Data Track

Acquisition • Measurement • Control

The Tracker 220 Series

A Complete Range of
Universal Input Digital Panel Indicators
for Temperature and Process Measurement

TRACKER 220 SERIES INDICATORS

- ❑ Universal Input
- ❑ **Analogue Output**
- ❑ Digital Status Inputs
- ❑ **Transmitter & Transducer Supplies**
- ❑ Four Alarm Set points
- ❑ **Wide Ranging Power Input**

- ❑ **IP65 Front Panel**
- ❑ Standard 1/8 DIN Size
- ❑ **Red or Green LED Display**
- ❑ Programmable Function Buttons
- ❑ **Maths Functions**
- ❑ Serial Communications

Universal Input
Any one of over 20 different input types can be directly connected. Thermocouple, RTD, 20mA, mV and 10 volt signals are accepted as standard.

Tough but Attractive
Designed to enhance the looks of any instrument panel, the enclosure uses flame retardant (VO) materials and the front panel conforms to IP65 (NEMA 4). The plug in sleeve-type construction facilitates simple exchange for routine servicing/calibration.

Clear Display
The flat, slightly recessed display, together with high brightness red or green LEDs ensure maximum visibility even in difficult ambient lighting conditions.

Universal Power Input
Wide-ranging 90 to 265v ac input allows world-wide installation. Low voltage ac/dc input option available.

Connectivity
Digital Status inputs, serial communications, analogue output, transmitter supply, alarm relays, transducer supply, are all available. The instrument can be removed for routine servicing without disturbing these connections.

Front Panel Control
Full set-up is available using the front panel buttons to step through a simple password protected menu. Some functions can be made directly available to an operator. Alternatively units can be supplied without buttons.

User Definable Buttons
Two of the front panel buttons can be user programmed to provide one or more special functions such as tare and auto zero.

CONFIGURATION
SOFTWARE

SCADA
SOFTWARE

The Tracker 220 series of universal input indicators comprises a range of four models which offer unparalleled price and performance. The use of surface mount components and modern microprocessor technology has enabled powerful features to be packed into a standard 1/8 DIN case. The measurement performance is significantly better than that normally associated with indicators in this price range.

The four models can be used for simple measurement-only applications or in more demanding situations requiring digital communications, alarms, maths functions and complex signal conditioning. The powerful menu-driven software enables fast flexible set-up from the front panel or via the serial communications interface. No adjustments of internal potentiometers, internal links or plug-in cards are necessary.

CE

All Tracker 220 series indicators have been tested and comply with the European Electromagnetic Compatibility directives and safety requirements. The instruments are designed to be used in the most demanding applications and each carries the CE marking. The enclosure is manufactured in re-cyclable and flame-retardant (VO) materials and the front panel conforms to IP65.
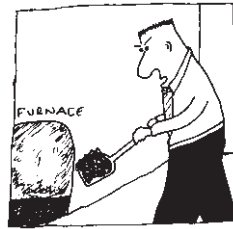
Temperature

The Tracker 220 series can be used in a wide variety of temperature measurement applications with results displayed in °C, °F or Kelvin (Absolute). In applications where non-linearising temperature transmitters are used the Tracker 220 series can linearise the 4-20 mA signal received to the thermocouple curve. Where accuracy is vital to an application, a 220 series indicator can be calibration-matched to the output of the actual sensor to be used, thus removing most system measurement errors.
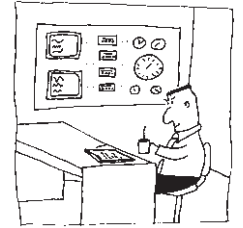
Signal Re-Transmission

The user programmable isolated analogue output allows the 220 series to be used in applications where a local display as well as data recording is required. This output can be configured to transmit the measured, averaged, maximum or minimum value and has its own damping filter for noisy or fast moving signals. The input can be locally conditioned and retransmitted over a relatively long distance. Being electrically isolated, problems associated with earth loops, which are often encountered in measurement systems, are eliminated.

