

ALARMING
MONITORING
DATA LOGGING



The image shows a close-up of the AS200 receiver unit. It features a digital display showing '11.09' in red LEDs. Above the display are labels for 'ALARM AC', 'STATUS', and 'DISPLAY'. Below the display are several control buttons and indicators, including an upward arrow button, a 'UNIT NUMBER' indicator with a red light, and a 'TIME DEL' indicator with a grey light. A downward arrow button is also visible.

AS200 Wireless Alarm, Monitoring and Data Logging System For your Laboratory Requirements

The AS200 Wireless Alarm, Monitoring and Data Logging System allows laboratory and hospital equipment such as Liquid Nitrogen, ULT Freezers, Fridges, Freezers and Incubators to be alarmed, monitored and data logged. The temperature transmitter range is -200°C to $+100^{\circ}\text{C}$ with an accuracy of 0.1°C . The system is an enhancement on the reliable and trusted previous wireless alarm system currently in 24 hour service protecting valuable product in LN2 vessels and refrigerated storage throughout the UK and Ireland.

The system ensures the safety and continued effectiveness of medicines, blood products and samples required to be held at specific refrigeration and freezer temperatures. Due to the high value of many of these goods, QA programs increasingly require that storage temperatures are to be verified several times per day and that records be maintained. The AS200 System will meet the alarm, monitoring and logging requirements, offering different levels of monitoring, data capture and analysis software.

Various levels of communications can be fitted to the receiver unit, from a conventional auto-dialler to a GSM dialler or web enabled facility. The GSM dialler and web enabled facility will give the target recipients details of the alarming equipment. The web enabled facility can contact up to 10 mobile phones sending a message with details of equipment in alarm.

Traceable calibration for temperature can be carried out for the AS200TX alarm transmitters.

FEATURES ► AS200 SYSTEM

- ◆ **Wireless alarm and data logging with minimal installation disruption.**
- ◆ **Independent alarm system with up to 999 alarms and acknowledgements stored in the receiver event log.**
- ◆ **Selective communications to suit requirements.**
- ◆ **Receiver connection to a computer enabling full monitoring and logging facilities.**
- ◆ **Up to 4 alarm acknowledgement key-fobs, details of acknowledger kept in event log.**
- ◆ **Temperature transmitter range -200°C to $+100^{\circ}\text{C}$.**
- ◆ **Transmitter accuracy 0.1°C over entire range.**
- ◆ **Range 500m uninterrupted signal path.**
- ◆ **Temperature, time delay, transmitter ID and high & low alarms displayed on transmitter.**
- ◆ **Full local alarming :- visual and audible at both transmitter equipment end and receiver.**
- ◆ **High, low, power fail, door open and volt free alarms on the transmitter.**
- ◆ **Reactivation of alarm every 60 minutes if transmitter at equipment end has not been muted. (*This feature can be disabled by client*)**
- ◆ **Standard receiver has 125 channels, one transmitter per channel.**
- ◆ **Download software enables the creation of an audit trail from the alarm and acknowledgement event log.**
- ◆ **Easy to use monitoring, data capture and analysis software giving numerical, graphical and statistical information.**

AS200TX ► ALARM & DATA TRANSMITTER

- ◆ Compact size. 110H x 65W x 27D (mm)
- ◆ Simple to use.
- ◆ Inputs available : Temperature and Volt Free Contact. (4-20mA option)
- ◆ Temperature range -200°C to $+100^{\circ}\text{C}$.
- ◆ Temperature transmitter resolution 0.1°C .
- ◆ Range 500m uninterrupted signal path.
- ◆ Temperature transmitter accuracy better than 0.1°C across the full range.
- ◆ Front panel display of I/P1 temperature, time delay, unit number ID and alarm parameters.
- ◆ Temperature high and low alarms.
- ◆ Audible and visual indication of an alarm.
- ◆ Adjustable time delay for temperature alarm. (0 to 90 minutes)
- ◆ Mains power failure alarm.
- ◆ Alarm information communicated with receiver AS200RX, giving details of transmitter unit and fault.
- ◆ Status and alarm indication on transmitter.
- ◆ Temperature, high & low alarms and delay time data transmitted every 30 minutes. This increases to every 10 minutes when in alarm. (*Increased frequency data transmitters available*)
- ◆ System self test.
- ◆ Easy calibration procedure / Auto calibration reminder customer set. Settings ; none, 6 months or 1 year.
- ◆ Rubber holster for easy installation and positioning.
- ◆ Traceable calibration for temperature can be carried out for the AS200TX alarm transmitters



