



Installation & Operation Manual

AccuTrak™ AT200 Magnetostrictive Level Transmitter



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1.0 INTRODUCTION

K-TEK AT200 transmitters (in conjunction with KM26 Level Gauges) are used extensively around the world to accurately measure level. High accuracy and no maintenance are two of the most common reasons for choosing this technology. With optional ratings to 800° F / 427° C, K-TEK's Magnetostrictive Level Transmitters are suitable for almost any application. HART, Foundation Fieldbus and Honeywell DE Protocol options make our AT200's easy to connect to most control systems. The LCD display provides indication as 4-20mA, %, and other engineering units.

When used on Storage Tanks, concerns of high accuracy, low maintenance and reasonable cost leads customers to install a KM26 for visual indication with an AT200 for connection to the DCS System. An optional internal 20-segment increment table allows the AT200 to provide accurate output in horizontal or round vessels (See Section 4 for details on the Volumetric Strapping Table).

K-TEK's AT200's can be used as an option for a "Displacer Replacer". Most Liquid Level Displacers in dynamic processes have seen many repetitive problems in operation including the following: extreme errors in output due to specific gravity changes, leaks around the torque tube penetration, and low or stuck readings due to product buildup on the torque tube or displacer. A new Chamber (KM26 Level Gauge) can be provided with the AT200. Tremendous improvements in accuracy will be realized. Additionally, this is an extremely easy way to convert pneumatic Displacer Transmitters.

The Magnetostrictive Level Transmitter (AT200) with the KM26 Level Gauge can be used to measure Interface Level. The AT200 is the finest technology available for liquid interface level measurement and control. K-TEK AT200's can also provide two 4-20mA outputs when coupled with the RI100 Repeat Indicator: one for total level and a one for interface level. Designs are available for interface level measurement with specific gravity differences as low as 0.03. Most commonly applied to oil and water separator interface, this technique is used in many process applications. Others include HF acid / propane vessels, de-salters and sumps.

Other uses for the AT200:

- Valve Positioning
- Equipment Positioning

FEATURES OF THE AT200 FAMILY TRANSMITTERS INCLUDE:

High Accuracy .01% of full scale, Simple push button calibration, Set it and forget technology never needs re-calibration.

Based on the Functional Safety Assessment of Exida, the AT200 transmitter is suitable for use in a Safety Instrumented Function requiring a SIL 2 risk reduction in single use and a SIL 3 risk reduction in redundant use with a Hardware Fault Tolerance of 1.

Only transmitters meeting all of the following requirements may be used in a Safety Instrumented Function:

- Transmitters fitted with a 4-20 mA output HART protocol /M4A or /M4B or /M4AS or /M4BS Electronic Module.
- Modules marked as follow: AT_H_01_S003_090209 or AT_H_TS_01_S003_090209 (Transmitters equipped with software revision of AT_H_090209 or AT_H_TS_090209 and a hardware revision 01).

6.0 SAFETY, MAINTENANCE, AND TROUBLESHOOTING

The AT200 will operate normally without the need for periodic maintenance or inspection. If the transmitter meets or exceeds the requirements of the application, the transmitter can be expected to provide reliable level indication for a minimum of 10 years.

If the AT200 transmitter is being used as part of a Safety Implemented System (SIS), periodic testing will be required to proof the transmitter and detect any potential failure which is defined as Dangerous Undetectable in normal operation. This testing must be performed at regular intervals (2 years) and the results of this testing must be documented. Should the transmitter exhibit a fault during normal operation, it will be necessary to perform the proof testing regardless of schedule. As part of the testing documentation, all parameters included in the menu structure of the transmitter (see page 8) as well as the configuration of the module jumpers (see page 6) must be recorded. An AT200 can be equipped to provide a level indication from two floats. The transmitter is only capable of supplying (1) 4-20mA output based on one of the two possible levels. If a transmitter is attached to a gauge containing more than one float, only the process variable selected by the PV= menu option will be considered as a safety function as this selected variable will be the basis for the 4-20mA output. The AT200 transmitter may only be used in a safety-related system when the mode of that system is low demand. As a device, the AT200 transmitter will be used to provide a level measurement to prevent overflow and dry run of a vessel.

If a transmitter fails an inspection or assistance is required for inspection or troubleshooting, contact the Service Department at K-TEK Corporation via e-mail at service@ktekcorp.com. The Service Department will answer questions, provide additional assistance, and issue Return Authorization Numbers for equipment in need of repair.

