

## Magnetic Angle Transmitter

MAT 01

### Magnetic Angle Transmitter MATO 1

The MAT01 provides magnet angle detection and computation of the angle to a 4..20mA output signal. Designed to measure the position of a magnet in Flotrak and Reflux (VA) Flowmeters, this transmitter is suitable for use in many other applications. With the MAT01 existing VA-Flowmeters can be upgraded to signal the flow through the instrument. This rugged, compact, microprocessor-driven device is capable of filling flow-corrections need at the meter, providing accurate flow information remotely to external support systems. The magnetic sensor with automatic gain control enables an extremely high dynamic capture range without sacrificing accuracy.

### Design Features of the MATO 1

- Smart microprocessor based field transmitter, 2-wire low-power device for ease of wiring and installation
- Sensor with microprocessor controlled gain (sensor is placed in center package)
- 4..20mA Analog Output for magnetic angle signaling. Voltage range: 8..28Vdc
- 11 Calibration-point transmitter linearisation
- external Zero Button Wire to enable simple zeroing after installation
- adjustable low-cutoff to ensure an offset free zero
- adjustable low-pass filter for a smooth analog output signal
- PC-interface with Windows95/98 program for setup and calibration (no external power required)
- accuracy better than 0.5% (range from 0.0 to 360.0 degrees)

### Physical Packaging

The MAT01 is a potted electronic module: totally encapsulated for physical ruggedness and electrical isolation. This . Presently available 2 variants of packaging:

- 1- An aluminum square tube measuring 20\*20\*110mm containing two mounting holes.
- 2- An aluminum square tube measuring 20\*20\*65mm without mounting holes.

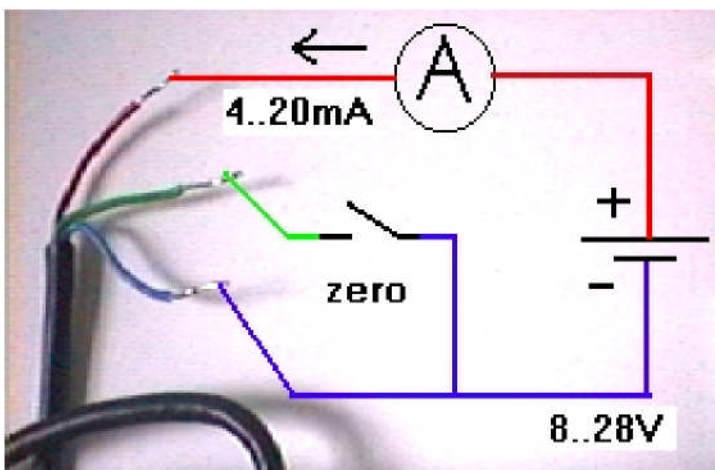


Figure 1

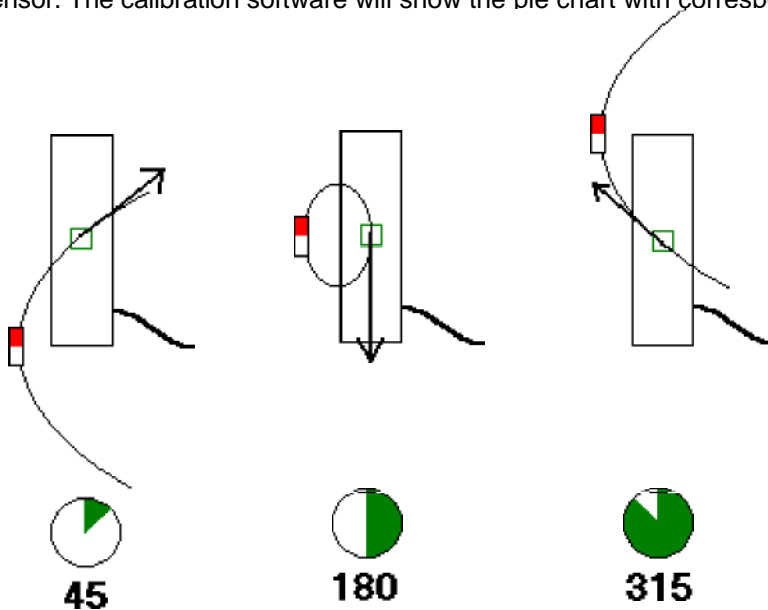
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### Application example

In the VA flowmeter the position of the float is proportional to the flow through the instrument. The MAT01 can be used to compute the flow in a VA flowmeter by measuring the float magnet position and calculating the corresponding flow by using the stored calibration points.



