

PROGRAMMABLE SENSOR CONTROLLER



**ATEX
M1
GROUP I
INTRINSICALLY
SAFE**

**COMPLETE
VERSATILITY OF
UNDERGROUND
SENSOR MANAGEMENT
AND DATA
COMMUNICATIONS**
in arduous,
industrial environments
and hazardous areas.

MINING
•
TUNNELLING
•
**MACHINE
MONITORING**
•
**CENTRALISED
MONITORING AND
ALARM SYSTEMS**



application versatility...

**GAS SENSORS
FLOW SENSORS
PRESSURE SENSORS
VIBRATION MONITORING
TEMPERATURE DEVICES
FREQUENCY INPUTS
DIGITAL SENSORS**

direct fingertip programming...

of input and output functions
with full information display and
data communications for mine wide
sensor collecting networks or
local control and alarm
monitoring

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nitroPDF professional

OPERATING DATA

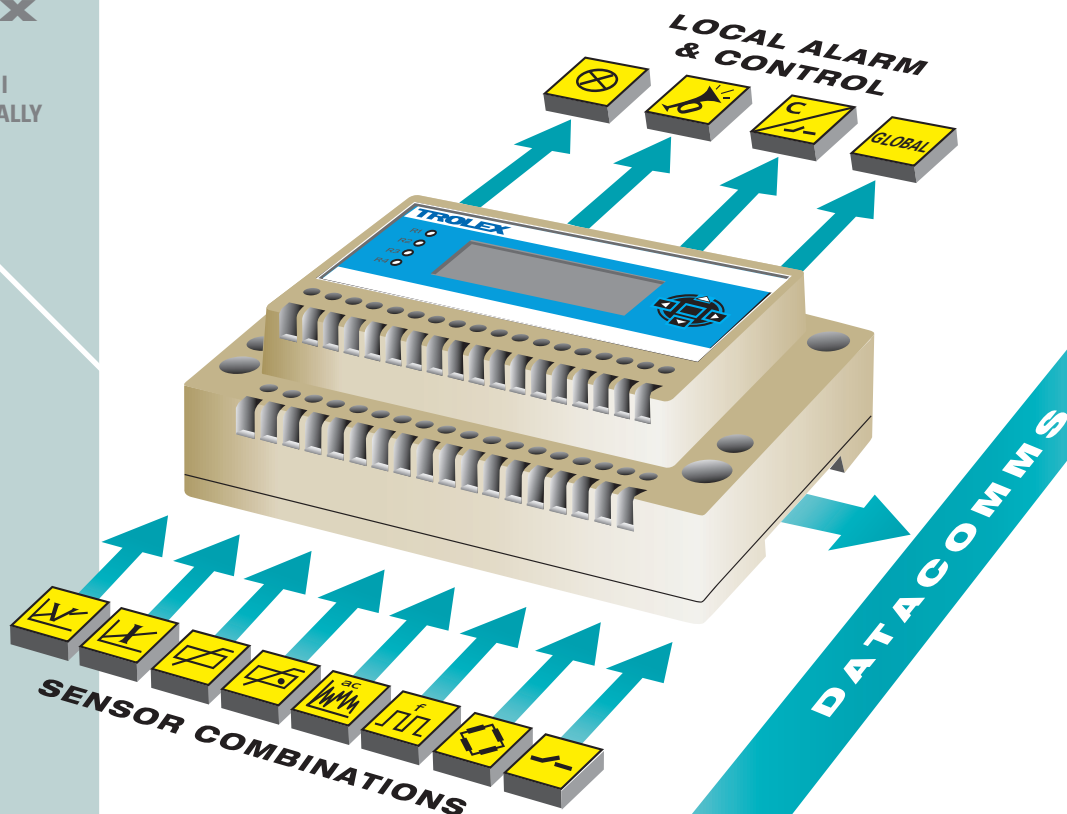
cost effective predictive maintenance...



