case</td>
</tr>
<tr>
<td>Environmental</td>
<td>4 to 122°F (-20 to 50°C), 0–95% RH, non-condensing</td>
</tr>
<tr>
<td>Listings</td>
<td>UL/cUL, CE pending</td>
</tr>
</tbody>
</table>

Voltage Transducer Connections

Photovoltaic Panels
- Connecting panel outputs in series increases the voltage sent from the panels to the load up to 1200 volts DC. The VTU is designed to measure this safely.

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

PLC Inputs
- B
- A
- C
- +
- -

VTU-OS Measures Both AC and DC Voltages

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

PLC Inputs
- B
- A
- C
- +
- -
VTU-DIN SERIES

AC or DC Voltage Transducers

VTU-DIN Series Voltage Transducers are high-performance True RMS transducers for sensing voltage in single, three-phase or DC installations. Housed in a slim, compact, easy-to-install DIN rail mounted case, these transducers come in a variety of voltage ranges. The VTU-DIN measures AC or DC voltage from 0–15 to 0–600 V and provides an industry standard output proportional to connected voltage in alternating current circuits with sinusoidal or non-sinusoidal (variable frequency) applications or direct current circuits.

Voltage Transducers Applications

True RMS or DC Voltage Monitoring
- Detect below normal or “brownout” voltage conditions; protect against possible motor overheating.
- Identify phase loss conditions by detecting voltage reduction in one or more phase of three-phase motor.
- Monitor over voltage conditions associated with regenerative voltage to help in diagnosing/avoiding motor drive issues.
- Detect voltage conditions that may cause stress or damage to soft starter components (SCRs).

Phase Loss Detection

AC or DC Monitored Circuit

Voltage Transducers Features

Zero to 5 KHz Measurement
- Allows for use in situations where power supplied is non-sinusoidal such as VFD applications, poor power quality installations or other electrically harsh/challenging environments.

Standard Outputs
- Industry standard outputs make use with existing controllers, data loggers and SCADA equipment easy and reliable.

Compact DIN Rail Mount Case*
- Space saving 35 mm wide enclosure mounts quickly for an attractive installation.

UL/cUL and CE Approved
- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 144.

Voltage Transducers Connections

AC/DC Voltage (primary)

24 VAC/DC Power Supply

PLC Inputs

24 VAC/DC Supply

Voltage Transducers Specifications

Power Supply
- 24 VAC or DC external power
- (Not isolated from the output)

Power Consumption
- <2 VA

Input
- 0–15, 25, 50, 60, 120, 150, 240, 300, 400, 500, 600 V AC or DC

Output
- 4–20 mA proportional (capped at 31 mA max.)
- 0–5 VDC
- 0–10 VDC

Response Time
- 500 ms (to 90% value)

Accuracy
- <1% error

Loading
- 4–20 mA output: <400 Ω
- 0–5/10 VDC output: >50 KΩ

Isolation Voltage
- 2500 VAC

Frequency Range
- 0–5 KHz

Case
- UL94 V-0 Flammability Rated; noncorrosive thermoplastic

Environmental
- 4 to 122°F (-20 to 50°C)
- 0–95% RH, non-condensing

Listings
- UL/cUL, CE

Voltage Transducer Ordering Information

Sample Model Number: VTUE-420-24U-DIN
AC/DC voltage transducers with 120 V range, standard 4–20 mA proportional output; 24 VAC/DC externally powered with a DIN rail compatible case.

VTU Series

VTU – – 2 4 U – D I N
(1) (2) (3) (4)

(1) Range
- A 0–15 V
- B 0–25 V
- C 0–50 V
- D 0–60 V
- E 0–120 V
- F 0–150 V
- G 0–240 V
- H 0–300 V
- I 0–400 V
- J 0–500 V
- K 0–600 V

(2) Output Type
- 420 4–20 mA
- 005 0–5 VDC
- 010 0–10 VDC

(3) Power Supply
- 24U 24 VAC/DC external power supply

(4) Mounting
- DIN DIN rail compatible

Test & Evaluation Units for OEMs
Free program expedites evaluation process. See page 1 for details.
APN Series Power Monitors

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.

Power Monitoring 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.

Power Monitoring 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 144.

For additional Application Examples, go to www.nktechnologies.com/applications
**APN-R SERIES**

**Power Monitoring Specifications**

- Power Supply: +24 VAC/DC (21–27 V)
- Power Consumption: +24 VAC/DC, <100 mA
- Power Consumption: +120 VAC, <50 mA
- Power Consumption: +240 VAC, <25 mA
- Measurement: 5 A CT input: 1000 A
- Measurement: 0.333 mV input: 1500 A
- Primary Voltage: 100 to 600 VAC
- Output: Modbus RTU – 14 Data Points
- Pulse Contact Output
- Accuracy: <1% FS
- Response Time: 120 ms
- Isolation Voltage: Tested to 4 KV
- Frequency Range: 10–100 Hz
- Case: UL94 V-0 Flammability Rated
- Environmental: -4 to 122°F (-20 to 50°C)
- Humidity: 0–95% RH, non-condensing
- listings: UL/cUL approved

**Power Monitoring Data Point Table**

<table>
<thead>
<tr>
<th>Phase A</th>
<th>Phase B</th>
<th>Phase C</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>kW</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>RMS</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>V</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Instantaneous kW</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Average kW</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Total kW</td>
</tr>
</tbody>
</table>

**Power Monitoring 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

**Power Monitoring 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.

**Power Monitoring 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 144.

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

125124
3511 Charter Park Drive • San Jose, CA 95136
800.959.4014 • www.nktechnologies.com • sales@nktechnologies.com

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 Transducer 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.

Power Transducer 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.

Crusher/Grinder/Shredder Motor Interlocks

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

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

### Power Transducer Specifications

- **Power Supply**: 24 VDC, loop-powered (10–36 V)
- **Primary Voltage Input**: 120, 240, 480 or 600 VAC
- **Output**: 4–20 mA proportional to max. KW, 25 mA limit
- **Accuracy**: ±0.5% of 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

### Power Transducer Applications

**Plant Energy Management**

- Monitor 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 intake or discharge line.
- Monitor impeller cavitation and bearing wear.

**Conveyor Monitoring**

- Monitor the power usage of conveyor systems to reduce energy consumption.

**Plant Monitoring**

- Monitor the power usage of large plants to identify areas of excessive energy consumption.

**Power Supply**

- **External**: Accepted worldwide.
- **Internal**: UL/cUL Approved
- **Safety**: Safe and secure connectors.
- **Installation**: Finger Safe Terminals
- **Compactness**: Low profile reduces cabinet depth requirements.
- **Labeling**: Clearly labeled terminals provide quick installation.
- **Output Selection**: Choose 4–20 mA, 0–5 or 0–10 VDC.