Pressure and Weighing

A variety of pressure transducers, pressure transmitters or strain gauge bridges can be connected to the Tracker 220 series. The indicator and sensor can be matched using the user calibration feature, greatly reducing errors due to sensor output and excitation supply voltage variations. A front panel button or digital status input can be configured to provide an auto zero feature allowing zero offset errors to be eliminated. For weighing applications, a tare function can be similarly configured.

Communications

The Tracker 220 series serial protocol is compatible with most SCADA software packages. Up to 32 indicators can be connected to a single master device in a multidrop two or four wire configuration. Tracker PC based software can be supplied which enables multiple configurations to be modified and stored. The display and analogue output can be controlled via the serial interface, allowing an indicator to be used as a remote display or control device.
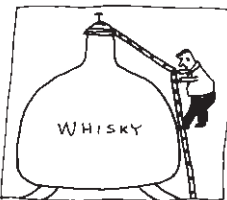
Process Inputs

The Tracker 220 series indicators have a number of features which make them particularly suitable for the measurement of process signals. Maths functions allow calculations for orifice plate, "V" notch weir flow and rectangular (Cippaletti) weir flow. A filter is available for noisy or fast- moving signals. A 24 point user linearisation facility is provided for applications such as tank contents measurements. All of the Tracker 220 input types can be scaled to any engineering units within the display range or, if necessary, mapped to one of the thermosensor or user linearisation curves. SG Correction is also available.

Alarm and Control

The comprehensive alarm functions built into the Tracker 220 series make them particularly suitable for monitoring, switching and control applications.

The hysteresis facility stops noisy signals switching alarms. High and low deviation allow control around a setpoint. On and off delay times can be set, with individual alarms configured as latching or non-latching, depending upon user requirements. Alarms can be displayed or acknowledged on the Tracker 220 front panel.

TRACKER 220 FEATURES
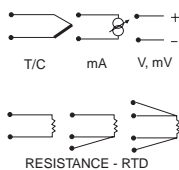
Universal Input

All of the Tracker 220 series can be directly connected to most process sensors including thermocouples, RTDs, 20mA loops, transmitters, or dc type signals. All thermosensor ranges have built-in linearisation curves and internal or external CJC is available. The display can show °C, °F or Kelvin (Absolute), with the decimal point position being user-adjustable to give the required measurement resolution or switched to automatic (auto ranging mode). The sensor break detection can be selected to produce upscale or downscale readings. Process inputs can be scaled to any engineering unit and any input can be mapped to one of the thermosensor linearisation curves.
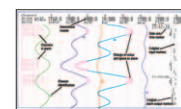
Analogue Output

Models 223 and 224 are fitted with an electrically isolated analogue output which has 0.05% resolution. This can be configured by the user as 0-10 volt, 0-20 mA or 4-20 mA and can be scaled over any portion of the display range. For example, a type K thermocouple can be retransmitted as a linear 4-20 mA signal equivalent to 0-1000°C to another device such as a chart recorder or data logger. The output is linear to temperature (display value).

The analogue output can be set to transmit the measured, the maximum, the minimum or the averaged value and has its own damping filter for noisy or fast moving signals.
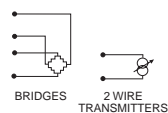
Sensor Excitation

All Tracker 220 models are fitted with a fixed 24 volt DC output which is electrically isolated. This can be used to power a single 20 mA loop for two wire transmitters.

In addition the Tracker models 221 and 222 have a 10v regulated supply and the Tracker models 223 and 224 are fitted with a programmable 0-12 volt dc regulated output. Both of these outputs are electrically isolated to 500v. The programmable supply is configured via the internal software and is primarily designed to power strain gauge-type sensors including load cells.

Serial Communications

Both models 223 and 224 are fitted with an electrically-isolated RS 422/485 serial interface. Models 221 and 222 can optionally be fitted with two wire communications. All measured values and set-up parameters are accessible, however, the instruments can be set to be read only, thus protecting their configuration.