- Up to 8 analogue sensors or process signals.
- Up to 8 frequency or pulse inputs for counting, timing, speed sensing, etc.
- Up to 16 on/off or digital inputs, thermostats, limit switches, etc.
- Easy to use menu selection for all display information: scale, offset, units and duty.
- Four programmable output relays with adjustable set points, time delays, hysteresis, relay phase, latching and voting.
- Simultaneous display of all input channels.
- Individual input signal *close-up* giving signal display, signal tendency, set point parameters and signal bar graph.
- Data communication output ports for RS485 or modem operation (Modbus, SAP, etc).
- Data logging facility, for up to 26,000 input readings per channel.



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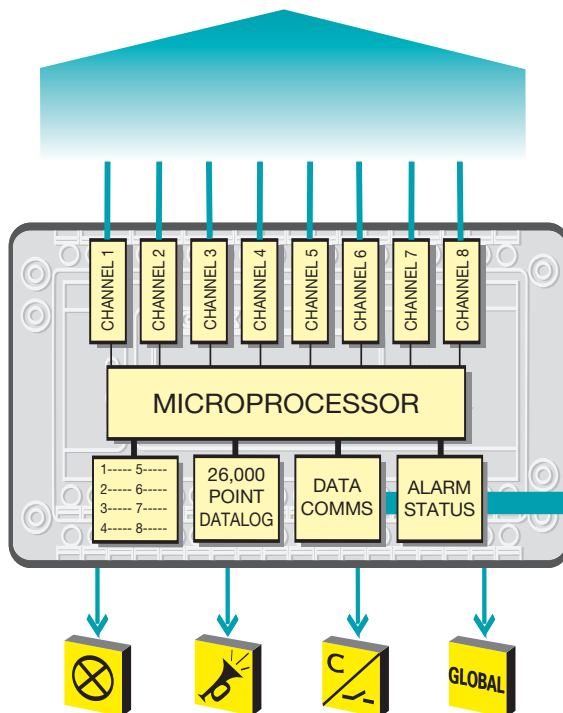
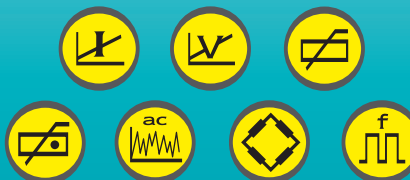


OPERATING DATA

8 input channels for any choice of analogue sensor, process signal or digital input...

Each channel function is determined by an interchangeable input module which can be selected for any desired functional combination.

Once in place, the module communicates directly with the central microprocessor to automatically format the operating characteristics of each channel.



DATA COMMS

THE DATA MEMORY IS PERMANENT AND ALL SETTINGS ARE RETAINED UNDER POWER FAILURE.

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OPERATING DATA

analogue inputs...

Any of the 8 channels can be configured to accept a variety of analogue signal formats and will interface directly with TROLEX sensors and most recognised sensor and process inputs.

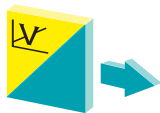
CURRENT SIGNALS



2 wire or 3 wire process signals.

Fully floating differential input allows several units to be connected in series on the same loop with high noise immunity.

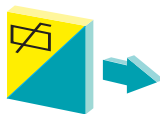
0...20mA • 4...20mA • 0...100mA • 5...1000mA



VOLTAGE SIGNALS

Differential input enables long signal lines with minimal signal loss.

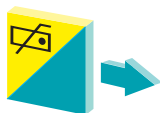
0...2V • 0.4...2V • 0...10V



PT100 INPUT

Input standard for platinum resistance temperature sensors. DIN43760. BS1904.

-50°C...200°C • -50°C...400°C

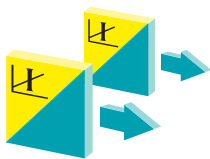


SEMICONDUCTOR INPUT

Fully linearised input standard for semiconductor temperature sensors.

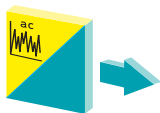
KTY21-6 -50°C...150°C

KTY84 0°C...300°C



TX6023 FLOW SENSOR INPUTS

Flow and pressure monitoring in pipelines on heavy mining machinery.