**Response Time**

- 100 ms (to 90% of step change)
- Loading: 500 Ω @ 24 VDC

### Power Transducer 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.

- **Input Voltage**:
  - 1: 120 VAC
  - 2: 240 VAC
  - 4: 480 VAC
  - 6: 600 VAC (not UL listed)
- **Output Signal**: 4–20 mA
- **Power Supply**: 24 VDC, loop-powered
- **Input Range**:
  - 0.5: 0.55 kw
  - 0.75: 0.75 kw
  - 1.0: 1.0 kw
  - 2.0: 2.0 kw
  - 3.0: 3.0 kw
  - 5.0: 5.0 kw
  - 10.0: 10 kw
  - 20.0: 20 kw
  - 50.0: 50 kw
  - 75.0: 75 kw
  - 100.0: 100 kw

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

### Pump Jam & Suction Loss Protection

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

APT Power Monitor with Analog Output

**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 144.

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 amperes; 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 146.7 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.

---

Test & Evaluation Units for OEMs

For program expansion evaluation process, see page 3 for details.
**APT SERIES**

**Power Transducer Specifications**

**Power Supply**
- ≥ 24 VAC/DC (21–26 V)
- 120 VAC (108–126 V)
- ≥ 240 VAC (216–254 V)

**Power Consumption**
- ≤ 5 W

**Primary Voltage Input**
- 120, 240, 480 or 600 VAC
- 4–20 mA current
- 0–5 or 0–10 VDC

**Output**
- 4–20 mA current
- 0–5 or 0–10 VDC

**Accuracy**
- 0.3% FS

**Response Time**
- ≤ 50 ms

**Isolation Voltage**
- Tested to 4 KV

**Frequency Range**
- 5–100 Hz

**Case**
- UL 94 V-0 Flammability Rated

**Environmental**
- -4 to 122°F (-20 to 50°C)
- 0–95% RH, non-condensing

**Response Time**
- 120 ms

**Accuracy**
- ≤ 0.5% FS

**Output**
- 4–20 mA current

**Signal Output**
- 0–5 or 0–10 VDC

**Submersible Pump Application**

**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 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**

- No chance for loose CT secondary provides added safety.

**Power Transducer Connections**

- No external current transformers.

**Trailing Ample Sensing Windows**

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

**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.

**Pump Monitoring**

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

**Grinding and Milling**

- Detect broken or missing tools or drill bits.
- Detect when the tool contacts the material.

**Grinding and Milling**

- Measure wattage/horsepower to optimize feed rate.
- Monitor pumps to detect open intake or outflow lines, cavitation or failing bearings.

**Equipment Monitoring**

- Monitor pumps to detect open intake or outflow lines, cavitation or failing bearings.
- Detect broken or missing tools or drill bits.
- Detect when the tool contacts the material.

**Pump Monitoring**

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

**Pump Monitoring**

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

**Pump Monitoring**

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

**Pump Monitoring**

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

**Pump Monitoring**

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

**Pump Monitoring**

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

**Pump Monitoring**

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

**Pump Monitoring**

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

**Pump Monitoring**

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

**Pump Monitoring**

- Monitor pumps to detect open intake or outflow lines, cavitation or failing bearings.
- Detect broken or missing tools or drill bits.
- Detect when the tool contacts the material.
Signal Converters

NK Technologies’ ADC series signal converters use sensor outputs (4–20 mA, 0–5 and 0–10 VDC) and convert these to digital RS485 outputs. The CTC series accept either 5 A secondary current from current transformers or 0.333 VAC secondary voltage from our ProteCT™ series sensors and converts it to 4–20 mA loop-powered output for use with PLCs, panel meters or data loggers.

Features:
- DIN rail mounting makes installation a snap
- Industry standard outputs

### ADC SERIES
Analog to Digital Converter

- Analog to Digital Converter........................................ page 132

### CTC SERIES
Signal Converter

- Signal Converter........................................................ page 134

#### Signal Converters

Convert Analog Signal to Digital Output

- Convert Output to 4–20 mA
- 4-20 mA SENSOR
- CURRENT TRANSFORMERS
- 0.333 mVAC
- S 5 A Secondary

**Ordering Information**

Sample Model Number: APT-005-24U-100-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.

APT-TH SERIES

**Power Transducer Dimensions**

**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: 500ms (10–90% step change)
- Accuracy: +/- 0.25% 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: UL, cUL and CE

#### Model Information

<table>
<thead>
<tr>
<th>Model</th>
<th>APT1 (208 V)</th>
<th>APT2 (240 V)</th>
<th>APT4 (480 V)</th>
<th>APT6 (600 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>NA</td>
</tr>
<tr>
<td>0.75 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>NA</td>
</tr>
<tr>
<td>1.00 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>2.00 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>3.00 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>5.00 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>10.0 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>15.0 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>20.0 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>40.0 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>50.0 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>75.0 kW</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>100 kW</td>
<td>NA</td>
<td>NA</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>150 kW</td>
<td>NA</td>
<td>NA</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>200 kW</td>
<td>NA</td>
<td>NA</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

- Monitored Voltage:
  1. 208 V three-phase
  2. 240 V three-phase
  4. 480 V three-phase
  6. 600 V three-phase

- Output Signal:
  4–20 mA
  0–5 VDC

- Power Supply:
  24U 24 VAC/DC

- Input Range (kW):
  0.50 kW
  0.75 kW
  1.00 kW
  2.00 kW
  5.00 kW
  7.50 kW
  10.0 kW
  15.0 kW
  20.0 kW
  40.0 kW
  50.0 kW
  75.0 kW
  100 kW
  150 kW
  200 kW

- Case:
  TH Three-hole, solid-core

Note: Not all ranges are available for each primary voltage input range. See Model Information chart.
ADC SERIES
Analog to Digital Converters

The ADC Series Signal Converter connects up to eight analog sensors, or up to eight separately powered analog output sensors, or up to four of each. This will produce a digital signal representing 0–100% of each sensor output. It is the perfect solution for photovoltaic power production system monitoring. The ADC converter allows for individually-ranged devices to interface with the industry-standard Modbus RTU serial protocol. The device can accept analog signals from current, voltage or temperature sensors, allowing the installer great versatility and higher accuracy. It was designed and built to meet NK Technologies’ trusted standards of reliability and ease of use.

Signal Converter Applications

Photovoltaic Power Production
- Measure current output accurately using a sensor sized appropriately.
- Measure current from a panel and after the combiner with the same device.
- Measure voltage output, temperature, or any parameter sensor 4–20 mA, 0–5 VDC or 0–10 VDC output.

Machine Control
- Combine several analog signals into a single Modbus address to enable web viewing of data.

SCADA System
- Report and record current, voltage, power, pressure, frequency and flow by using existing sensors but adding network communication easily.

Signal Converter Dimensions

Signal Converter Features

Eight Points of Data
- Convert up to eight analog, sensor outputs using a single network address.
- Sensor loop power is supplied by the converter. No DC power supply is required.
- Models for 8 loop-powered (2-wire) and 8 externally powered (4-wire) or 4 of each type.

Fast and Easy Installation
- DIN rail mount converter* with finger-safe terminals clearly marked for field installation speed.