Two protocols are available, namely the MODBUS and the proprietary DTPI, which has been designed to be easier to implement. The display, analogue output and transducer supply can all be set or configured via the serial interface.
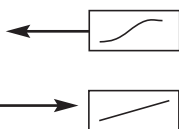
User Linearisation

Some applications require a special linearisation curve to be defined by the user. A typical example is tank contents measurement where the pressure of a liquid can be measured but this does not have a linear relationship to the actual volume. User linearisation allows up to 24 calibration points to be defined. Each point can be entered manually or, for greater accuracy, directly from the sensor output, thus removing most system measurement errors. The 24 readings can be entered in any order. The Tracker 220 will use the stored values to define the required linearisation curve.
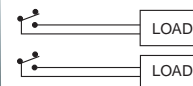
Alarms

Each of the Tracker 220 series has four software alarms. These can be configured by the user for alarm type, setpoint, on/off delay and on/off hysteresis value. Alarms can be individually set to be latching or non-latching and to flash a message on the front panel display when active. Any of the four software alarms can operate a relay (models 222 and 224 only). In addition a special AND function allows a relay to switch only if two or more alarm conditions are active. Relays can be configured to be energised or de-energised in the alarm condition.

TRACKER 220 SOFTWARE

All configuration parameters can be password protected and are preserved in the event of a power failure. The following software functions are available to the user:

Input Type	Maths Functions	<u>Models 223 and 224 only</u>
Linearisation Type	Alarm Set-up x 4	Status Input Set-up x 2
Internal or External CJC	Averaging Time Period	Transducer Supply Set-up
Sensor Break Detection	User Linearisation	Analogue Output Set-up
Display Resolution	Password Set-up	Analogue Output Scaling
Display Filter Time Constant	Function Button Set-up x 2	Analogue Output Damping
Scaling and Calibration	Relay Set-up (222/224 only)	Serial Comms Set-up

Advanced Maths

All models have the following maths functions available to the user:

Maximum and Minimum (Peak/Valley) Memory
Signal Averaging
Square Root
5/2 Root
3/2 Root
Tare (Weighing Applications)
Auto Zero
S.G. Correction (Specific Gravity)
The Auto Zero function is particularly useful for correcting sensor zero offset errors in a system.

Software Alarms

There are four software alarms as standard on the Tracker 220 series indicators. A separate alarm menu is provided for each alarm allowing for independent operation.

The software allows the user to configure the following parameters for each alarm:

Type (High, Low or Deviation)
Setpoint Value
Deviation High and Low
On and Off Delay Time
On and Off Hysteresis Value
Output (None, Relay 1 or 2 or both)
Latching or Non-Latching
Alarm Display Message On or Off
Front Panel Setpoint Edit On/Off (Alarms 1 and 2)
Link Setpoint On or Off (Alarms 3 and 4)

The set-up link function allows multiple alarms to track one adjustable setpoint value.

All setpoint values can be password protected or Setpoints 1 and 2 can be edited by an operator. The display can be set to flash a message when an alarm is active.

Alarm Relay Control

Models 222 and 224 are each fitted with two alarm relays which can be activated by any of the four software alarms. In addition the AND function allows a relay to be set only when two or more software alarms are active. Relays can be configured to be energised or de-energised (fail safe) in the alarm condition.

Digital Status Inputs

Tracker models 223 and 224 are fitted with two digital inputs which can be activated by external volt-free contacts. These can be programmed individually by the user to perform one or more of the following functions:

Tare
Auto Zero
Display Hold
Display Maximum
Display Minimum
Display Average
Reset Maximum, Minimum and Average
Alarm Disable
Alarm Acknowledge
Analogue Output Hold
Keyboard Lock
Display Test

Function Buttons

The two buttons marked 🔲 and ✳ on the front panel of all models can be user-programmed to give operator level access to one or more of the following functions:

Tare
Auto Zero
Display Hold
Display Maximum
Display Minimum
Display Average
Reset Maximum, Minimum and Average
Display Test

Display

The software allows the user to configure the display. The decimal point position can be set to the required measurement resolution or switched to automatic (auto-ranging) mode. A filter is available to damp fast-moving signals and leading zeros can be suppressed if required.