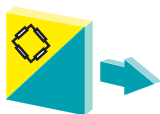
ac INPUT

ac input signals from load cells, ac generators, accelerometers and velocity sensors* or power measurement systems.

ac Peak: 10Hz...10KHz, 10V pk/pk

ac RMS: 10Hz...10KHz, 10V pk/pk

*Trolex TX5630 Vibration Sensors



BRIDGE INPUT

Balanced four arm bridge input.

Bridge measuring circuits.

Pressure sensors and strain gauges.

0.1...100mV/V.





OPERATING DATA

digital inputs...

Any of the 8 channels can be configured to accept pulsing or frequency inputs from NAMUR proximity sensors or switches and each can be individually programmed by the user for seven different pulse processing functions. Input pulses can be prescaled by a selectable factor and the input threshold pulse acceptance level can be programmed to suit a particular application.

INPUT SIGNALS

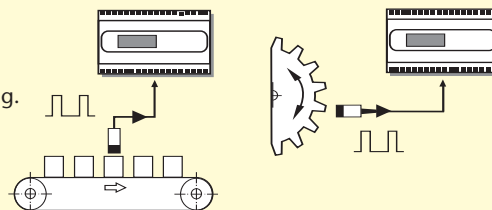
-  VOLTAGE FREE CONTACTS OR PHOTOSENSORS
-  NAMUR SENSORS DIN 19234
- FREQUENCY RANGE: 0...10KHz

PULSE COUNT

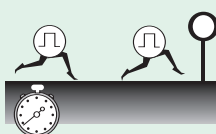


INPUT PULSE COUNTING; SINGLE OR CONTINUOUS CYCLING, SEQUENCE COUNTING, UP COUNTING, DOWN COUNTING, BI-DIRECTIONAL COUNTING.

- Batch Counting.
- Totalising.
- Rotational Direction Sensing.
- Rotation Counting.
- Machine Positioning
- Length Measurement.

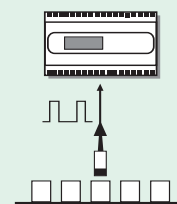


PULSE INTERVAL



COMPARES THE INTERVAL BETWEEN TWO CONSECUTIVE PULSES WITH A PROGRAMMED TIME PERIOD:

- Low Speed Pulse Monitoring.
- Chain Conveyor Monitoring.
- Interval Timer when used with a pushbutton or switch.
- Time Elapsed Indicator.



PULSE FREQUENCY

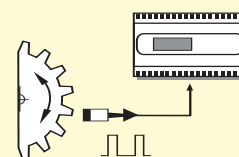


THE RATE OF PULSES OR FREQUENCY IS MEASURED AND COMPARED AS AN **ABSOLUTE** VALUE:

SLIP FREQUENCY

THE RATE OF PULSES OR FREQUENCY IS MEASURED AND COMPARED AS A **PERCENTAGE SLIP** VALUE:

- Under/Over Speed Monitoring.
- Frequency Measurement.
- Conveyor Monitoring.
- Flow Rate Monitoring



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digital inputs...



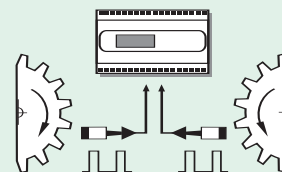
DIFFERENTIAL FREQUENCY

TWO SEPARATE PULSE SOURCES ARE COMPARED AS *ABSOLUTE* VALUES:

DIFFERENTIAL SLIP FREQUENCY

TWO SEPARATE PULSE SOURCES ARE COMPARED AS A *PERCENTAGE SLIP* VALUE:

- Comparative Speed Sensing.
- Differential Feed Rate Control.
- Slip Speed Monitoring.
- Differential Frequency Monitoring.

