Series 340N2
Ver 0.98

Btu Transmitter
by Data Industrial

Owner's Manual

The Data Industrial Series 340N2 Btu transmitter is an economical, compact device for sub-metering applications using Johnson Controls Metasys® Network Companion™ and Facilitator™ Supervisory Systems.

The 340N2 calculates thermal energy by measuring liquid flow in a closed pipe system and measuring temperature at inlet and outlet points. The 340N2 requires two 10 kΩ thermistors for temperature input. The flow input may be provided by any Data Industrial sensor and many other pulse or sine wave signal flow sensors.

The onboard microcontroller and digital circuitry make precise measurements and produce accurate, drift-free outputs. The 340N2 is commissioned using Data Industrial Windows® based software. Calibration information for the flow sensor, units of measurement and output scaling may be preselected or entered in the field. While the unit is connected to a PC or laptop computer, real-time flow rate and total, temperatures and energy rate and total are available.

The Series 340N2 transmitter features two LED's to verify input and output signals.

The primary output for the Series 340N2 is an isolated solid state switch closure that is user programmed for units of energy or flow. The output pulse width is adjustable from 50 mS to 5 sec.

The secondary output is the Johnson Controls N2 communications protocol that allows the Series 340N2 to be assigned an address and allow all measurement parameters: inlet and outlet temperature, flow rate, flow total, energy rate and energy total to be transmitted from as many as 255 units on a single 3-wire bus.

The Series 340N2 Btu transmitter operates on AC or DC power supplies ranging from 12 to 24 volts.

The compact cast epoxy body measures 3.65"(93mm) x 2.95"(75mm) and can be easily mounted on panels, DIN rails or enclosures.

PN# 72033
1/12/01 Rev B

INSTALLATION

Mechanical installation

The series 340N2 transmitter may be surface mounted onto a panel, attached to DIN rails using adapter clips or wall mounted using two optional enclosures.

Location
Although the 340N2 device is encapsulated, all wiring connections are made to exposed terminals. The unit should be protected from weather and moisture in accordance with electrical codes and standard trade practices.
In any mounting arrangement, the primary concerns are ease of wiring and attachment of the programming cable.
The unit generates very little heat so no consideration need be given to cooling or ventilation.

Surface Mount Installation
The 340N2 may be mounted to the surface of any panel using double-sided adhesive tape or by attaching fasteners through the holes in the mounting flanges of the unit.
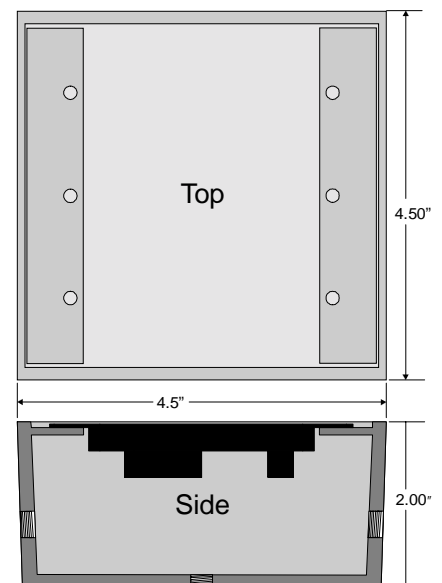
Din rail Mounting
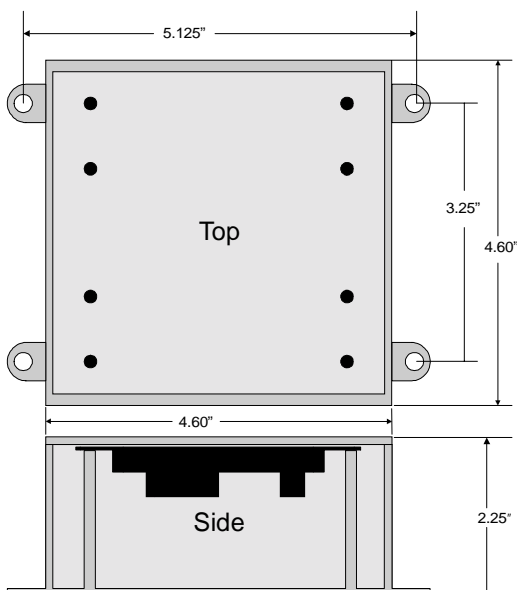Optional clips snap onto the mounting flanges allowing the 340N2 to be attached to DIN 15, 32, 35 mm DIN rail systems.