CAUTION: In the event a magnetostrictive transmitter has suffered a failure in any component which is exposed to the process, any other magnetostrictive transmitter installed in the same or similar process should be inspected for the same failure regardless of its maintenance schedule. These Common Cause Failures include: 1) float collapse due to over pressure, 2) float corrosion due to material incompatibility, 3) damage of the sensor tube due to improper installation.

Notes on usage in Safety Instrumented Systems:

- 1) The AT200 performs internal diagnostics at a maximum interval of 15 minutes.
- 2) The AT200 will provide annunciation of a diagnostic failure in less than 15 minutes of the occurrence.
- 3) The failure of any internal diagnostics will result in notification of the fault by setting of diagnostic bits in HART protocol output.
- 4) All AT200 FMEDA analysis is based on using a safety accuracy of 2%.
- 5) The internal diagnostics are designed to achieve a Safe Failure Fraction of 90% minimum.
- 6) The target average probability of failure on demand is less than 1.5×10^{-3} .
- 7) AT200 transmitters may only be used in a SIS when:
 - a) Transmitters are fitted with a 4-20 mA output HART Protocol /M4A or /M4B or /M4B or /M4AS or /M4BS Electronic Module
 - b) Modules must be marked as follows: AT_H_01_S003_090209 or AT_H_TS_01_S003_090209

6.1 Personnel Qualifications

Safety Inspection, Maintenance and Troubleshooting should only be performed by qualified personnel. These qualifications include a knowledge of the information in this instruction manual, knowledge of the product and its operating principles, knowledge of the application in which the transmitter is being applied, and general experience as an Instrument Technician.

Before, during and after performing Safety Inspection, Maintenance or Troubleshooting it will be necessary to observe and adhere to any safety standards, practices or requirements defined in the policies of the end user.

6.2 Required Tools

The following tools may be required to perform inspection, maintenance or troubleshooting of the AT200 transmitter.

- Crescent Wrench
- Screwdrivers
- Hex Key Wrenches
- Digital Multi-meter
- Tape Measure
- Portable Oscilloscope (Optional)
- Oscilloscope Connector (purchased from K-TEK) or three pieces 26awg solid core wire (6in/150mm)

6.0 SAFETY, MAINTENANCE, AND TROUBLESHOOTING

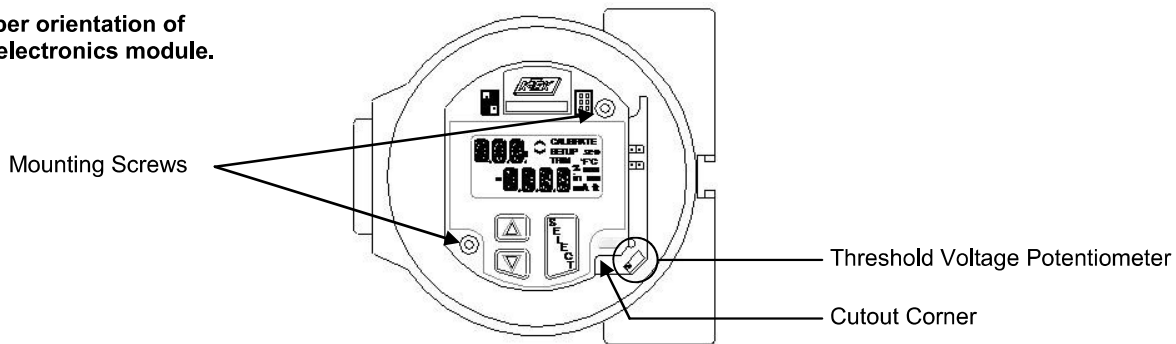
6.9 Threshold Adjustment

If the output occasionally jumps to an alarm condition This can be an indication of a loss of signal or a transmitter threshold detector not set properly. The adjustment can be done as follows

Note: It is preferable to make this adjustment with the float located towards the end of the sensing tube, away from the transmitter housing, but within the normal measuring range. This is the only adjustment that can be done on the unit.

- Locate adjustment potentiometer next to the bottom right of the electronics module.
- With unit powered up, turn adjustment CLOCKWISE until the output goes and stays in alarm (3.6mA or 21 mA).
- Turn adjustment slowly COUNTER-CLOCKWISE until a steady output is established. This output should match the float position.
- Turn adjustment slowly COUNTER-CLOCKWISE and keep track of the number of turns, until the output is not stable any more.
- Turn adjustment back CLOCKWISE, half the amount of turns recorded in previous steps. Verify that a steady output is achieved.

Proper orientation of the electronics module.



6.10 Module Replacement

The AT transmitter is equipped with modular electronics which are removable and in certain cases upgradeable. An EPROM and threshold adjustment potentiometer located in the transmitter housing will maintain the settings of the unit if the electronics are removed. This allows swapping modules without losing calibration and setup configuration.