Password Protection

The instrument's configuration can be protected by the use of a user-definable password. In addition, editing of the alarm setpoints, alarm acknowledging and the resetting of the maximum, minimum or average value memory can be individually protected from an operator.

Display

Type:	14.2mm high brightness LED (red or green)
Range:	–19999 to 99999 (T223, T224)
	–1999 to 9999 (T221, T222)
Update Rate:	2 per second

A/D Converter

Dual slope integrating with auto zero
Conversion rate: 10 per second
Resolution: 16 bit + sign (1µV)
Common mode Rejection: >150dB
Series mode Rejection: >70dB (50 or 60Hz)

Voltage Inputs

Ranges: ± 100mV, ± 10V
Accuracy: 0.05% of reading ± 20µV (typically 0.02%)
Resolution: 1µV (100mV range), 100µV (10V range)
Input Impedance (Ohms): >100M (mV i/p) >1M (V i/p)

Current Input

Range: ± 20mA
Accuracy: 0.05% of reading ± 4µA (Typically 0.02%)
Resolution: 2.0µA
Input Impedance: 5 Ohms typical
Maximum Burden: 100mV

Reference Junction Compensation (CJC)

Accuracy: better than ± 0.5°C after 30 minutes

Resistance/RTD Inputs

Configuration: 2, 3 or 4 wire programmable.
Excitation Current: 0.25mA typical
Range: 0–400 Ohms (0-4K Ohms using 10V input)
Accuracy: 0.4 Ohms (typically 0.2 Ohms)
Resolution: 0.01 Ohms

Thermosensor Break Detection

Programmable: Up or down scale

Transmitter/Transducer Supplies

All supplies isolated: 500 Vdc/peak ac

24V Transmitter supply – All models
Nominally 24V @ 32mA maximum

10V Regulated Transducer Supply – T221, T222
10 volts ± 0.1V @ 30mA maximum

0–12V Regulated Transducer Supply – T223, T224
Resolution: 0.01V
Accuracy: ± 0.05V (Typically 0.02V)
Temperature Drift: <100ppm/°C
Output Ripple: <5mV
Output Current: 35mA maximum

Analogue Output – T223, T224

Isolation: 500 Vdc/peak ac
Ranges: User selectable 0–10V, 0–20mA or 4–20mA
Accuracy: 0.2% of Span (typically 0.1%)
Temperature drift: <100ppm/°C
Output Ripple: <10mV
Response: 63% within 32ms, 99% within 100ms
Resolution: 0.05% of Span (5mV or 0.01mA)
Maximum Voltage Output: 11V @ 22mA
Maximum Current Output: 22mA @ 18V
Load: 0-900 Ohms (mA)
Programmable damping filter

Alarm Relay Outputs – T222, T224

Relays: 2 x Change over contacts – 1 Amp @ 250VAC
– 5 Amp @ 30VDC

Safety and EMC Certifications

Safety: EN61010, IEC1010. Susceptibility: EN50082–2, EN50082–1.
Emissions: EN50081–1. **CE Certified 1995, 1999**

Specifications subject to change without notice. All trademarks acknowledged.

TRACKER 220 SELECTION CHART

THERMOCOUPLES

			221	222	223	224	Accuracy including linearisation Worst case	Typical @ 25°C
Type J	Fe/NiCu	–210 to 1200°C	√	√	√	√	± 0.5°C	± 0.2°C
Type K	NiCh/NiAl	–270 to 1372°C	√	√	√	√	± 0.5°C	± 0.2°C
Type T	Cu/CuNi	–270 to 400°C	√	√	√	√	± 0.5°C	± 0.2°C
Type B	Pt30%/6%Rh	0 to 1820°C	√	√	√	√	± 1.5°C	± 0.8°C
Type E	NiCh/CuNi	–270 to 1000°C	√	√	√	√	± 0.5°C	± 0.3°C
Type N	Nicrosil-Nisil	–200 to 1300°C	√	√	√	√	± 0.5°C	± 0.3°C
Type R	Pt13%Rh Pt	–50 to 1767°C	√	√	√	√	± 1.0°C	± 0.6°C
Type S	Pt10% –Rh Pt	–50 to 1767°C	√	√	√	√	± 1.0°C	± 0.6°C
Type U	Cu/CuNi	–200 to 400°C	√	√	√	√	± 0.7°C	± 0.4°C
Type L	Fe/Con	–200 to 900°C	√	√	√	√	± 0.7°C	± 0.4°C
Type G	W/W26%Rh	0 to 2320°C	√	√	√	√	± 1.0°C	± 0.4°C
Type D	W3%/26%Rh	0 to 2320°C	√	√	√	√	± 1.0°C	± 0.4°C
Type C	W5%/26%Rh	0 to 2320°C	√	√	√	√	± 1.0°C	± 0.4°C
Ni/Ni 18% Moly		0 to 1370°C	√	√	√	√	± 1.0°C	± 0.4°C
Platinel II		0 to 1370°C	√	√	√	√	± 1.0°C	± 0.4°C
Palaplat		0 to 240°C	√	√	√	√	± 1.0°C	± 0.4°C