Application Versatility
- Convert any standard sensor output to Modbus RTU digital network format.

Choice of Power Supplies
- ADC converter can be factory set for 120 VAC, 240 VAC or 24 VDC power supplies.

Communication Baud Rate Choices
- Field-selectable 9600 or 19200 baud rate speeds.

UL/cUL Approved
- Accepted worldwide.

Analog Sensor to Digital Network Conversion

Signal Converter Connections

Signal Converter Specifications

Power Supply
- 120 VAC (108–132 V)
- 240 VAC (216–264 V)
- 24 VDC (20–28 V)

Power Consumption
- 120 VAC: <10 mA
- 240 VAC: <25 mA
- 24 VDC: <200 mA

Output
- Modbus RTU Slave 8 Channels (RS485)

Output Protocol
- Start bit, 8 data bits (LSB first), 1 bit for even parity, 1 stop bit

Output Functions
- Function 04, “Read Input Registers”

Input Range
- 4–20 mA (power from converter or external)
- 0–5 VDC (externally powered)
- 0–10 VDC (externally powered)

Accuracy
- 1.0% FS

Indication
- Green Power On LED, yellow Busy LED, red Fault LED

Addressing
- 8 wide binary switch (1 to 247)

Environmental
- 4 to 122°F (-20 to 50°C)
- 0–95% RH non-condensing

Listings
- UL/cUL

Use any 4–20 mA, 0–5 VDC or 0–10 VDC output sensor as an input to the NK Technologies’ ADC analog-to-Modbus converter. Current, voltage, temperature, or any parameter that the application calls for. With the digital Modbus output scaled for zero to 100 percent the signal will represent whatever you may need to measure.

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

Signal Converter Ordering Information

Sample Model Number: ADC1-420-120-MOD-DIN
Eight channel 4-20 mA input converter, 120 VAC powered.

Signal Converters

ADC SERIES

NK Technologies
3511 Charter Park Drive • San Jose, CA 95136
800.959.4014 • www.nktechnologies.com • sales@nktechnologies.com

ADC SERIES

NK Technologies
3511 Charter Park Drive • San Jose, CA 95136
800.959.4014 • www.nktechnologies.com • sales@nktechnologies.com
CTC SERIES

Signal Converters

CTC Series Signal Converters allow you to use an existing standard 5 A secondary or low-voltage ProteCT™ current transformer over a conductor to produce an industry standard 4–20 mA two-wire, loop-powered signal. The signal is proportional to the current in the primary circuit. The CTC series snaps onto a standard DIN rail. The sensor output is connected to the load (PLC or panel meter, etc.) and a 24 VDC power source, and the current transformer is connected to the input terminals.

Signal Converter Specifications

- **Power Supply**: 24 VDC loop-powered (12–30 V)
- **Output**: 4–20 mA proportional to max. current
- **Output Impedance**: <500 Ω
- **Input Range**: Based on current sensor ratio
- **Input Burden**: 1.67 VA max. for stated accuracy
- **Accuracy**: 1.0% FS
- **Response Time**: 100 ms (to 90% step change)
- **Max. Inrush Current**: 300% FS (6 sec. duration)
- **Frequency Range**: 10–100 Hz
- **Environmental**: -4 to 122°F (-20 to 50°C)
- **Listings**: UL/cUL

Signal Converter Ordering Information

Sample Model Number: CTC333-420-24L-DIN

Converter accepts 333 VAC inputs from ProteCT™ current sensors, and produces a corresponding 4–20 mA signal.

### Signal Converter Dimensions

![Dimensions Diagram]

- **X1**: 3.5” (89.9 mm)
- **X2**: 2.3” (58.4 mm)
- **Y**: 1.46” (37.7 mm)
- **Z**: 0.94” (24.0 mm)
- **Thickness**: 0.18” (4.5 mm)

### Signal Converter Features

- **Uses any Standard 5 A Current Transformer or the Safer ProteCT™ Low Voltage Design**
- **Produces a 4–20 mA signal proportional to the AC current through the CT based on CT ratio.**
- **Two wires in, two wires out: Couldn’t be easier.**

### Fast and Easy Installation

- **DIN rail mounted** and 24 VDC loop-powered supply allows for quick and easy two-wire installation.

### No Calibration Needed

- **The primary current transformer ratio provides the scaling required without any other installer intervention.**

### UL/cUL Approved

- **Accepted worldwide.**

### Signal Converter Applications

**Adding Current Monitoring for System Upgrades**

- Measure an entire plant current consumption or individual machine usage.

**Detect Problems Before Failure Occur**

- Detect bearing failures on drive motors and open discharge lines on pumps.

**Tool Monitoring and Jam Protection**

- Measure drive motor HP to determine tool travel or contact with work.
- Monitor motor current use to provide an indication of motor jams.
- Use existing current transformers to monitor the current, and transmit 4–20 mA industry standard output.

### Crushers/Grinders/Shredder Motor Interlocks

![Diagram of Motor Interlocks]

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

For program expedited evaluation requests, see page 3 for details.

---

**OEMs**

CTC SERIES

Signal Converters

3511 Charter Park Drive • San Jose, CA • 95136
800.959.4014 • www.nktechnologies.com • sales@nktechnologies.com

CTC SERIES

Signal Converters

3511 Charter Park Drive • San Jose, CA • 95136
800.959.4014 • www.nktechnologies.com • sales@nktechnologies.com
Current Transformers

NK Technologies offers current transformers (CTs) for use with power transducers, panel meters, and in two-piece installations, with transducers and switches to extend ranges for high amperage/large conductor applications.

Features:
- 1 A, 5 A or 0–333 mV secondary outputs
- Split-core or solid-core case
- Agency approved
- 5 A secondary ratios available from 50 A to 3000 A and higher

CT-MS & CT-LS Series
1 A & 5 A Secondary Current Transformers ............... page 137

Current Transformers
5 A Secondary....................................................... page 139

CTRC Series
AC Current Transformer
ProteCT Type 333 mVAC Output....................... page 140

ProteCT™ Series
mV Current Transformers................................. page 142

1 A and 5 A Secondary Current Transformers offer a compact, cost-effective means of measuring primary current. These current transformers provide an easy-to-install method to measure AC current, producing a 0–1 A or 0–5 A output proportional to the current flowing through the sensing window. Both the CT-MS and the CT-LS series offer a larger than average sensing window and a split-core design for easy installation.

Current Transformer Features
- Split-core case for convenient installation over large wires or bus bars.
- 1 A and 5 A secondary CTs are compatible with standard power monitors and panel meters designed for 1 A or 5 A input.
- Larger sensing windows: MS Series aperture measures 2.22” x 1.19” and measures current from 0–150 to 0–800 A.
  LS Series aperture measures 3.49” x 2.36” and measures current from 0–800 to 0–1400 A.
- Plated terminals for reliability.