Alarms

In the event of an alarm activation at the transmitter it will display the alarm input and the audible alarm will be activated. The AS200RX receiver displays both the unit number and input of the transmitter in the alarm condition; these details will be time and date stamped. Any communications equipment attached to the receiver will be activated immediately or after a programmable window of 10 minutes.

The system has a reactivation circuit which will re-alarm at the receiver after 1 hour if the transmitter in alarm has not been muted. This stops alarms being ignored as the user must mute the transmitter at the equipment end. The reactivation facility can be disabled or enabled at the receiver.

Temperature Range

The temperature range of the transmitter is -200°C to $+100^{\circ}\text{C}$ with an accuracy of 0.1°C across the entire range. This makes the transmitter suitable for many types of equipment from LN2 to incubators.

Front Panel Display

The front panel display shows the unit number of the transmitter, time delay or temperature of input 1. When in an alarm condition the display toggles between alarm I/P and variable selected. The status led indicates the current condition of the transmitter and the alarm active led flashes brightly in an alarm condition.

High and Low Alarm

A single high and low alarm can be set for I/P1 and I/P2, these parameters can easily be displayed.

Delay Time

A single delay time can be set for I/P 1 and I/P 2 ranging from 0 to 90 minutes, these parameters can easily be displayed. Input 3 has a fixed delay time of 10 minutes.

Inputs

Up to three inputs are available on the transmitter. A common configuration would be to use input 1 to monitor the air temperature of the equipment, input 2 is used to monitor the sample temperature and input 3 to monitor the door open / closed condition. This configuration of the inputs will give maximum protection and temperature data for the sample will be recorded as well as the air temperature if logging is employed on the system.

Input 1 : This is for temperature and the value can be displayed on the transmitter. This input sends its temperature value to the receiver so it can be monitored and logged if required. (*4 to 20mA input available to monitor other sensors*)

Input 2 : This is for temperature. This input sends its temperature value to the receiver so it can be monitored and logged if required. (*This input is an option*)

Input 3 : This is a volt free contact, closed in the OK condition and open in the alarm condition. (*This input is an option*)

Output

One relay output is available on the transmitter. This output is volt free and is configured in the open position when not in the alarm condition, changing to the closed position in the alarm condition. The relay will remain energised when in the alarm condition until the mute switch is depressed on the transmitter. (*This output is an option*)

Power Failure Alarm

If power failure is detected for longer than 10 minutes the transmitter will activate a power failure alarm at the transmitter and receiver.

Calibration

The temperature transmitter has been designed to have an easy calibration procedure. The transmitter display will show a calibration reminder automatically which is customer enabled. The reminder can be set for intervals of 6 or 12 months or be disabled. Traceable calibration for temperature can be carried out for the AS200TX alarm transmitters.

Test temperatures at +50.0°C, 0.0°C and -50.0°C can be simulated on transmitter input 1 to test the alarm. The fob temperature simulator is attached to a connector inside the transmitter unit and a temperature probe bypass switch is thrown. The simulated temperature is selected and will be shown on the display. If this temperature is out with the alarm limits it will activate the relevant alarm after the time delay.