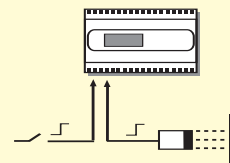


DIGITAL INPUTS

SIMPLE ON/OFF INPUTS (DUAL INPUT ON EACH CHANNEL):

- Switches.
- Thermostats.
- Namur Proximity Sensors.
- Limit Switches.
- Photocells.

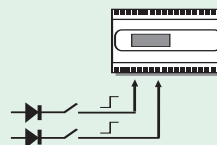
Functions as two independent alarm control inputs or as two independent programmable timers.



DIGITAL LEVEL INPUT WITH FAILSAFE

SIMPLE ON/OFF INPUTS WITH OPEN CIRCUIT/SHORT CIRCUIT SENSOR CONNECTION PROTECTION DUAL INPUT ON EACH CHANNEL:

- Switches.
- Thermostats.
- Limit Switches.
- Pressure Switches.



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just four keys for programming the sensor controller...

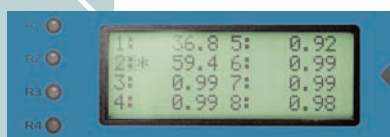


no special software
no computer knowledge
no data entry terminals

The TX9042 is packed with an amazingly versatile selection of operating functions – all fully programmable.

- Two set points per channel.
- Latching, auto reset, pulse or bi-stable relay operation.
- Hysteresis or relay deadband selection.
- Relay phase selection- rising alarm or falling alarm.
- Power on Delay to override machine 'run up' periods.
- Output relay Time Delay adjustment.
- Selectable input signal sampling rate or update time.
- Input signal pre-scaling.
- Signal span and offset adjustment.
- Engineering units menu for true value indication.
- Rising or falling signal tendency indication.
- Bar graph signal display.
- Last signal 'Peak' or 'Low' value data storage.
- Display space to enter specific input channel text.

information display...



All eight input signals are displayed simultaneously on the LCD panel showing the channel number and the signal level in each case.

All channels are scanned continuously and the update period of each channel can be varied independently.

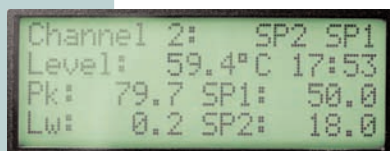
Any individual channel can be selected to show 'close-up' data about its input signal.



Channel CLOSE-UP LEVEL 1 will show the channel number, the signal value with true engineering units, and the status of the two channel setpoints.

Analogue signals will have a bar graph display to enable magnitude comparison and will show the periodic rising or falling tendency of the signal.

Unique text about the channel can also be entered in the display relating to duty or information about the sensor.

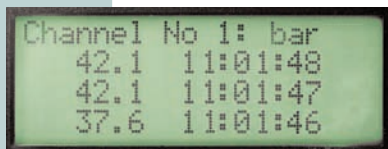


Channel CLOSE-UP LEVEL 2 will display stored information about the previous PEAK and MINIMUM signal values together with the setpoint levels and a time clock/calender display.

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data logging...