Current Transformer Applications
- Serves as current input for use with APT and APN series KW transducers.
- Serves space in control panels by remotely locating the sensing of the current closer to the load.
- The current transformer secondary can be connected to the NK CTC-05A-420-24L-DIN to produce a loop-powered, 4–20 mA signal proportional to the current through the CT.

Power-Pump Load Monitoring

Connecting a Current Transformer
A current transformer (CT) should never be energized (AC current through the sensing window) without a load connected to the output terminals. Best practice is to terminate the current transformer secondary on a terminal block with the ability to short between two points before extending the leads to the load. If it is ever necessary to remove the load from the CT while it is or could become energized, a shorting bar can be placed between the secondary loads, as shown in the drawing below. This will allow the load to be removed safely.
### Current Transformer Dimensions

<table>
<thead>
<tr>
<th>CT-MS</th>
<th>CT-LS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4&quot;</td>
<td>3.80&quot;</td>
</tr>
<tr>
<td>87.7mm</td>
<td>98.3mm</td>
</tr>
<tr>
<td>1.37&quot;</td>
<td>1.50&quot;</td>
</tr>
<tr>
<td>35.7mm</td>
<td>38.1mm</td>
</tr>
</tbody>
</table>

### Current Transformer Specifications

#### Power Supply
- Self-powered

#### Current Range
- CT-MS: 0–110 through 0–800 A
- CT-LS: 0–800 through 0–1400 A

#### Output Signal
- 0–1 A or 0–3 A (AC)

#### Frequency
- 50–600 Hz

#### Primary Circuit Voltage
- 600 VAC

#### Accuracy
- 0–1400 A models: ± 3% (10–100% of range) to 50°C
- 150 A model: ± 5% (10–100% of range) to 50°C

#### Linearity
- 0.5% (10–100% of range)

#### Thermal Rating
- 0 @ 30°C

### Current Transformer Ordering Information

#### (1) Model
- CT-MS Models:
  - 0150: 150 ratio
  - 0200: 200 ratio
  - 0250: 250 ratio
  - 0300: 300 ratio
  - 0350: 350 ratio

- CT-LS Models:
  - 0500: 500 ratio
  - 0600: 600 ratio
  - 0800: 800 ratio
  - 1000: 1000 ratio
  - 1200: 1200 ratio
  - 1400: 1400 ratio (1 A only)

#### (2) Output Signal
- 1: 0–1 A secondary
- 5: 0–5 A secondary

#### (3) Case Style
- MS: Medium sensing window
- LS: Large sensing window

### Current Transformer Features

- Solid-case core, choice of round with flying leads or square with terminals and integral feet for panel mounting.
- Aperture diameters from 1.13" to 2.51/TD.
- Agency approved.

### Current Transformer Applications

- Serves as current input for use with APT and APN Series KW transducers.
- Save space in control panels by remotely locating CTs closer to load.
- 5 A secondary compatible with standard products offering a 5 A analog input option.
- Broad line accommodates primary currents from 50 A to 1600 A.

### Current Transformer Specifications

#### Power Supply
- Self-powered

#### Current Range
- See Ranges/VA Burdens

#### Output Signal
- See Ranges/VA Burdens

#### Frequency
- 50–600 Hz

#### Insulation Class
- 50–400 Hz

#### Output Signal
- 0–5 A (AC)

#### Rating Factor
- ANSI rated, (<2.0%)

#### Allowable Burden
- See Ranges/VA Burdens

#### Aperture Size
- CT-LS: 0–800 through 0–1400 A

### Current Transformer Ranges/VA Burdens (max.)

<table>
<thead>
<tr>
<th>Series</th>
<th>CT Ratio</th>
<th>VA (by CT Series)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200:1</td>
<td>1.0 VA</td>
<td>101 2000</td>
</tr>
<tr>
<td>250:1</td>
<td>1.2 VA</td>
<td>201 6000</td>
</tr>
<tr>
<td>300:1</td>
<td>1.2 VA</td>
<td>301 8000</td>
</tr>
<tr>
<td>350:1</td>
<td>1.2 VA</td>
<td>401 12000</td>
</tr>
<tr>
<td>400:1</td>
<td>1.2 VA</td>
<td>501 16000</td>
</tr>
</tbody>
</table>

### Current Transformer Ordering Information

#### Sample Model Number: CT-0800-5-LS
- Current transformer with 800:5 ratio allowable burden, 5 A secondary output, and large sensing window.
- Sample Model Number: CT-0800-5-LS

### Test & Evaluation Units for OEMs

- Free program expedites evaluation process. See page 3 for details.

- Test & Evaluation Units for OEMs
  - Save space in control panels by remotely locating CTs closer to load.
  - Serves as current input for use with APT and APN Series KW transducers.
  - Save space in control panels by remotely locating CTs closer to load.
  - 5 A secondary compatible with standard products offering a 5 A analog input option.
  - Broad line accommodates primary currents from 50 A to 1600 A.

### Current Transformer Applications

- Serves as current input for use with APT and APN Series KW transducers.
- Save space in control panels by remotely locating CTs closer to load.
- 5 A secondary compatible with standard products offering a 5 A analog input option.
- Broad line accommodates primary currents from 50 A to 1600 A.

---

Note: For recommended lead length based on allowable burden, see the CT White Paper.

Note: For recommended lead length based on allowable burden, see the CT White Paper.
CTRC SERIES
AC Current Transformer
ProteCT™ Type 333 mVAC Output

CTRC AC Current Transformers monitor circuits up to 2000 A and produce a safe, low voltage output proportional to the RMS current value. This output is designed as an input to a power monitor or transducer, replicating the AC wave shape with phase angle resolution better than 2 degrees. The flexible coil design allows the sensor to be installed over multiple conductors or bus assemblies easily. The cable requires very little space to fit between adjacent phase conductors. The design eliminates the magnetically permeable core of standard current transformers while providing excellent isolation, sensing only the magnetic field of the phase inside the loop.

Current Transformer Features
333 mVAC Output
• Specifically designed for connection to power monitors and transducers.
• Safe, with no need for shorting blocks.
24 VAC or DC Powered
• Supply and Output are optically isolated.
Factory Calibrated
• Reduces field calibration errors.
• Coils matched with signal conditioning.
DIN Rail Mounted Case*
• Compact size requiring very little panel space.
• Simple snap fit to standard rails.
UL/cUL and CE Approved
• Accepted worldwide.
*For information on the DIN rail accessories kit, see page 144.

Current Transformer Applications
Power Monitoring
• Accurate representation of current without the weight or hazards created by 5 A secondary current transformers.
Individual Machines
• Measure power use for cost allocation.
• Detect voltage sags and spikes.
Monitor Entire Building Power Usage
• Locate unneeded power consumption.