Data Logging & Monitoring

Data logging and monitoring from AS200TX transmitters are possible with the AS200RX receiver when used in conjunction with a computer and AS200-SW software. The data collected for each transmitter is as follows :- Tx Unit Number, Tx Serial Number, Temperature I/P1, Temperature I/P2, Volt Free Contact I/P3, High Alarm, Low Alarm and Delay Time. Alarm status of I/P1, I/P2, I/P3, AC power and low battery are also displayed.

AS200TS ► TEST TEMPERATURE FOB



Test temperatures at +50.0°C, 0.0°C and -50.0°C can be simulated on transmitter input 1 to test the alarm. The fob temperature simulator is attached to a connector inside the transmitter unit and a temperature probe bypass switch is thrown. The simulated temperature is selected and will be shown on the display. If this temperature is out with the alarm limits it will activate the relevant alarm after the time delay.

The resistance to simulate 0.0C is supplied with a traceable calibration certificate. This can be used to calibrate the AS200TX transmitter.

AS200RX ► ALARM & MONITORING RECEIVER

- ◆ Compact size. 195H x 100W x 60D (mm)
- ◆ Simple to use.
- ◆ 125 Channels, one transmitter per channel.
- ◆ Additional receivers can be added to expand system.
- ◆ Two line LCD display of alarms giving details of the transmitter unit and fault.
- ◆ Up to 999 alarms and acknowledgements can be stored in the receiver event log.
- ◆ All alarms and acknowledgements are time and date stamped in event log.
- ◆ Acknowledged by individually unique user key-fob.
- ◆ Up to four individually named user key-fobs available.
- ◆ Reactivation of alarm at the receiver every hour if alarm is not muted at transmitter. *(This feature can be disabled by client)*
- ◆ Add / remove transmitters by a simple press of one button & administrators key-fob.
- ◆ Audible alarm.
- ◆ Programmable alarm communications window of 10 minutes.
- ◆ Auxiliary Volt Free Contact : Common, Normally Open, Normally Closed.
- ◆ Power failure alarm.
- ◆ Rechargeable battery backup.
- ◆ Selectable communications available, conventional auto-dialler, GSM dialler and web enabled facility.



Alarms

Once an alarm is generated from an AS200TX transmitter the AS200RX will display and sound an alarm. The display will show the unit number of the transmitter, I/P and time & date it was received. The audible alarm can be muted but a user key-fob must be used to clear the alarm from the screen.

Acknowledgement Key-Fobs

Up to four individually named user key-fobs are available. Key-fob user 1 is designated the administrators key-fob. The administrators key-fob can add and remove transmitters from the system and clear the alarm log. The remaining user key-fobs will only acknowledge alarms.

Alarm Log / Display

The receiver alarm log will store up to 999 alarm and acknowledgement details. Each alarm and acknowledgement is time & date stamped and can be downloaded to a computer to create an audit trail.

Communications

Selectable communications are available including conventional auto-dialler, GSM dialler and web enabled facility. The GSM or web enabled facility can be used in conjunction with a conventional auto dialler.

Receiver Setup Software

Simple to use software allows the administrator to setup the time, date and key-fob user names. Key-fob user number 1 is designated as the administrators key-fob and has unique functions.

Alarm log Software

Download and view software enables the creation of an audit trail from the alarm and acknowledgement event log. The receiver will store up to 999 alarm events and can be downloaded,

The receiver setup and alarm log software is supplied with the receiver as standard issue.

Monitoring, Data Capture & Analysis of Data

Monitoring, data capture and analysis from AS200TX transmitter is possible with the AS200RX receiver when used in conjunction with a computer and AS200-SW software.

The data collected from each transmitter is as follows :- Unit Number, Unique Serial Number, Temperature I/P1, Temperature I/P2, Volt Free Contact I/P3, High Alarm, Low Alarm and Delay Time. Alarm status of I/P 1, I/P 2, I/P 3, AC power and low battery are also displayed.

The transmitter will update the computer every 30 minutes with the data. This increases to every 10 minutes when the transmitter is in an alarm condition. Faster data collection available on request.