In the event that a module is defective, simply remove it by loosening the 2 mounting screws and replacing it with spare module. Returning a defective electronics module or sensor tube to the factory should be handled by using the proper RMA authorization form as attached in Section 13.2 or by contacting the K-TEK Service Department at service@ktekcorp.com.

The software revision of a transmitter can be identified by a tag on the back of the electronics module. The date code of the software revision will appear as a series of numbers such as AT_H_090209 or AT_H_TS_090209. The type of module will be identified on the same tag with a code such as M4AS or M4BS.



WARNING: In order to maintain certification requirements, repair of the instrument at the component level can only be done by returning the device to the factory. Field repair and maintenance should only involve replacing electronic modules.

6.11 Terminal Strip Checkout

Moisture within the housing may cause failure of the RFI filtering within the terminal strip. This can be indicated as a current output that is higher than the current indicated by the LCD Display. To verify terminal strip failure, remove the field wiring and the electronics module. Using a multi-meter, check the resistance from each of the terminal points to the housing. All of the terminal positions should indicate open to the housing. Consult the factory for terminal strip servicing procedures.




7.0 TAG INFORMATION

	MADE IN USA
MODEL NO:	
SERIAL / TAG NO:	
MAX TEMP - HOUSING: 170°F ; SENSOR:	
WORKING / MAX PRESSURE:	
CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER ATTENTION: OUVRIR LE CIRCUIT AVANT D'ENLEVER LE COUVERCLE	
	
<p>HAZARDOUS LOCATIONS: CL I, DIV1, GRPS A, B, C, D, CL II, DIV1, GRPS E, F, G, CL III</p> <p>INTRINSICALLY SAFE Ex ia: CL I, DIV1</p> <p>APPROVED GRPS C & D, CL I, DIV1, GRPS E, F, G, CL III & SUITABLE (FMRC NON-INCENDIVE) CL I, DIV2, GRPS A, B, C, D, WHEN INSTALLED PER CONTROL DRAWING ELE0001</p> <p>T4 AT 77 °C AMBIENT -NEMA 4X</p>	
	T3C -TYPE 4X



FM and CSA Approved
Hazardous Locations and
Intrinsically Safe

	MADE IN USA
MODEL NO:	
SERIAL / TAG NO:	
MAX TEMP - HOUSING: 170°F ; SENSOR:	
WORKING / MAX PRESSURE:	
CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER ATTENTION: OUVRIR LE CIRCUIT AVANT D'ENLEVER LE COUVERCLE	
	
<p>HAZARDOUS LOCATIONS: CL I, DIV1, GRPS A, B, C, D, CL II, DIV1, GRPS E, F, G, CL III</p> <p>INTRINSICALLY SAFE Ex ia: CL I, DIV1</p> <p>APPROVED GRPS C & D, CL II, DIV1, GRPS E, F, G, CL III & SUITABLE (FMRC NON-INCENDIVE) CL I, DIV2, GRPS A, B, C, D, WHEN INSTALLED PER CONTROL DRAWING ELE0001</p> <p>T4: AT 77 °C AMBIENT -NEMA 4X</p>	
	T3C -TYPE 4X



FM and CSA Approved
Intrinsically Safe Only

	MADE IN USA
MODEL NO:	
SERIAL / TAG NO:	
MAX TEMP - HOUSING: 170°F ; SENSOR:	
WORKING / MAX PRESSURE:	
CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER ATTENTION: OUVRIR LE CIRCUIT AVANT D'ENLEVER LE COUVERCLE	
	
<p>HAZARDOUS LOCATIONS: CL I, DIV1, GRPS A, B, C, D, CL II, DIV1, GRPS E, F, G, CL III</p> <p>INTRINSICALLY SAFE Ex ia: CL I, DIV1</p> <p>APPROVED GRPS C & D, CL II, DIV1, GRPS E, F, G, CL III & SUITABLE (FMRC NON-INCENDIVE) CL I, DIV2, GRPS A, B, C, D, WHEN INSTALLED PER CONTROL DRAWING ELE0001</p> <p>T4: AT 77 °C AMBIENT</p>	
	T3C




FM and CSA Approved
Hazardous Locations only
RI, M4AD, M4BD, options

	MADE IN USA
MODEL NO:	
SERIAL / TAG NO:	
MAX TEMP - HOUSING: 170°F ; SENSOR:	
WORKING / MAX PRESSURE:	
CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER ATTENTION: OUVRIR LE CIRCUIT AVANT D'ENLEVER LE COUVERCLE	
	