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

AC Current Transformer Dimensions

Current Transformer Connections

Current Transformer Specifications

CTRC SERIES
AC Current Transformer
ProteCT™ Type 333 mVAC Output

CTRC SERIES
AC Current Transformer
ProteCT™ Type 333 mVAC Output

CTRC SERIES
AC Current Transformer
ProteCT™ Type 333 mVAC Output

CTRC SERIES
AC Current Transformer
ProteCT™ Type 333 mVAC Output

CTRC SERIES
AC Current Transformer
ProteCT™ Type 333 mVAC Output

CTRC SERIES
AC Current Transformer
ProteCT™ Type 333 mVAC Output

CTRC SERIES
AC Current Transformer
ProteCT™ Type 333 mVAC Output

CTRC SERIES
AC Current Transformer
ProteCT™ Type 333 mVAC Output
ProteCT™ SERIES Current Transformers

ProteCT™ Series Current Transformers are intended for use with APT and API Series power transducers. ProteCT™ low voltage output current transformers provide easy sensing of current on three-phase applications with the added safety of a 3.3 mV output secondary. Available in split-core case as standard.

Current Transformer Applications
- Tailored for use with AP Series AutoPhase KW/KWH transducers
- Self-powered design works well in data logger applications
- Excellent response time for power monitoring applications

Current Transformer Features
- No exposed metal parts on assembled ProteCT™ devices.
- High-Impact, UL94 V-0 Rated Polymer Housing
- Snap-close case speeds installation and eases retrofits for standard Split-core Case Design
- Unique low voltage output allows safe opening of transformer secondary, protecting installers from shock hazards found on traditional 5 A CTs.
- Eliminates Need for “Shorting Blocks”
- Standard Split-core Case Design
- Snap-close case speeds installation and eases retrofits for existing jobs.
- Eliminates need to power down or disconnect system to install CT, maximizing up time.
- High-Impact, UL94 V-0 Rated Polymer Housing
- No exposed metal parts on assembled ProteCT™ devices.
- Choose From Three ID’s: 0.85, 1.25, 2.0*

*Monitor Watts Used by a Pump

AMPFLASHER™ ACI SERIES

The AMPFlasher™ ACI Series Current Indicator is a compact, inexpensive, easy-to-use LED ring which slips onto a conductor to give a flashing indication of current flow. Ideal for use in control panels, or wherever confirmation of current flow is desired. AMPFlasher™ current indicators are a cost-effective way to detect live conductors and see current flow to fans, heaters, pumps, lighting or other powered devices.

AC Current Indicator Applications
- Quick visual status of electric motor load.
- Identify open heater circuit connections.
- Provide panel mounted indication of current draw on monitored load.
- Confirmation of operation for critical lighting or equipment.

AC Current Indicator Features
- Low Sensitivity Turn-on Point
- Detect currents as low as 0.5 A with a single conductor pass, eliminates the need to wrap conductors through multiple times to increase sensitivity.
- High Visibility Flashing LED
- Flashing LEDs perform better in daylight conditions and from multiple angles than constant on LEDs.

Choice of Outputs
- LED output standard, optional LED on 24” pigtails for remote indication.
- LED output standard, optional LED on 24” pigtails for remote indication.

AC Current Indicator Ordering Information

Sample Model Number: ACI-0.5-L
Current Indicator with 0.5 A sensitivity and red flashing LED.

AC Current Indicator Dimensions

Note: Panel opening should be 0.267 to 0.273” panel thickness 0.032 to 0.125”
**DIN Rail Kits**

**DIN Rail Kit Features**

- Includes two end stops and a bichromatic galvanized steel rail.
- High mechanical strength and corrosion resistance.
- Slotted design allows for attachment to most suitable surfaces.
- Rail can be cut in field to desired length.

**DIN Rail Kit Specifications**

<table>
<thead>
<tr>
<th>DIN Rail Kit</th>
<th>DIN Rail Kit Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail Material</td>
<td>Rail is galvanized steel; 35 mm x 7.5 mm x 175 mm</td>
</tr>
<tr>
<td>Rating</td>
<td>Conforms to EN50813, 50022, DIN 46277</td>
</tr>
</tbody>
</table>

**DIN-2 Adapter Kit**

<table>
<thead>
<tr>
<th>DIN-2 Adapter Kit</th>
<th>DIN-2 Adapter Kit Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail Compatibility</td>
<td>&quot;Top Hat&quot; Type: 35 x 15 mm, 35 x 7.5 mm</td>
</tr>
<tr>
<td>&quot;G&quot; Type: 32 x 15 mm</td>
<td></td>
</tr>
<tr>
<td>Bracket Material</td>
<td>UL 94V-0 unfilled nylon</td>
</tr>
<tr>
<td>Temp Range</td>
<td>-4 to 122°F (-20 to 50°C)</td>
</tr>
</tbody>
</table>

**DIN Rail Kit Ordering Information**

- Part Number for DIN Rail Kit: DINKIT
- Part Number for DIN-2 Adapter Kit: DIN-2

**Test & Evaluation Units for OEMs**

Free program expedites evaluation process. See page 3 for details.

**ISO 9001 and ISO 14001 Registrations**

NK Technologies' commitment to quality and the environment goes beyond compliance to international standards. We have developed and implemented an integrated quality and environmental management system to ensure our business and manufacturing processes provide customer confidence and satisfaction while being good stewards of our environment.

The foundation of our consolidated system is based on the ISO 9001 and ISO 14001 standards. However, we go above and beyond basic compliance to continuously improve all of our quality and environmental related operations. Our unwavering goal is to always achieve customer satisfaction with everything we do.

As an ISO registered organization, our customers can buy with confidence knowing that NK Technologies designs and manufactures its products within a formal quality assurance system periodically audited by an independent third party auditor. Our process, including lead-free solder, ensures we do not deviate from documented procedures that provide objective evidence of compliance to the ISO standards.

**Quality and Environmental Systems Manager**

Ron Rapczynski

We will continue to practice these principles in our global business.

**RK Technologies' ROHS 3 Compliance**

NK Technologies’ ROHS status is based on information provided by our raw material manufacturer’s stated compliance to 2011/65/EU European Union Directive and amendment (EU) 2015/863, which adds 4 phthalates to 2011/65/EU as of July 22, 2019. NK Technologies ROHS status may include an allowable exemption as defined in the EU Directive 2011/65/EC and relevant amendments.