The image shows two screenshots of the AS200RX software. The top screenshot is the 'AS200RX' main window, which includes a 'Connected' status indicator, a 'Connect' button, and a 'Time and Date' section with dropdown menus for hours (14), minutes (05), days (06), months (10), and years (05). Below this is a 'Keyfob User' section with a numeric keypad (1-4) and a 'Name' field containing 'T Watson'. At the bottom are 'Download Memory' buttons for 'Download' and 'View'.

The bottom screenshot is the 'AS200RX ALARM LOG' window, displaying a table of alarm events. The table has columns for 'Created', 'TX UNIT', 'ALARM TYPE', and 'DATE'. The data shows a series of alarms from 10/11/2005 at 09:49:36, with various TX units (10) and alarm types (I/P1, I/P2) occurring on 22/09/05.

COMM ► COMMUNICATIONS FOR THE AS200 RECEIVER

Several types of communications can be fitted to the receiver unit, from a conventional auto-dialler to a GSM dialler or web enabled facility. The GSM dialler and web enabled facility will give the target recipients details of the alarming equipment. An auto-dialler and web enabled dialler or GSM dialler can be connected to one AS200RX.

WEB ENABLED DIALLER



The web enabled dialler allows the user to allocate a mixture of up to 10 mobiles and emails to be contacted in the event of an alarm. Only the targeted personnel for a particular piece of equipment will be contacted in the event of an alarm. The targeted message will contain the unit number, alarm and a brief description.

Note : Requires a dedicated telephone line and uses premium number when an alarm call is made.

The image shows two screenshots of the AS200RX software. The top screenshot is the 'ALARM SETUP' window, which has a table for defining alarm contacts. The table has columns for 'Tx Unit', 'Description', 'Click Here!', 'Click Here!', 'Click Here!', and 'Next'. The data includes contacts for 'Fresator Room 6', 'Cool Room Ground Floor', 'UCT Fresator 3', 'UCT Unit 3', 'Brew Deteral', 'Fresator Room 20', '44 Fridge Room 12', 'Cool Room 1', 'UCT 6 Room 2', and '30C Fresator Dr Brown Lab'. Below the table is a 'NEW TRANSMITTER LIST' section with a list of names and phone numbers, including John Hall, John White, Mary Brown, and Gavin Miller.

The bottom screenshot is the 'ALARM LOG' window, showing a table of alarm events. The table has columns for 'Tx Unit', 'Description', 'Click Here!', 'Click Here!', 'Click Here!', and 'Next'. The data includes contacts for 'Fresator Room 6', 'Cool Room Ground Floor', 'UCT Fresator 3', 'UCT Unit 3', 'Brew Deteral', 'Fresator Room 20', '44 Fridge Room 12', 'Cool Room 1', 'UCT 6 Room 2', and '30C Fresator Dr Brown Lab'. Below the table is a 'NEW TRANSMITTER LIST' section with a list of names and phone numbers, including John Hall, John White, Mary Brown, and Gavin Miller.

GSM DIALLER

The GSM dialler allows the user to allocate a mixture of up to 5 mobiles or land lines to be contacted in the event of an alarm. The unit can be set up to target individual personnel for a particular piece or group of equipment in the event of an alarm. The targeted message will contain the unit number, alarm and a brief description. The system employs an acknowledgment procedure with a 3 digit pin.

AUTO DIALLER



If simpler communications are required a speech dialler unit can be fitted to the receiver. Power for the speech dialler and alarm trigger is obtained from the receiver. This ensures that, even during a mains power cut, the equipment will still detect an alarm condition and dial out.

The Speech Dialler Unit accepts one input from the receiver, which causes corresponding messages (A,) to be sent out to pre-arranged telephone numbers.

Telephone Numbers: 4 or 10 different telephone numbers.
Messages: . The phrase can be up to 40 seconds long.

Acknowledgement : This is achieved by pressing the number [8] on their telephone keypad, this prevents further calls being initiated.