<p>HAZARDOUS LOCATIONS: CL I, DIV1, GRPS A, B, C, D, CL II, DIV1, GRPS E, F, G, CL III</p> <p>INTRINSICALLY SAFE Ex ia: CL I, DIV1, GRPS A, B, C, D, CL II, DIV1, GRPS E, F, G, CL III & SUITABLE (FMRC NON-INCENDIVE) CL I, DIV2, GRPS A, B, C, D, WHEN INSTALLED PER CONTROL DRAWING ELE1036</p> <p>T4 AT 77 °C AMBIENT -NEMA 4X</p> <p>FISCO FIELD DEVICE</p>	




FM Approved
Foundation Fieldbus option

	LOUISIANA, 70769	Сделано в США
МОДЕЛЬ:		
СЕРИЙНЫЙ НОМЕР:		
Темп. среды: -40...+66°C; Т сенсора:		
МАКС. ДАВЛЕНИЕ: мПа U макс. = 30 В		
ВНИМАНИЕ: ОТКРЫВАТЬ, ОТКЛЮЧИВ ОТ СЕТИ!		
НАИЧО ЦСВЗ N° РОСС УЛ.Г.605.802442		
	1ExdIICt6	IP67
Г605	0ExiaIICT6	
ИСПОСОБОПАСНАЯ ЦЕПЬ:		
U i = 30 В	C i = 11 мФ	P i = 1 Вт
I i = 200 мА	L i = 10 мГн	
TAG0139		




GOST Russia Approved
Hazardous Locations and
Intrinsically Safe

	LOUISIANA, 70769	MADE IN USA
MODEL NO:		
SERIAL / TAG NO:		
MAX AMB. TEMP - HOUSING: -20 TO +66°C; SENSOR:		
SENSOR MAX PRESSURE: VMAX:36VDC		
CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER ATTENTION: OUVRIR LE CIRCUIT AVANT D'ENLEVER LE COUVERCLE		
		II 1/2 GD EEx d IIC T6 T80°C 02 ATEX 132659
0539	FLAMEPROOF ZONE 1 AND 2	
0036 PED		
IP67	TAG0006	



ATEX Approved
Flameproof

	LOUISIANA, 70769	MADE IN USA
MODEL NO:		
SERIAL / TAG NO:		
MAX AMB. TEMP - HOUSING: -40 TO +66°C; SENSOR:		
SENSOR MAX PRESSURE: VMAX:30VDC		
II 1/2 G/D Ex ia IIC T4 [-40°C ≤ Tamb ≤ 66°C] Ex iaD 20/21 IP6X T80°C [-40°C ≤ Tamb ≤ 66°C] IP66/67 ITS08ATEX15866X		
		INTRINSICALLY SAFE: ZONE 0,1 AND 2
0575	U i ≤ 30 VDC C i ≤ 4.8 nF P i ≤ 1 W	
0871 PED	I i ≤ 200 mA L i ≤ 10 μH	
	TAG0007	

ATEX Approved
Intrinsically Safe
excludes RI option

	LOUISIANA, 70769	MADE IN USA
MODEL NO:		
SERIAL / TAG NO:		
MAX AMB. TEMP - HOUSING: -40 TO +66°C; SENSOR:		
SENSOR MAX PRESSURE:		
II 1/2 G/D Ex ia IIC T4 [-40°C ≤ Tamb ≤ 66°C] Ex iaD 20/21 IP6X T80°C [-40°C ≤ Tamb ≤ 66°C] IP66/67 ITS08ATEX15866X		
		INTRINSICALLY SAFE: ZONE 0,1 AND 2
0575	U i ≤ 28 VDC C i ≤ 4.8 nF P i ≤ 1.2 W	
0871 PED	I i ≤ 250 mA L i ≤ 10 μH	
	FISCO Field Device TAG0080	

ATEX Approved
Intrinsically Safe
Foundation Fieldbus option

	18321 SWAMP ROAD PRAIRIEVILLE, LA 70769	MADE IN USA
MODEL NO:		
SERIAL / TAG NO:		
MAX AMB. TEMP - HOUSING: -20 TO +66°C; SENSOR:		
SENSOR MAX PRESSURE: VMAX:30VDC		
CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER ATTENTION: OUVRIR LE CIRCUIT AVANT D'ENLEVER LE COUVERCLE		
	IECEx IULD 06.0013X Ex ia IIB T4 T66°C	
0036 PED	INTRINSICALLY SAFE: ZONE 0,1 AND 2.	
	U i : 30 VDC C i : 15 nF P i : 1 W	
	I i : 200 mA L i : 10 μH	
IP67	TAG0082	

IEC Approved
Intrinsically Safe
excludes RI option