Series 340N2 Dimensions
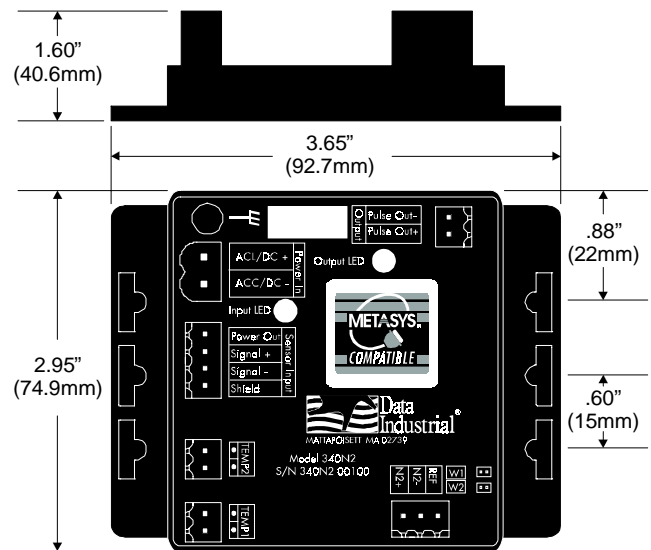
340N2 Metal Box Dimensions

340N2 Plastic Box Dimensions

Wall Mounting
Optional metal and plastic enclosures are available to mount the 340N2 to a wall when no other enclosure is used. The enclosure is first attached to the wall using fasteners through its mounting holes.
After wiring, the transmitter may be attached to the enclosure with the terminal headers facing in using the slots in the mounting flanges. As an alternate mounting arrangement, the 340N2 may be fastened to the box cover using double-sided adhesive tape.

Temperature Sensor Installation
The location of the temperature sensors with regard to the flow sensor is important to the accuracy of the energy calculation. Temperature sensor **T1** must be located closest to the flow sensor. A distance of 5 pipe diameters will give the greatest accuracy. Always intall the temperature sensor downstream of the flow sensor.
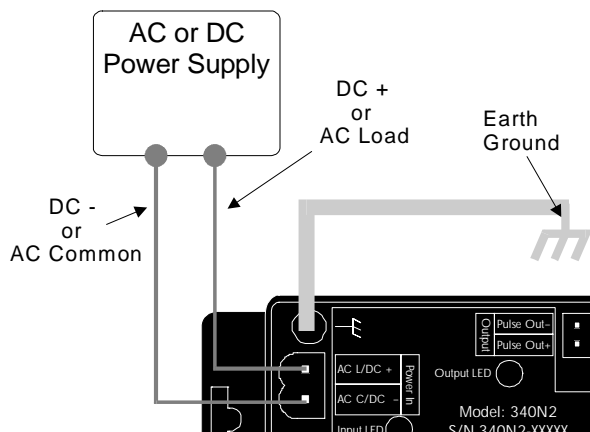
Electrical Installation
All connections to the 340N2 are made to screw terminals on removable headers.

Side View - Typical 300 Series Removable Connector Wiring

Wire

3/32" Flathead Screwdriver

Series 300 Connector

Power Supply Wiring
The Series 340N2 requires 12-24 Volts AC or DC to operate. The power connections are made to the ORANGE header. The connections are labeled beside the header. Observe the polarity shown on the label.