AS200TR ► TRANSCIVER

The transceiver unit is used to increase the distance between a transmitter and the receiver, if required. Transceivers can be used in series allowing very large distances to be achieved. The specified range for a transceiver is 500m uninterrupted signal path. This distance will be reduced in buildings especially if their construction is of concrete and steel.

- ◆ Compact Size.
- ◆ Simple to use.

The transceiver is powered by an external DC supply and has a rechargeable battery fitted as standard. If power fail is detected on the transceiver an alarm will be sent to the receiver initiating an alarm condition.



AS200-SW ► MONITORING, DATA CAPTURE & ANALYSIS SOFTWARE

When the AS200RX receiver is connected to a computer the AS200-SW monitoring and data capture software enables the display and logging of all the information sent from the AS200TX transmitters. The data is sent from the transmitters every 30 minutes, increasing to a frequency of every 10 minutes when in an alarm condition.

The information sent from each transmitter includes the following :- transmitter number, transmitter serial number, value input 1 (I/P1), value input 2 (I/P2), value input 3 (I/P3), high alarm set-point, low alarm set-point, delay time and time of last update. The alarm status of I/P1, I/P 2, I/P 3, mains power and low battery are also displayed.

The data is recorded in a CSV and PSA file format. The PSA file is encrypted and can only be decoded and read by the AS200-SW analysis software. The CSV file can be read in both the AS200-SW software or Excel. A set of new CSV and PSA files are generated every day to make record archiving simple.

The analysis software can display all the data recorded within the selected files or can filter data between dates and times to customers requirements.

MONITORING, DATA CAPTURE SOFTWARE

- ◆ Display and logging of all the information sent from the transmitters.
- ◆ Data is updated every 30 minutes from each transmitter, increasing to every 10 minutes when in an alarm condition.
- ◆ Information sent from each transmitter includes the following :- transmitter number, transmitter serial number, value I/P1, value I/P2, value I/P3, high alarm set-point, low alarm set-point, delay time and time of last update.
- ◆ Alarm status of input 1, input 2, input 3, AC power and low battery are displayed.
- ◆ Data is recorded in a CSV and PSA file. The PSA file is encrypted and can only be decoded and read by our analysis software. The CSV file can be read in our analysis software or excel. A set of new CSV and PSA files are generated every day to make record archiving simple.
- ◆ Standard 25 inputs can be expanded in blocks of 25 up to 125 inputs.

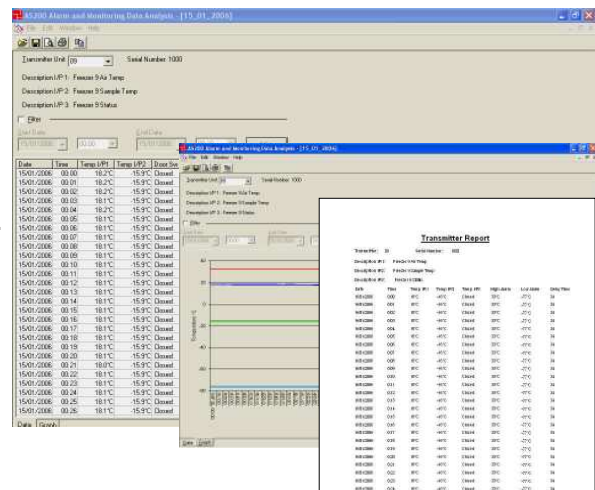
 A screenshot of the 'AS200 Alarm and Monitoring - 25' software interface. It shows a table with columns for Tx No, Serial No, Alarm Status, IP 1, IP 2, IP 3, AC Batt, Description I/P 1, Description I/P 2, Description I/P 3, Value I/P 1, Value I/P 2, Value I/P 3, Unit, High Alarm, Low Alarm, Delay, and Last Update. The table contains 25 rows of data, with row 10 highlighted in red to indicate an alarm condition.