Based on the information provided to us by the suppliers of raw materials used in the manufacture and delivery of our products, NK Technologies maintains a list of specific model numbers and product families designated as ROHS 3 Compliant for orders placed on or after October 1, 2006. The products listed conform to European Commission Directive 2015/863/EU as July 1, 2019, and do not intentionally contain more than the allowed maximum limit.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Maximum Limit (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead (Pb) 1</td>
<td>1000 ppm (0.1 weight %)</td>
</tr>
<tr>
<td>Cadmium (Cd) 2</td>
<td>100 ppm (0.01 weight %)</td>
</tr>
<tr>
<td>Mercury (Hg) 1</td>
<td>1000 ppm (0.1 weight %)</td>
</tr>
<tr>
<td>Hexavalent Chromium (Cr+6) 1</td>
<td>1000 ppm (0.1 weight %)</td>
</tr>
<tr>
<td>Polybrominated biphenyl (PBBS) 1</td>
<td>1000 ppm (0.1 weight %)</td>
</tr>
<tr>
<td>Polybrominated biphenyl ethers(PBDEs) 1</td>
<td>1000 ppm (0.1 weight %)</td>
</tr>
<tr>
<td>Bis(2-Ethylhexyl) phthalate (DEHP)</td>
<td>1000 ppm (0.1 weight %)</td>
</tr>
<tr>
<td>Butyl benzyl phthalate (BBP)</td>
<td>1000 ppm (0.1 weight %)</td>
</tr>
<tr>
<td>Dibutyl phthalate (DBP)</td>
<td>1000 ppm (0.1 weight %)</td>
</tr>
<tr>
<td>Diisoctyl phthalate (DIBP)</td>
<td>1000 ppm (0.1 weight %)</td>
</tr>
</tbody>
</table>

Except when allowed by the Directive for example, 3500 ppm in steel, 4000 ppm in aluminum alloys and 4500 ppm in copper alloys.

**RoHS 3 Compliance shall be taken to mean that,**

- With regard to existing designs, RoHS 3 certified substitutions for all materials and components have been specified.
- Components used in the production of compliant parts are certified RoHS compliant and our suppliers have confirmed this compliance status.
- Soldering operations involved in the production of compliant products are performed using lead-free solder.

NK Technologies is committed to ensuring the health, safety and well-being of our employees, customers and the environment worldwide and we will continue to practice these principles in our global business.

**Quality and Environmental Systems Manager**

Ron Rapczynski

NK Technologies' commitment to quality and the environment goes beyond compliance to international standards. We have developed and implemented an integrated quality and environmental management system to ensure our business and manufacturing processes provide customer confidence and satisfaction while being good stewards of our environment.

The foundation of our consolidated system is based on the ISO 9001 and ISO 14001 standards. However, we go above and beyond basic compliance to continuously improve all of our quality and environmental related operations. Our unwavering goal is to always achieve customer satisfaction with everything we do.

As an ISO registered organization, our customers can buy with confidence knowing that NK Technologies designs and manufactures its products within a formal quality assurance system periodically audited by an independent third party auditor. Our process, including lead-free solder, ensures we do not deviate from documented procedures that provide objective evidence of compliance to the ISO standards.

**Quality and Environmental Systems Manager**

Ron Rapczynski

We will continue to practice these principles in our global business.
TERMS AND CONDITIONS OF SALE

All quotes, offers of products for sale and sales by Neilsen-Kuljian, Inc. (sometimes also doing business as NK Technologies) or its affiliates are subject to the following terms and conditions.

1. PRICE AND DELIVERY: All prices quoted, and delivered, will be “EXWORKS (EXW)” or “Free On Board (FOB)” from our factory located in San Jose, California, United States of America. Delivery shall be established by mutual agreement or as determined by NK Technologies. All orders are subject to a minimum order amount of One Hundred U.S. Dollars ($100) in total Drop shipments can be arranged as needed and may incur additional handling fees.

2. CONFLICTING OR MODIFYING TERMS: No modification of additions to or conflicting provisions to these terms and conditions of sale and shipment, whether oral or written, incorporated into Buyer's order or other communications are binding upon the Company unless specifically agreed to by the Company in writing and signed by an officer of the Company. The Company reserves the right to refuse to honor any such modifications.

3. WARRANTY: NK Technologies warrants its products to be free of defects in material and workmanship for a period of five (5) years after receipt by Buyer. This warranty does not apply to any products or parts not purchased as new from NK Technologies; or products manufactured by others or parts not manufactured by NK Technologies, provided however, NK Technologies does agree to assign and transfer to Buyer, insofar as is permitted by law, any warranty pertaining to such products. If any NK Technologies' manufactured product fails to conform to the warranty applicable to such product, NK Technologies shall, at its option, either (i) repair or replace the product, or (ii) furnish the Buyer with a credit or other full or partial refund to Buyer as determined by the Company, provided the Buyer returns the product to the Company with such product's manufacturing date and/or purchase invoice number within the warranty period or the warranty is void. NK Technologies may, at its option, cancel any order or remaining part thereof, without liability, by giving notice to Buyer.

4. PAYMENTS: Unless otherwise agreed by the Company, all orders are due for payment immediately upon confirmation of the order by the Company. All prices stated in the order are subject to change and may grant payment terms of net thirty (30) days from date of shipment. Under certain circumstances (sales outside of the United States, special order products or parts, or credit of acceptable Buyer credit history), the Company reserves the right to require the prepayment of all or a portion of an invoice in advance of shipment. If an invoice is paid by credit card, a processing fee may be charged and paid by Buyer at the Company's discretion. In addition, a transaction fee may be applied if an invoice is paid with a foreign credit card. These credit card fees will be added and applied to the invoice. International Buyer(s) may be subject to any additional costs including any related tax, and credit card processing fees.

5. TAXES: All prices quoted, and deliveries made, are subject to these terms and conditions of sale and are prepaid and added to a Buyer’s invoice; however, the Company reserves the right to provide a resale certificate or similar document acceptable to the Company before returning any product for which Buyer expects to return payments or checks for such credit amount or credit memo.

6. DELIVERY SCHEDULES/FORCE MAJEURE: Orders are generally shipped on the date specified and acknowledged on the Company’s order confirmation sent to Buyer upon acceptance of an order. NK Technologies reserves the right to adjust the date of shipment should there be any changes in Buyer’s purchase. If Buyer’s purchase is subject to the requirements of any governmental authority or agency, Buyer will be responsible for providing a resale certificate or similar document acceptable to the authority imposing such tax, fee or charge. Buyer shall indicate at time of order placement any tax identification number.

7. TITLES: All titles to the products will pass to Buyer upon delivery to the carrier at the FOB or EXW point; provided however, NK Technologies may, at its option, cancel any order or remaining part thereof, without liability, by giving notice to Buyer.

8. RETURN POLICIES: Unauthorized returns will be refused. Returns of products, whether due to Buyer’s error or mistakes, or for the failure to perform its obligations due to causes beyond its reasonable control, shall be at Buyer’s expense. Title to the products will pass to Buyer upon delivery to the carrier at the FOB or EXW point; provided however, Buyer’s purchase may at its option, cancel any order or remaining part thereof, without liability, by giving notice to Buyer.

9. TITLE: Title to the products will pass to Buyer upon delivery to the carrier at the EXWORKS or FOB point; provided however, NK Technologies shall retain a purchaser maintenance and support fee in each instance for all products manufactured by the Company. Written authorization must be obtained from the Company before returning any product for which Buyer expects to receive a credit. Return authorization instructions are mailed with the shipment. Return goods can only be returned when approved by the Company and shall include, with the return, a Return Material Authorization (RMA) number issued by NK Technologies. At its discretion, NK Technologies may allow the return of product purchased within the prior one hundred and eighty (180) day period in exchange for: (1) a restocking fee of twenty five percent (25%) of the invoice amount in addition to other costs including, but not limited to, freight, handling fees, and insurance or custom charges, if applicable. The Company at its discretion may pay standard ground freight charges for items being returned to Buyer which are repaired or replaced within the warranty period. Approved credit memos will be issued to Buyer’s account and Buyer may use such credit for future purchases with NK Technologies. Buyer agrees that NK Technologies will not issue any refund payments or checks for such credit amount or credit memo.