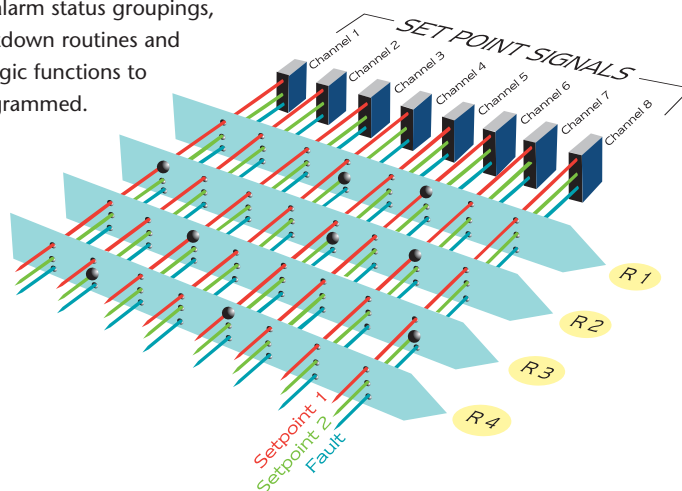


Channel No 1: bar	
42.1	11:01:48
42.1	11:01:47
37.6	11:01:46

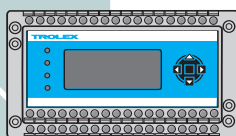
RS485 data communication can be provided and data logging is also included for recording historical information for up to 26,000 readings on each channel. The data shows the channel reference, with its value at the date and time recorded. The logging interval is user selectable. Rapid logging is possible to closely capture critical shutdown routines or a catastrophic plant failure. The information can be periodically reviewed or transferred on demand over the data communication link.

control functions...

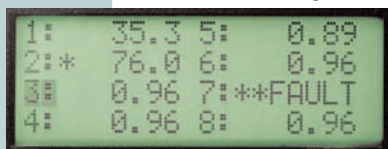
Each channel has two independent set point signals with an additional common output for 'system fault' indication. There are four independent set point output relays with LED status indicators and any of the channels or the fault signal can be assigned or networked to any of the output relays. This enables alarm status groupings, selective shutdown routines and elementary logic functions to be easily programmed.



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input signal fault alarm...

1:	35.3	5:	0.89
2:*	76.0	6:	0.96
3:	0.96	7:**FAULT	
4:	0.96	8:	0.96

An input signal failure or cable fault will drive the display OVERSCALE or UNDERSCALE dependent upon the nature of the fault. This will result in FAULT SIGNAL OUTPUT and a SIGNAL ERROR display on the appropriate channel. The operating integrity is also under constant surveillance by a self checking WATCHDOG system which gives a fault signal if a failure should occur.

information security...



All essential information can be protected by a user security code. This prevents the data from being corrupted by an unauthorised user but still permits access to day to day functions.

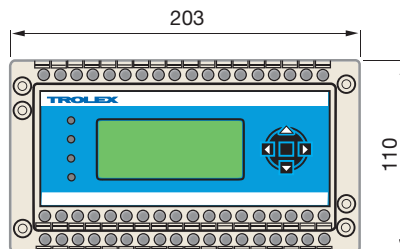
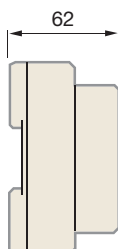
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technical details...

Display Accuracy:	±0.25% (Analogue Channels).
Set Point Accuracy:	±0.5%.
Ambient Temperature Limits:	-10°C...50°C.
Electrical Connections:	4mm barrier/clamp terminals.
Housing Material:	ABS.
Nett Weight:	800gms.
Environmental Protection:	Must be housed in a protective metal enclosure to comply with I.S. requirements.
Information Display:	LCD. 20 characters x 4 lines ; 6mm high characters.
Mounting:	DIN Rail.
Microprocessor:	Microprocessor controlled menu operation, with non-volatile data retention. 10 bit A-D conversion (Analogue channels).
Set Points:	2 per channel plus FAULT signal.
Output Relays:	4 encapsulated reed relays with function programming.
Contact Rating:	230V 0.25A 3W maximum.
Set Point Adjustment:	0...99%.
Hysteresis Adjustment:	0...99%.
Power on Delay Adjustment:	0...255 seconds for each channel.
Output Delay Adjustment:	0...18hrs for each setpoint.
Input Update Period Adjustment:	0...60 seconds for each channel.
Engineering Units Menu:	V, mV, mA, °C, °F, °K, g, kg, mbar, bar, Pa, kPa, PSI, %, ppm, %RH, mm, m, mm/s, m³/s, rpm, pps, Hz, kHz, secs, m:s, h:m, m/s, m³/H, m³/m, A, l/m, g/m, l/s, g/s, l/h, g/h.
Fault Signal:	Open or Short Circuit signal line or microprocessor WATCHDOG alarm will generate a FAULT signal. The fault will be identified on the display.
Data Communications:	TTL Digital or RS485.
Data Logging:	Up to 26,000 readings with 'on demand' down loading.
Supply Voltage:	12V dc +20% -2.5% @ 125mA.