Sample Power Supply Wiring Diagram

AC or DC Power Supply

DC + or AC Load

Earth Ground

DC - or AC Common

If a Data Industrial plug in type power supply (A-1026 or A-503) is used, connect the black/white striped wire to the terminal marked positive (+) and the black wire to the terminal marked negative (-).

Note:
Included with every Series 340N2 is a 340N2IK kit containing a screw, lockwasher and ground lead to connect the Series 340N2 to Earth Ground. Connect the Earth Ground Lug of the Series 340N2 to a solid Earth Ground with as short a wire as possible. This will help prevent electrical interference from affecting the Series 340N2's normal operation.

Sample Sensor Wiring Diagram

Sensor Wiring
All flow sensor types connect to the four terminal header labeled "Sensor Input".
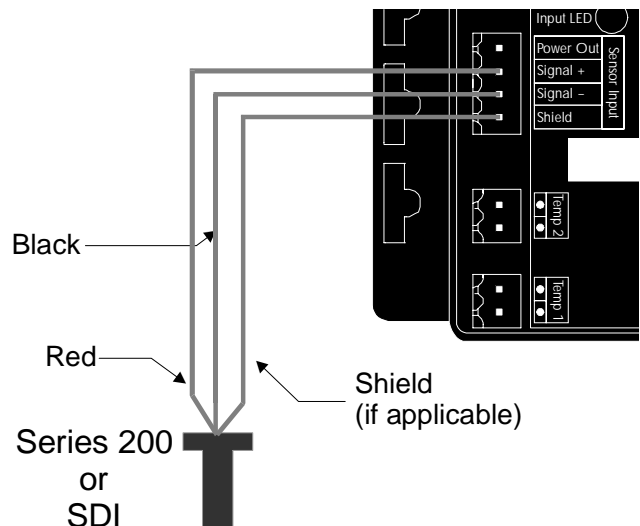
200 Series
Connect the Red wire to Sensor signal (+), Black wire to Sensor signal (-) and the Bare wire to Shield.
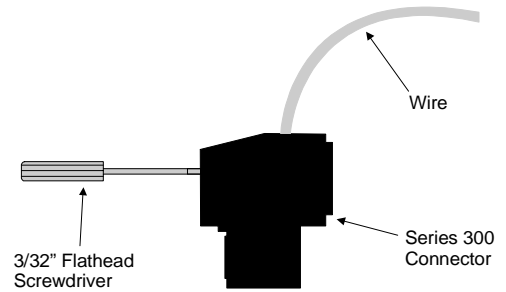
SDI Series
Connect the Plus (+) terminal of the sensor to Sensor signal (+) on the transmitter and the Minus (-) terminal of the sensor to Sensor signal (-) on the transmitter. Connect the shield terminal of the sensor to the shield terminal of the transmitter.

Other Sensors
The Sensor Input *Power Out* terminal supplies nominal 12VDC excitation voltage for 3 wire sensors. Connect sensor *signal +* and sensor *signal -* wires to transmitter terminals.
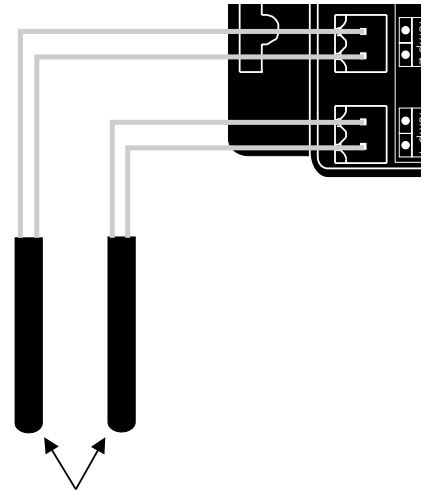