RESISTANCE THERMOMETERS

		221	222	223	224	Worst case	Typical @ 25°C
Pt100 (alpha=385)	–200 to 850°C	√	√	√	√	± 0.5°C	± 0.2°C
Pt100 (alpha=392)	–100 to 457°C	√	√	√	√	± 0.5°C	± 0.2°C
Pt130	–200 to 500°C	√	√	√	√	± 0.5°C	± 0.2°C
Ni 100	–60 to 250°C	√	√	√	√	± 0.5°C	± 0.2°C

DC INPUT TYPES

	221	222	223	224	Worst case	Typical @ 25°C
± 20mA	√	√	√	√	± 0.05%	± 0.02%
± 100mV	√	√	√	√	± 0.05%	± 0.02%
± 10V	√	√	√	√	± 0.05%	± 0.02%
RESISTANCE 0–400 Ohms	√	√	√	√	± 0.4Ω	± 0.2Ω
0–4000 Ohms using 10V Input	√	√	√	√	± 0.5%	± 0.3%

	221	222	223	224
DISPLAY DIGITS	4	4	5	5
°C, °F or KELVIN	√	√	√	√
USER LINEARISATION	√	√	√	√
DISPLAY FILTER	√	√	√	√
MATHS FUNCTIONS	√	√	√	√
MAX, MIN and AVERAGING	√	√	√	√
INTERNAL OR EXTERNAL CJC	√	√	√	√
2 x FUNCTION BUTTONS	√	√	√	√
4 x SOFTWARE ALARMS	√	√	√	√
24V TRANSMITTER SUPPLY	√	√	√	√
10V TRANSDUCER SUPPLY	√	√		
0–12V TRANSDUCER SUPPLY			√	√
RS422/485 SERIAL INTERFACE	√	√	√	√
DIGITAL STATUS INPUTS			√	√
TWO ALARM RELAYS		√		√
ANALOGUE OUTPUT			√	√

Ordering Code

Model Number   Power   Display

Power
1   90 to 265V ac 50 or 60Hz
     10VA (40mA @240V)
2   12 to 32V ac or dc.

Display Colour
R   Red
G   Green

Example: 223–1–R
     Tracker 223, mains
     powered with red display.

Serial Communications

Type: RS422/485 2 or 4 wire multidrop
Speed: 1200, 2400, 4800 or 9600 baud
Parity: Odd, even or none
Stop Bits: 1 or 2
Protocol: MODBUS™ (RTU or ASCII), J-BUS and DTPI
Isolation: 500 Vdc/peak ac

Physical/Mechanical

Front Panel: Protection to IP65 (NEMA4)
Dimensions: 48mm (H) x 96mm (W) x 173mm (D)
Panel Cutout: 44mm (H) x 92mm (W)
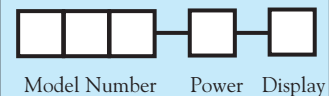Depth Behind Panel: 166mm including terminals
Weight: 0.4kg maximum. Packed weight 0.55kg.

Environmental

Temperature: 10–50°C operating, –10 to 70°C storage.
Humidity: 0–95% RH non condensing

Distributed by:

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