Dimensions:



ALL DIMENSIONS IN MM

NB. THE UNIT MUST BE HOUSED IN A PROTECTIVE METAL ENCLOSURE TO COMPLY WITH I.S REQUIREMENTS.

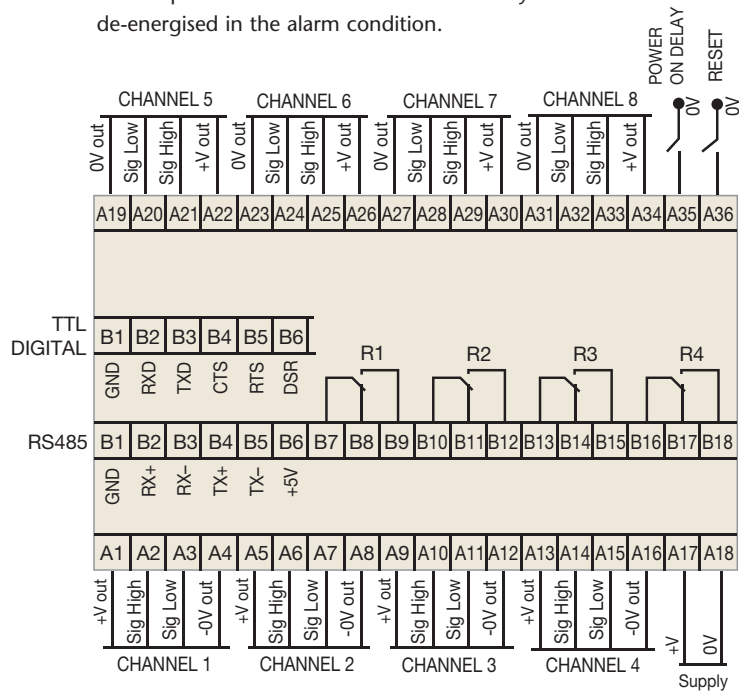


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connections...

The output contacts are shown with the relays de-energised in the alarm condition.

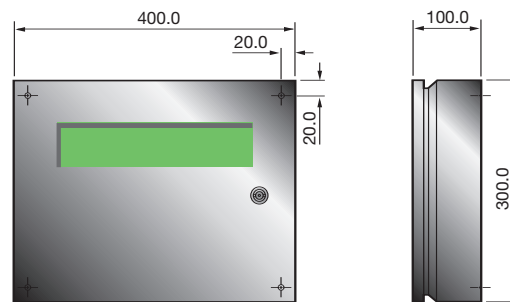


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housings for programmable sensor controllers...

Environmentally protected housings for the DIN rail mounting version of the TX9042 Programmable Sensor Controller.

- Robust stainless steel enclosure.
- Stainless steel front cover with polycarbonate viewing window.
- Environmentally protected to IP66.
- Ample M20 cable entries.
- Mounting rail for TX9042 modules.