In the figure below the position of the magnet is varied vertically. The relevant magnetic field lines are sketched to show the measured magnetic angle at the sensor place. The vectors represent the measured field direction at the sensor. The calibration software will show the pie chart with corresponding field inclination.

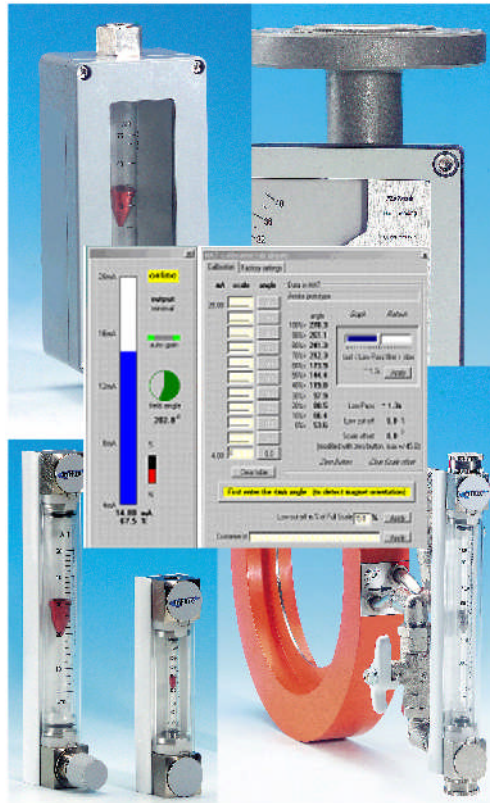


**Calibration**

With a PC-interface module and Windows95/98 program calibration points can easily be entered. The program uses the cubic-spline method to obtain the best 11 calibration points (0%, 10% .. 100%). In the transmitter the calibration points, lowpass-filter constant and low-cut-off values are stored in non-volatile memory. This will ensure data integrity for many decades without the need for any maintenance.



PC-interface



**Manufactured By**



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### Electrical specifications

red wire ('+' pin) = positive power supply voltage  
 blue wire ('-' pin) = negative power supply voltage  
 green wire ('zero' pin) = with blue wire: combined zero-button function and serial communication

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
$V_{rb}$	Supply voltage wire red – blue	8		28	Volt
	Output current (wire red) 0% -> 100%+overrange				
$I_{rb}$	Wire green floating	4.0 -> 20.1	4.0 -> 21.0	4.0 -> 22.0	mA
$I_{rbs}$	Wire green shortage to blue (during zeroing)		8		mA
	Voltage wire green – blue				
$V_{gbf}$	Floating	4.8		6.3	Volt
	Current wire green				
$I_{gbs}$	Shortage wire green – blue (during zeroing)	0.4		0.7	mA
$R_{isol}$	Isolating resistance: any wire to (floating) ALU housing	10			M
$H_{cap}$	Field strength Capture range @ 20 °C (i.e. automatic gain not clipping)		TBD		kA/m
$T_{op}$	Operating temperature range	-30 (-20)		65 (150)	°C (°F)

The **green wire (zero pin)** has a double function

- 1- Under normal operation the green wire must be floating, see figure . During zeroing the polarity of the magnet is also determined and stored. In this way it is possible to burn many transmitters with equal values without worrying the magnet polarity of individual floats. The described zeroing function can also be triggered from the calibration program.
- 2- When connected to a PC-interface and hooked to a PC-RS232 port, the green/blue wire is used for digital communication.

#### PC-interface

- With this interface the MAT can be hooked to the serial RS232 port of your computer. At power/startup the transmitter is waiting (~2seconds) for serial communicating before entering normal operation. When a serial communication is established, the transmitter is instructed to sustain its low-power mode (typically 2.6mA). In this low-power mode the transmitter is directly powered from the RS232 port without the need of an external power supply.

#### Certifications:

- CE EMC compliance IEC EN61326 (KEMA file 2007540-KRQ/EMC 00-4736)
- <Ex> II 3 G EEx nA II T6 IP65 (KEMA nr 01ATEX1034 X)
  - o EN 50021 : 1999
- <Ex> II 2 GD and 2D T 70 °C Eex ia IIC T6 IP65 (KEMA nr 01ATEX1032 X)
  - o EN 50014 : 1997
  - o EN 50020 : 1994
  - o EN 50281-1-1 : 1998