Black

Red

Series 200 or SDI

Shield (if applicable)
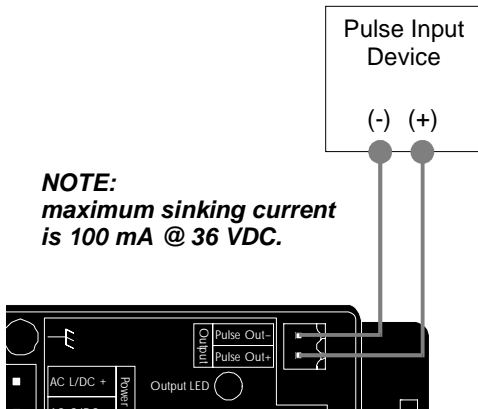
Thermistor Wiring Diagram

Temperature Element Wiring

The Data Industrial thermistors are not polarity sensitive. Connect thermistor closest to the flow sensor to Series 340 terminal block marked TEMP 1 and the other thermistor wires to Series 340 terminal marked TEMP 2.

Sample Pulse Output wiring Diagram

Pulse Input Device

(-) (+)

NOTE:
maximum sinking current is 100 mA @ 36 VDC.

Pulse Output Wiring

10K Thermistors

The Series 340N2 has solid state switch output rated for a maximum sinking current of 100 mA @ 36 VDC. In most cases the pulse out (+) terminal of the 340N2 will connect to the Input pulse (+) and the pulse out (-) terminal to the Input pulse (-) of the receiving device. These terminals are located on a separate two terminal removable header on the 340N2 labeled "Output" . Observe the electrical polarity of the output.
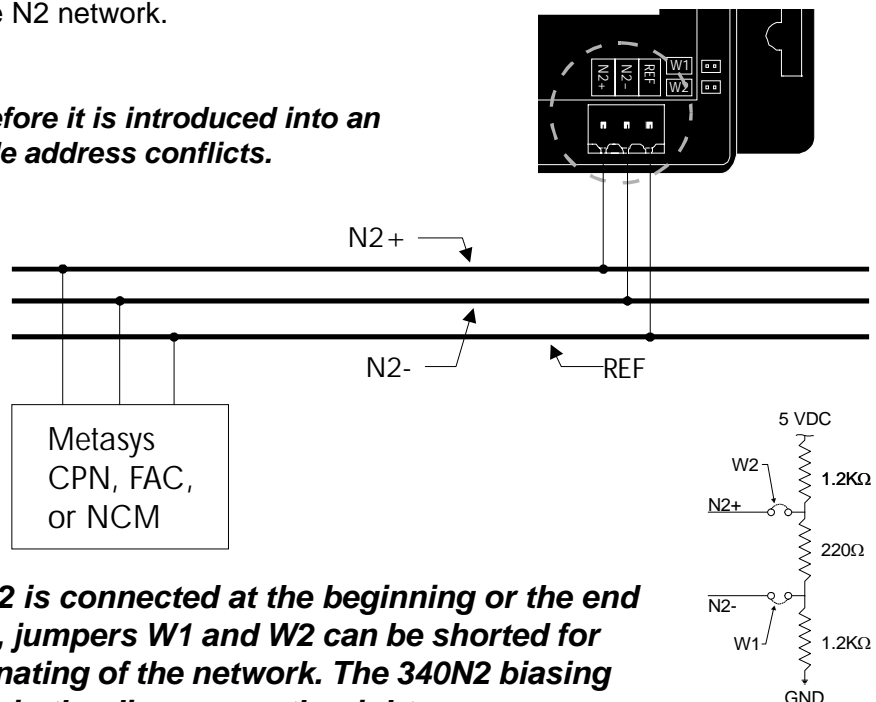
Connecting the N2 Bus

Sample wiring to N2 Network

Observe polarity when connecting the 340N2. Connect the **N2+**, **N2-** and **Ref** to the appropriate connections in the N2 network.

Notes:
The 340N2 Must be commissioned before it is introduced into an existing network to avoid any possible address conflicts.