ALL DIMENSIONS IN MM

Entry holes Ø22.0
for M20 cable glands

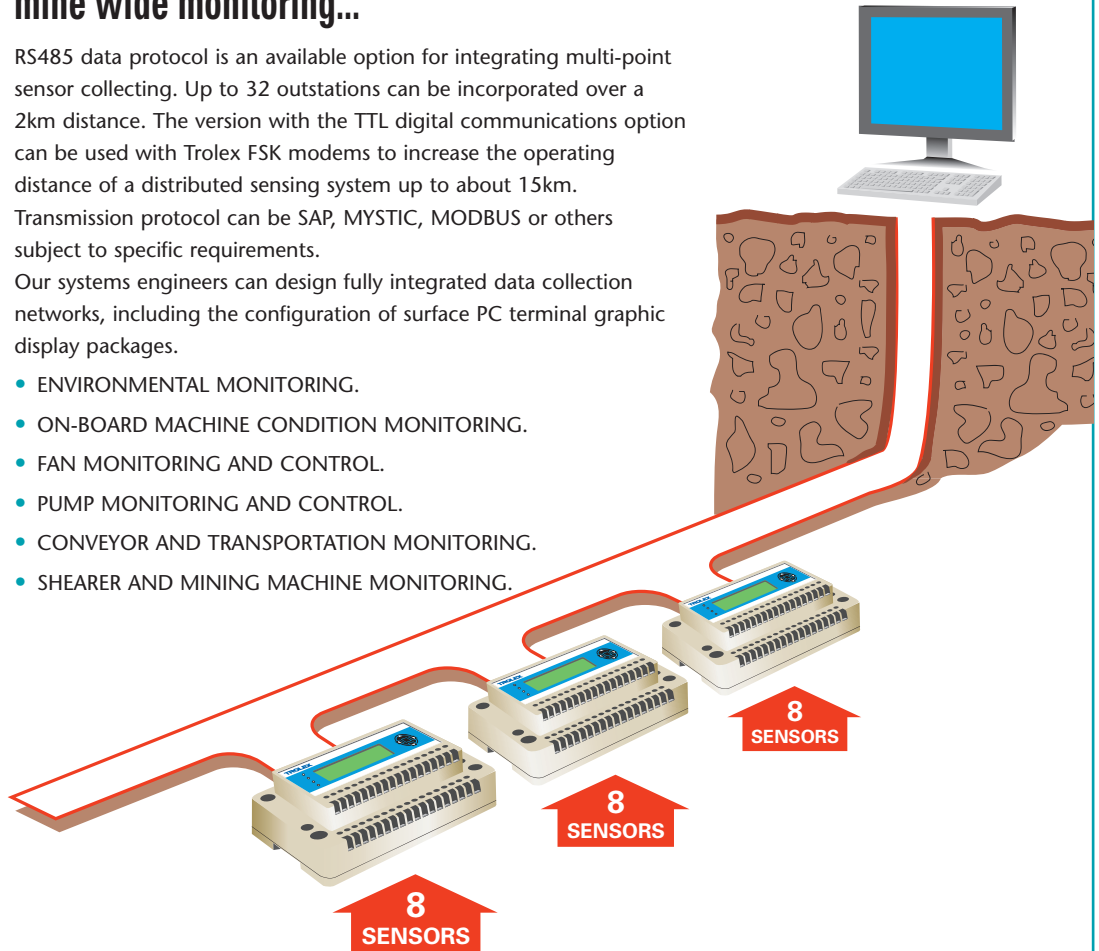
HOUSING	X	Entry Holes
TX9024	400mm	10

OPERATING DATA

mine wide monitoring...

RS485 data protocol is an available option for integrating multi-point sensor collecting. Up to 32 outstations can be incorporated over a 2km distance. The version with the TTL digital communications option can be used with Trolex FSK modems to increase the operating distance of a distributed sensing system up to about 15km. Transmission protocol can be SAP, MYSTIC, MODBUS or others subject to specific requirements. Our systems engineers can design fully integrated data collection networks, including the configuration of surface PC terminal graphic display packages.

- ENVIRONMENTAL MONITORING.
- ON-BOARD MACHINE CONDITION MONITORING.
- FAN MONITORING AND CONTROL.
- PUMP MONITORING AND CONTROL.
- CONVEYOR AND TRANSPORTATION MONITORING.
- SHEARER AND MINING MACHINE MONITORING.



complete sensing systems from Trolex to ensure total system compatibility...

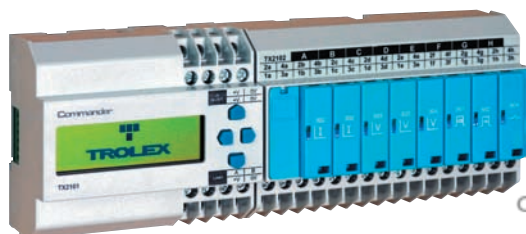


TRIP AMPLIFIER

for use with analogue output sensors.

CONFIGURABLE SENSOR CONTROLLER

for monitoring up to 8 output sensors.