DATA ANALYSIS SOFTWARE

- ◆ CSV and encoded PSA files can be read.
- ◆ Numerical & Graph information easily displayed for any transmitter.
- ◆ Easy print facility for data required.
- ◆ Filtering of data is possible between specific dates and times.

Statistical Information of the following is recorded : First Reading; Date and Time, Last Reading; Date and Time, Number of Readings, Maximum Temperature, Minimum Temperature, Average Temperature, Time in High Alarm and Time in Low Alarm.

The Data Capture software and Data Analysis software come as a package. Each licence allows one capture software and up to 5 data analysis software programs.



AS200SWP ► ALARM, DATA LOGGING & ANALYSIS SOFTWARE

Enhanced data capture software is available for all transmitters on the system. This software may be customized, options include :-

- ◆ Trend Graphs
- ◆ Multi-graphs
- ◆ Printed Reports
- ◆ Recipe & Batch Facility
- ◆ FDA 21 CFR 11 Compliance
- ◆ Electronic Records and Signatures
- ◆ SMS & Email Facilities

AS200CAL ► CALIBRATION FOR AS200TX TRANSMITTER & PROBE

The AS200TX has a built in calibration reminder. The reminder displays "Cal" on the transmitter after a pre-selected time interval. The time interval can be easily set by the user to 6 monthly, 12 monthly or be switched off. The transmitter also has a simple to use calibration procedure.

Calibration consist of two parts, calibration of the AS200TX and calibration of the AS200TX with the temperature probe attached.

AS200TX Instrument Calibration

An internal switch disconnects the temperature probe and a temperature resistance simulator is attached to simulate the temperature probe. The simulated probe resistance is set at $1000\Omega \pm 0.01\%$, $\pm 3\text{ppm}/^\circ\text{C}$ which accurately simulates 0°C . The calibration of the instrument displays a resistance measurement which is adjusted by the user. Once adjusted the accuracy of the instrument can be checked by simulating different temperatures by varying the resistance.

The AS200TX is a very stable instrument and will rarely require calibration. It is recommended that the AS200TX is checked by simulating several temperatures to ensure it is within calibration parameters. This can easily be achieved by using the AS200TC temperature simulator.

AS200TX Instrument & Probe Calibration

The AS200TX uses platinum resistance temperature probes. A calibrated temperature instrument and probe (Laboratory Standard) has its probe immersed in an accurately controlled temperature bath. The AS200TX under test also has its temperature probe immersed in the controlled temperature bath. After a stabilising period of not less than 60 minutes readings are taken. The results are recorded from the instrument under test and the laboratory standard. Two set-point temperatures are used 0°C and $+40^\circ\text{C}$.

Laboratory Standard

All instruments and probes used to verify results have been calibrated at a UKAS accredited calibrator. The temperature indicator and probe used are calibrated together as a system.

AS200TX Instrument Accuracy & Stability

The AS200TX is a extremely accurate instrument employing a 16 bit ADC and automatic temperature compensation of the current sources.

Before every probe measurement the current sources are automatically compensated by the microprocessor. This ensures the current which is used during calibration is always exactly the same during actual operation. This provides compensation for the hardware used and eliminates any measurement drift due to voltage or temperature changes on the current source circuits. The instrument temperature error is typically 5 ppm/ $^\circ\text{C}$.

These features enable the AS200TX transmitter to have an accuracy of better than 0.1°C across its complete temperature range from $+100^\circ\text{C}$ to -200°C .

Temperature Probe Accuracy & Stability

Platinum Resistance Probes are extremely accurate sensors for laboratory and industrial applications. The tolerances of the temperature probes are to BSEN60751 and IEC751 standard. The accuracy of a Class B probe is better than $\pm 0.3^\circ\text{C}$ and a Class A probe is better than 0.15°C @ 0°C .

The temperature probes are aged as part of the manufacturing process thus ensuring the highest levels of stability throughout their life. Typically the resistance at 0°C will not change by more than 0.04%.

Note : ppm is parts per million. One ppm is 1 part in 1,000,000 or 0.0001%.