N2+

N2-

REF

Metasys CPN, FAC, or NCM

5 VDC

W2

1.2KΩ

N2+

220Ω

N2-

W1

1.2KΩ

GND

If the Series 340N2 is connected at the beginning or the end of the N2 network, jumpers W1 and W2 can be shorted for biasing and terminating of the network. The 340N2 biasing circuitry is shown in the diagram on the right.

Commissioning the 340N2

Prior to installing the Series 340N2 into an N2 network it should be commissioned to avoid any address conflicts with other instruments on the network. Commissioning the Series 340N2 is accomplished using the Data Industrial PC software.

1. Load the interface software into the computer.

2. The 340N2 buss connector should be connected to a Data Industrial A-302 programming cable. (If not available a B&B Electronics Model 485SD9TB may be used) The RS232 side should be connected to a PC comm port and the RS485 side to the 340N2.

3. Connect the Series 340N2 transmitter to a power supply.

4. Open the interface software and select the appropriate COMM PORT as shown in the dialog box below.
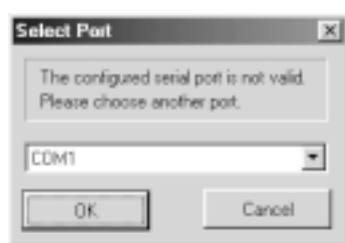
5. Open the Parameters Screen as shown below.

To go to the calibration settings screen select "parameters" from either place shown.
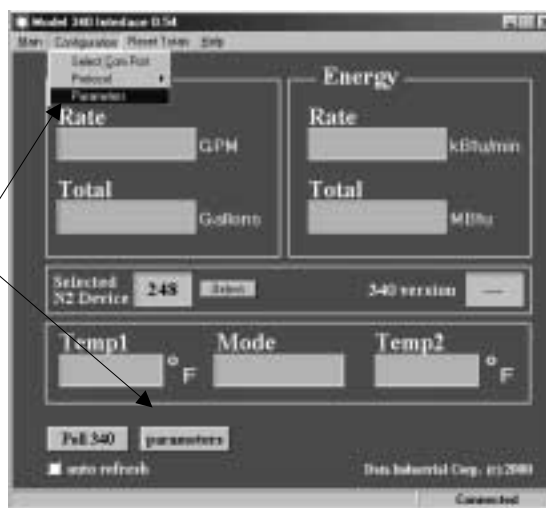
6. Program using diagram below as a reference.

Step 1
Select the flow sensor type
(sine or pulse) and enter the
k and offset - *see note #1*

Step 2
Select the desired temperature
sensor units.

Step 3
Select the method of computing the
temperature differential. *See Note #2*
Typically:
T1>T2 for Heating
T1<T2 for Cooling

Step 4
Select the desired flow
rate and total units here

Step 5
Select the desired energy
rate and total units here

Step 6
Select the output units per
pulse, and the pulse width.

Step 7
Press send to transmit
calibration data to the 340

Step 8
Press to exit parameters screen
and to go back to main screen

Press to refresh the parameters screen with
current 340 settings.

See Note #3

Press to restore the factory default
settings to the screen.

Note: must press "send" before values
take effect.

Note #1:
Data Industrial are pulse type sensors and the flow sensor "K" and "offset" information is printed in the flow sensor owners manual, and also available on our website. Calibration constants for other sensors must be supplied by the manufacturer.

Note #2
Typically the temperature measured by T1 will be greater than T2 in a heating application and less than T2 in a cooling application. The selection of one of these choices will determine if energy calculations are made for heating only (T1>T2), cooling only (T1<T2), or both (absolute).