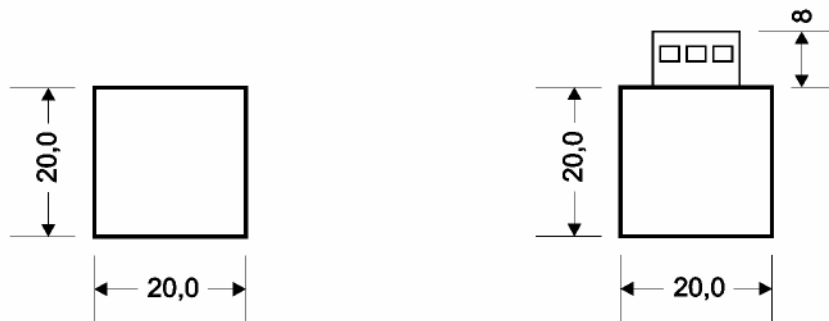
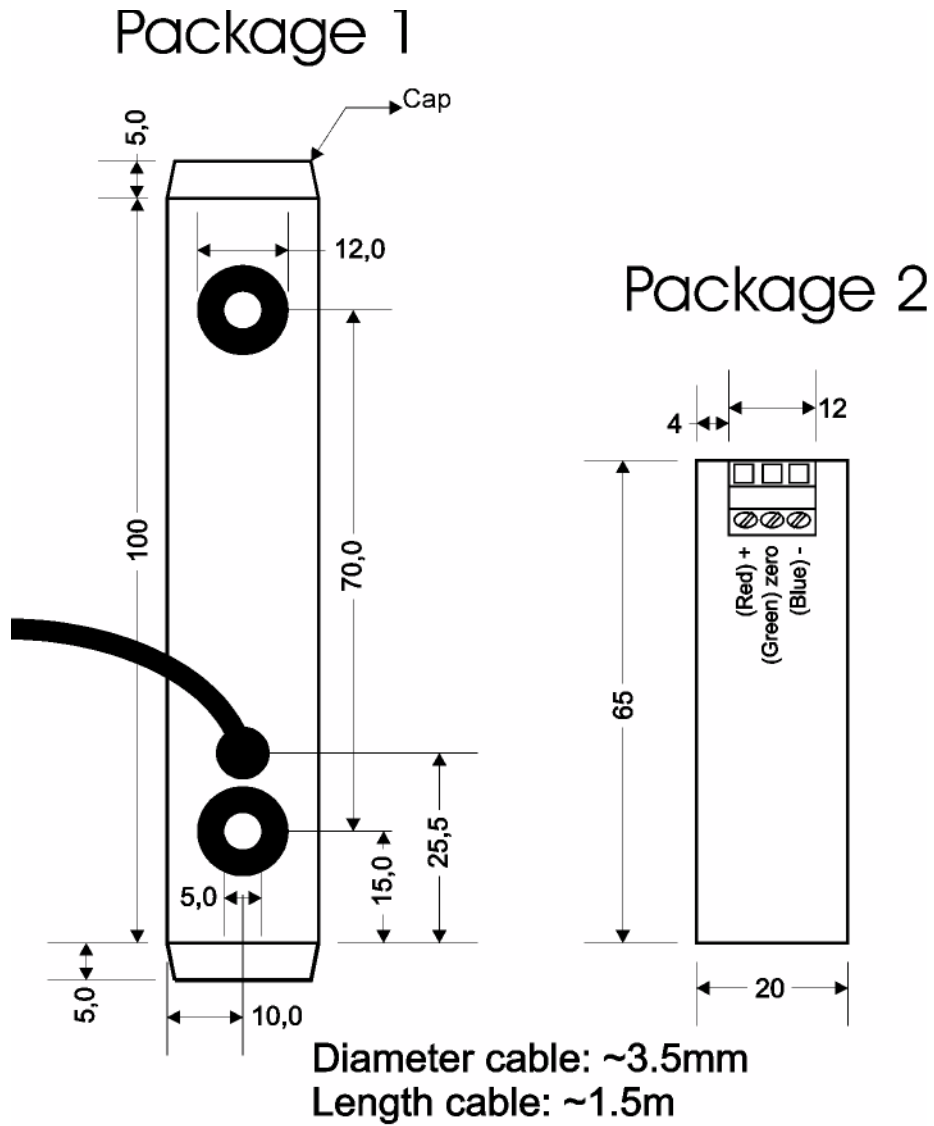
#### Pending:

For the US:

- US:
- Intrinsic Safe (with barrier):
  - Class I, II, III, Div 1, Group A,B,C,D,E,F,G
- Non incendive (no barrier):
  - Class I, II, III, Div 2, Group A,B,C,D,E,F,G



Dimensions



in mm, accuracy may vary

**Techniquip Ltd.,**  
The Old Brewery,  
Norton Fitzwarren,  
Taunton, Somerset, TA2 6RN  
eMail:  
[sales@techniquip.co.uk](mailto:sales@techniquip.co.uk)  
Web: [www.techniquip.co.uk](http://www.techniquip.co.uk)