10. LIABILITY: BUYER AGREES THAT NK TECHNOLOGIES SHALL NOT BE RESPONSIBLE OR LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, EXEMPLARY, PUNITIVE OR CONSEQUENTIAL DAMAGES, LOSS OR DAMAGE RESULTING FROM THE USE OF THE PRODUCT INCLUDING PERSONAL INJURY OR PROPERTY DAMAGE. NK Technologies’ entire liability and Buyer’s exclusive remedy for any claims of any kind arising out of Buyer’s use, misuse or inability to use the products, or any related activities, or any violation by Buyer of these conditions of sale in any other way, shall be limited to, in the Company’s discretion, either (1) an offsetting order for a value equal to or exceeding that of the product returned. Return of products categorized as “N/C”, non-cancellable or non-returnable or those made with nonstandard material or other material specially made to meet Buyer’s specifications shall not be returnable for any reason or for the failure to perform its obligations due to causes beyond its reasonable control, shall be at Buyer’s expense. Title to the products will pass to Buyer upon delivery to the carrier at the FOB or EXW point; provided however, Buyer’s purchase may at its option, cancel any order or remaining part thereof, without liability, by giving notice to Buyer.

11. INDEMNIFICATION: It is the sole and exclusive responsibility of Buyer to determine the suitability and ability to use any and all NK Technologies’ products for Buyer’s use. Buyer agrees to indemnify, defend, and hold NK Technologies and NK Technologies’ employees, officers, directors, and owners harmless from and against all claims, losses, expenses, damages and costs (including but not limited to, direct, incidental, special, consequential, punitive, exemplary and indirect damages), and agrees to reimburse NK Technologies its reasonable attorneys’ fees in defending any claim resulting from or arising out of Buyer’s use, misuse or inability to use the products, or any related activities, or any violation by Buyer of these conditions of sale in any other way. Such obligations and terms and conditions stated hereby carefully prior to operating NK Technologies’ products.

12. INTELLECTUAL PROPERTY RIGHTS: The COMPANY EXPRESSLY DISCLAIMS ALL REPRESENTATIONS AND WARRANTIES CONCERNING THE SCOPE OR VALIDITY OF ANY INTELLECTUAL PROPERTY RIGHTS ASSOCIATED WITH THE PRODUCTS, WHETHER DIRECT OR INDIRECT, OR ANY VERSION OF  TERMS AND CONDITIONS take precedence, and can be found on our website at nktechnologies.com
### INDEX BY NAME

<table>
<thead>
<tr>
<th>Series</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADC Series</td>
<td>132</td>
</tr>
<tr>
<td>AG Series</td>
<td>93</td>
</tr>
<tr>
<td>AGL Series</td>
<td>96</td>
</tr>
<tr>
<td>AG-LC Series</td>
<td>99</td>
</tr>
<tr>
<td>AGLD Series</td>
<td>101</td>
</tr>
<tr>
<td>AGT Series</td>
<td>103</td>
</tr>
<tr>
<td>AGT-FD Series</td>
<td>105</td>
</tr>
<tr>
<td>AMPFlasher™</td>
<td></td>
</tr>
<tr>
<td>ACI Series</td>
<td>143</td>
</tr>
<tr>
<td>APN Series</td>
<td>121</td>
</tr>
<tr>
<td>APN-R Series</td>
<td>123</td>
</tr>
<tr>
<td>APS Series</td>
<td>125</td>
</tr>
<tr>
<td>APT Series</td>
<td>127</td>
</tr>
<tr>
<td>APT-TH Series</td>
<td>129</td>
</tr>
<tr>
<td>ASO Series</td>
<td>22</td>
</tr>
<tr>
<td>A51 Series</td>
<td>6</td>
</tr>
<tr>
<td>A51 Series COMPACT CASE</td>
<td>13</td>
</tr>
<tr>
<td>A51 NOR-FT-GO SERIES</td>
<td>8</td>
</tr>
<tr>
<td>A53 Series</td>
<td>10</td>
</tr>
<tr>
<td>ASC Series</td>
<td>18</td>
</tr>
<tr>
<td>ASD Series</td>
<td>20</td>
</tr>
<tr>
<td>ASL Series</td>
<td>14</td>
</tr>
<tr>
<td>ASM Series</td>
<td>16</td>
</tr>
<tr>
<td>AT Series</td>
<td>42</td>
</tr>
<tr>
<td>AT/ATR-FD Series</td>
<td>48</td>
</tr>
<tr>
<td>AT/ATR-FL Series</td>
<td>50</td>
</tr>
<tr>
<td>AT/ATR-LS Series</td>
<td>54</td>
</tr>
<tr>
<td>AT/ATR-MS Series</td>
<td>52</td>
</tr>
<tr>
<td>AT/ATR-TH Series</td>
<td>46</td>
</tr>
<tr>
<td>ATCR Series</td>
<td>56</td>
</tr>
<tr>
<td>ATH Series</td>
<td>64</td>
</tr>
<tr>
<td>ATP Series</td>
<td>58</td>
</tr>
<tr>
<td>ATP/ATPR-FL Series</td>
<td>62</td>
</tr>
<tr>
<td>ATPR Voltage</td>
<td>60</td>
</tr>
<tr>
<td>ATPR Voltage OUTPUT SERIES</td>
<td>60</td>
</tr>
<tr>
<td>ATQ Series</td>
<td>66</td>
</tr>
<tr>
<td>ATR Series</td>
<td>44</td>
</tr>
<tr>
<td>ATS Series DIGITAL</td>
<td>68</td>
</tr>
<tr>
<td>ATS Series ROTARY</td>
<td>70</td>
</tr>
<tr>
<td>CT-MS &amp; CT-LS Series</td>
<td>137</td>
</tr>
<tr>
<td>CTC Series</td>
<td>134</td>
</tr>
<tr>
<td>CTRC Series</td>
<td>140</td>
</tr>
<tr>
<td>CURRENT TRANSFORMERS</td>
<td>139</td>
</tr>
<tr>
<td>DG Series</td>
<td>107</td>
</tr>
<tr>
<td>DIN RAIL KITS</td>
<td>144</td>
</tr>
<tr>
<td>DLT Series</td>
<td>88</td>
</tr>
<tr>
<td>DS1 Series</td>
<td>34</td>
</tr>
<tr>
<td>DS1-FD Series</td>
<td>38</td>
</tr>
<tr>
<td>DS3 Series</td>
<td>36</td>
</tr>
<tr>
<td>DT Series, 3-WIRE</td>
<td>78</td>
</tr>
<tr>
<td>DT Series, 4-WIRE</td>
<td>73</td>
</tr>
<tr>
<td>DT Series, 5 &amp; 12 VDC POWERED</td>
<td>80</td>
</tr>
<tr>
<td>DT-BB Series, HV BUS BAR</td>
<td>84</td>
</tr>
<tr>
<td>DT-DL Series, LARGE APERTURE</td>
<td>86</td>
</tr>
<tr>
<td>DT-FD Series, HIGH VOLTAGE</td>
<td>82</td>
</tr>
<tr>
<td>PROTECT™ Series</td>
<td>142</td>
</tr>
<tr>
<td>VTD Series</td>
<td>112</td>
</tr>
<tr>
<td>VTD-BD Series</td>
<td>114</td>
</tr>
<tr>
<td>VTHR Series</td>
<td>110</td>
</tr>
<tr>
<td>VTU-DIN SERIES</td>
<td>118</td>
</tr>
<tr>
<td>VTU SERIES</td>
<td>116</td>
</tr>
</tbody>
</table>