Note #3
The filter coefficient screen allows adjustment of the flow and energy filters. A scale of 0-10 is used with 10 providing the greatest degree of smoothing. See the Dialog Box below.
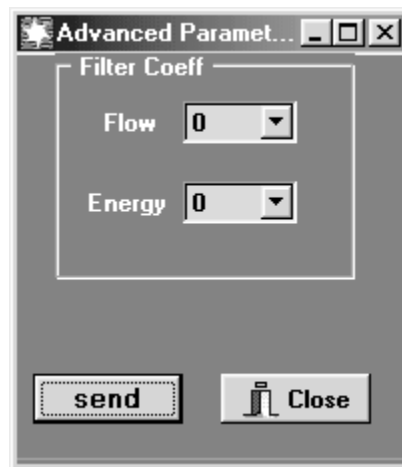
Metasys Network Setup
To incorporate point data into the Metasys Network and the Metasys Companion Network the following
Point Map is provided

340N2 Point Map

NPT[1]	NPA[2]	UNITS	POINT DESCRIPTION	RANGE / VALUE	NOTES
			binary output (2:4)		
BO	01	n/a	Reset Total	1 = reset totals	Note 1
			float data (1:5, 2:5)		
ADF	01	gpm * (flow rate conv coeff)	Flow Rate	0-max float	
ADF	02	gallons * (flow total conv coeff)	Flow Total	0-((2^32)-1)	
ADF	03	kBtu/hr * (energy rate conv coeff)	Energy Rate	0-max float	
ADF	04	Btu * (energy total conv coeff)	Energy Total	0-((2^32)-1)	
ADF	05	°F or °C	Temp1		
ADF	06	°F or °C	Temp2		
ADF	07	n/a	Flow Rate Conversion Coefficient 0-max float		
ADF	08	n/a	Flow Total Conversion Coefficient 0-max float		
ADF	09	n/a	Energy Rate Conversion Coefficient 0-max float		
ADF	0A	n/a	Energy Total Conversion Coefficient 0-max float		
			integer data (1:6, 2:6)		
ADI	01	n/a	Temperature Units	(0-1)	Note 2

Note 1: This point resets flow and energy totals when sent an Override of value 1. It will
recognize this command, but keep a value of 0 always.
Note 2: 0 = Fahrenheit, 1 = Centigrade

[1] Network Point Type
[2] Network Point Address.

CAUTION: Data Industrial Corporation has decided not to implement the Change of State feature in our
Series 340N2 Btu transmitter. By our decision not to use this feature, normal Metasys COS (Alarm Limits
for analog values and normal condition for binary) notification will be defeated. If COS notification is
required, it is necessary for the operator to perform the following:

1) Map the specific object(s) requiring COS to a CS object.
2) Define an AD or BD object with the CS object of the required COS point, as the Associated In.
3) Assign Alarm Limits to the AD.
4) The AD or BD point will only be scanned at a minimum of 30 seconds.
5) The normal state of the BO must be updated (written to) by GPL.

Analog/Binary input points that are mapped in directly that do not support COS will never report a
change of state condition. They will report the current value when read, but no alarm notification will occur.
A read will only occur if a focus window is open or a feature requires the current value.

SPECIFICATIONS

Power
Power supply options:
  12-35 VDC +/- 5%
  12-24 VAC +/- 10%
Current Draw:
  60 mA @ 12 VDC

Flow Sensor Input
All sensors:
  Excitation voltage 3 wire sensors:
    7.9 – 11.4 VDC 270Ω source
  impedance
Pulse type sensors:
  Signal amplitude:
    2.5 VDC threshold
  Signal limits:
    Vin < 35V (DC or AC peak)
  Frequency:
    0-10kHz
  Pull-up:
    2 kΩ
Sine Wave Sensors:
  Signal amplitude:
    10 mV p-p threshold
  Signal limits:
    Vin < 35V (DC or AC peak)
  Frequency:
    0-10kHz

Temperature Sensor Input
2 required:
  10 kΩ thermistor, 2 wire, type II, 10 kΩ @ 25°C