COMMANDER DISTRIBUTED I/O SYSTEM

for large scale general plant monitoring systems.

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TX9042 PSC specification sheet...



Power Supply Module	+12V	P5423.531 (ATEX)	
Power Supply Module	+12V	P5423.56 (NON-ATEX)	

IT IS NOT PERMITTED TO MIX ATEX AND NON-ATEX MODULES AND SUB ASSEMBLIES

MODULE DESCRIPTION		Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	Module Part Number (ATEX)		Module Part Number (NON-ATEX)	
Current	0...20mA									P5423.516		P5423.101	
	4...20mA									P5423.508		P5423.62	
Voltage	0...2V									P5423.514		P5423.99	
	0.4...2V									P5423.509		P5423.64	
	0...10V									P5423.515		P5423.100	
Flow	Flow (not Io limited *3)									P5423.552			
	Flow (Io limited)									P5423.553			
	4...20mA (Io limited)									P5423.556			
Thermocouple	K Type									P5423.539		P5423.80	
	I/R -50...400°C									P5423.527		P5423.186	
PT100	-50...200°C									P5423.510		P5423.72	
	-50...400°C									P5423.513		P5423.94	
KTY21	-50...150°C									P5423.519		P5423.253	
KTY81	-50...150°C									P5423.511		P5423.74	
KTY84	0...300°C									P5423.512		P5423.76	
TX6023 Flow	Flow									P5423.528		P5423.180	
	Pressure									P5423.518		P5423.190	
ac RMS	500Hz...10Hz (TX5630)									P5423.506.01		P5423.67.01	
	15Hz...100Hz (TX5630)									P5423.506.02		P5423.67.02	
	500Hz...10kHz (Mavis)									P5423.506.03		P5423.67.03	
	15Hz...100Hz (Mavis)									P5423.506.04		P5423.67.04	
Digital	12/24V									P5423.523		P5423.66	
	Fail Safe									P5423.522		P5423.133	
	Vortex									P5423.524		P5423.164	
Strain Gauge	Strain Gauge 2mV/V									P5423.520.01		P5423.129.01	
	Strain Gauge 3mV/V									P5423.520.02		P5423.129.02	
	Strain Gauge 10mV/V									P5423.520.03		P5423.129.03	
	Strain Gauge 50mV/V									P5423.520.04		P5423.129.04	
	Strain Gauge 100mV/V									P5423.520.05		P5423.129.05	
	Bridge PSU (1*)											P5423.163	

Communication Options		(ATEX)	(NON-ATEX)
RS485	.55	P5423.535	P5423.256
TTL Digital (*2)	.54	P5423.534	P5423.86

*1 - This module requires two adjacent channels – acceptable combinations 1+2, 2+3, 3+4, 5+6, 6+7 & 7+8. **NOT 4+5.**

*2 - For use with TX9049 Modem (FSK). Specify data transmission protocol: SAP, Modbus, Mystic, etc.

*3 - May be used in conjunction with P5546.18 Interface Unit.

Customer:

Order No:

Signed:

Dated:

P5423.532 Iss 0

OPERATING DATA

certification & approval...



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Designed to comply with the EC directive on EMC.
EMC directive 89/336/EEC.



03 ATEX 0292X

accessories...

TX6640

Exd/Exi POWER SUPPLY

Capable of powering up to 4 - TX9042 Sensor Controllers
(not including sensors).

Please specify input options:

- 24V ac supply
- 110V ac supply
- 230V ac supply

Please specify output options:

- 7.5V dc supply
- 12V dc supply (IS)



TX9204

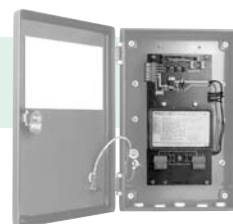
HOUSING

Accommodates 1 - TX9042 Sensor Controller



TX9049

MODEM (FSK)



TROLEX LIMITED

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CHESHIRE SK7 5DY, UK

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W: trolex.com

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