### INDEX BY PRODUCT

<table>
<thead>
<tr>
<th>Product</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Sensing Switches</td>
<td>4</td>
</tr>
<tr>
<td>A51 Series</td>
<td>6</td>
</tr>
<tr>
<td>A51 NOR-FT-GO SERIES</td>
<td>8</td>
</tr>
<tr>
<td>A53 Series</td>
<td>10</td>
</tr>
<tr>
<td>A51 Series COMPACT CASE</td>
<td>13</td>
</tr>
<tr>
<td>ALT SERIES</td>
<td>14</td>
</tr>
<tr>
<td>AS3 SERIES</td>
<td>18</td>
</tr>
<tr>
<td>ASL SERIES</td>
<td>20</td>
</tr>
<tr>
<td>ASM SERIES</td>
<td>16</td>
</tr>
<tr>
<td>ATR Series</td>
<td>44</td>
</tr>
<tr>
<td>AT/ATR-TH SERIES</td>
<td>46</td>
</tr>
<tr>
<td>AT/ATR-FD SERIES</td>
<td>48</td>
</tr>
<tr>
<td>AT/ATR-FL SERIES</td>
<td>50</td>
</tr>
<tr>
<td>AT/ATR-LS SERIES</td>
<td>54</td>
</tr>
<tr>
<td>AT/ATR-MS SERIES</td>
<td>52</td>
</tr>
<tr>
<td>AT/ATR-TH SERIES</td>
<td>46</td>
</tr>
<tr>
<td>ATCR SERIES</td>
<td>56</td>
</tr>
<tr>
<td>ATQ SERIES</td>
<td>66</td>
</tr>
<tr>
<td>AGL SERIES</td>
<td>96</td>
</tr>
<tr>
<td>AG-LC SERIES</td>
<td>99</td>
</tr>
<tr>
<td>AGLD Series</td>
<td>101</td>
</tr>
<tr>
<td>AGT Series</td>
<td>103</td>
</tr>
<tr>
<td>AGT-FD SERIES</td>
<td>105</td>
</tr>
<tr>
<td>AGT Series</td>
<td>107</td>
</tr>
<tr>
<td>ATPR VOLTAGE</td>
<td>60</td>
</tr>
<tr>
<td>ATPR/VOLTAGE OUTPUT SERIES</td>
<td>60</td>
</tr>
<tr>
<td>ALT SERIES</td>
<td>42</td>
</tr>
<tr>
<td>ALT SERIES</td>
<td>44</td>
</tr>
<tr>
<td>AT/ATR-TH SERIES</td>
<td>46</td>
</tr>
<tr>
<td>AT/ATR-FD SERIES</td>
<td>48</td>
</tr>
<tr>
<td>AT/ATR-FL SERIES</td>
<td>50</td>
</tr>
<tr>
<td>AT/ATR-LS SERIES</td>
<td>52</td>
</tr>
<tr>
<td>AT/ATR-MS SERIES</td>
<td>54</td>
</tr>
<tr>
<td>ATCR SERIES</td>
<td>56</td>
</tr>
<tr>
<td>ATQ SERIES</td>
<td>58</td>
</tr>
<tr>
<td>Voltage Transducers</td>
<td>109</td>
</tr>
<tr>
<td>VTR SERIES</td>
<td>110</td>
</tr>
<tr>
<td>VTD SERIES</td>
<td>112</td>
</tr>
<tr>
<td>VTD-BD SERIES</td>
<td>114</td>
</tr>
<tr>
<td>VTU SERIES</td>
<td>116</td>
</tr>
<tr>
<td>VTU-DIN SERIES</td>
<td>118</td>
</tr>
<tr>
<td>Power Sensing Products</td>
<td>120</td>
</tr>
<tr>
<td>APN SERIES</td>
<td>121</td>
</tr>
<tr>
<td>APN-R SERIES</td>
<td>123</td>
</tr>
<tr>
<td>APS SERIES</td>
<td>125</td>
</tr>
<tr>
<td>APT SERIES</td>
<td>127</td>
</tr>
<tr>
<td>APT-TH SERIES</td>
<td>129</td>
</tr>
<tr>
<td>Signal Converters</td>
<td>131</td>
</tr>
<tr>
<td>ADC SERIES</td>
<td>132</td>
</tr>
<tr>
<td>CTC SERIES</td>
<td>134</td>
</tr>
<tr>
<td>Current Transformers</td>
<td>136</td>
</tr>
<tr>
<td>CT-MS &amp; CT-LS SERIES</td>
<td>137</td>
</tr>
<tr>
<td>CTRC SERIES</td>
<td>139</td>
</tr>
<tr>
<td>PROTECT™ SERIES</td>
<td>140</td>
</tr>
<tr>
<td>AMPFlasher™</td>
<td>143</td>
</tr>
<tr>
<td>AG SERIES</td>
<td>93</td>
</tr>
<tr>
<td>AG SERIES</td>
<td>96</td>
</tr>
<tr>
<td>AG-LC SERIES</td>
<td>99</td>
</tr>
<tr>
<td>AGLD SERIES</td>
<td>101</td>
</tr>
<tr>
<td>AGT SERIES</td>
<td>103</td>
</tr>
<tr>
<td>AGT-FD SERIES</td>
<td>105</td>
</tr>
<tr>
<td>AGT Series</td>
<td>107</td>
</tr>
<tr>
<td>ACCESSORIES</td>
<td>144</td>
</tr>
<tr>
<td>DIN RAIL KITS</td>
<td>144</td>
</tr>
</tbody>
</table>
For the most current and up-to-date information...

www.nktechnologies.com

- Up-to-date Product Information
- Data Sheets & Instruction Sheets
- CAD Drawings
- Product Certifications
- Request for Quote
- Support
- Application Examples
- Engineering Resource Articles
- Sign up for Product Updates
- Distributor Information
- ... and so much more!

Visit our website for all the technical, application and support information that you could ever want or need!