Pulse Output
Opto-isolated solid state switch
Operating Voltage range:
  0 - ±60V (DC or AC peak)
Closed (on) state:
  Load Current - 700mA max. over
operating temperature range
  On-resistance - 700mΩ max. over
operating temperature range
Open (off) state – leakage @ 70°C
  <1µA @ 60V (DC or AC peak)

N2 Output
RS-485 output compliant with
EIA / TIA - 485 standards

Operating Temperature
-29° C to +70° C
-20° F to +158° F

Storage Temperature
-40° C to +85° C
-40° F to +185° F

Weight
4.8 oz. with headers installed

SENSOR CALIBRATION

Data Industrial
Use "K" and "offset" provided in sensor owner's manual

Other Sensors
Check with factory

UNITS OF MEASURE

Flow measurement
Rate:
  gpm, gph, l/sec, l/min, l/hr, ft3/sec, ft3/min, ft3/hr, m3/sec, m3/min, m3/hr
Total:
  gallons, liters, cubic feet, cubic meters

Energy measurement
Rate
  kBtu/min, kBtu/hr, kW, MW, hp, tons
Total
  Btu, kBtu, MBtu, kWh, MWh, kJ, MJ

Temperature Units
Fahrenheit, Centigrade

PROGRAMMING
Requires PC or laptop running Windows® 9x, ME, NT, 2000

Data Industrial A-340N2 programming kit containing software and A302 programming cable

FACTORY DEFAULTS

	Default Values	Customer Values
Serial Number	n/a	
Version	n/a	
Temperature Units	°F	
Sensor Type	Pulse	
K=	1	
offset=	0	
Flow Rate Units	gpm	
Flow Total Units	gallons	
Energy Rate Units	kBtu/hr	
Energy Total Units	Btu	
Energy Calculation	absolute	
Flow Filter	0	
Energy Filter	0	
Scaled Pulse Output Units	energy	
Scaled Pulse Output Units Per Pulse	1	
Scaled Pulse Output Pulse Width	100	

Warranty

Data Industrial Corporation ("Seller") of 11 Industrial Drive, Mattapoisett, Massachusetts 02739-0740, U.S.A., warrants to the original purchaser of its product that such product manufactured by Data Industrial Corporation shall be free from defects in materials or workmanship when installed, serviced and operated according to Data Industrial Corporation instructions or in other such normal use. This warranty is effective for a period of 12 months from the date of installation by the Purchaser or 18 months from the date of shipment by the "Seller" whichever occurs or terminates first. This limited warranty does not cover damage or loss resulting from corrosion or erosion caused by acids or other chemicals or by severe environmental conditions or negligent or improper installation or improper operation, misuse, accident, unauthorized repair or substitution of components other than those provided by the "Seller", and does not cover limited life components such as bearings, shafts, impellers where wear rate is a function of application and environment. Any component not manufactured by the "Seller" but included in its products shall not be covered by this warranty and is sold only under such warranty as the manufacturer may provide.

If Buyer or Purchaser wishes to make a claim hereunder, he shall send written notice of any defect within the warranty period, to "Seller" at the above address. "Seller" may at its sole option instruct Buyer to ship subject part, postage prepaid, to the "Seller" at above address or authorize a representative to inspect the part on site. "Seller" will at its sole option repair or replace any defective product covered by this warranty. If Buyer makes repairs or alterations to any product or part covered by this warranty without "Sellers" prior written approval, this warranty shall be null and void.

The foregoing shall constitute Buyers or Purchasers sole and exclusive remedy against "Seller", and no other remedy, including but not limited to, incidental or consequential damages for personal injury, loss of fluids, gases or other substances or for loss of profits or injury to property or person shall be available to the Buyer or Purchaser. The warranty extended herein shall be in lieu of any other implied warranty of merchantability or fitness for a particular purpose, and seller shall bear no liability for representatives or retail sellers. In no event shall Data Industrial Corporation be liable for any contingent, incidental, or consequential damage or expenses due to partial or complete inoperability of its product.