



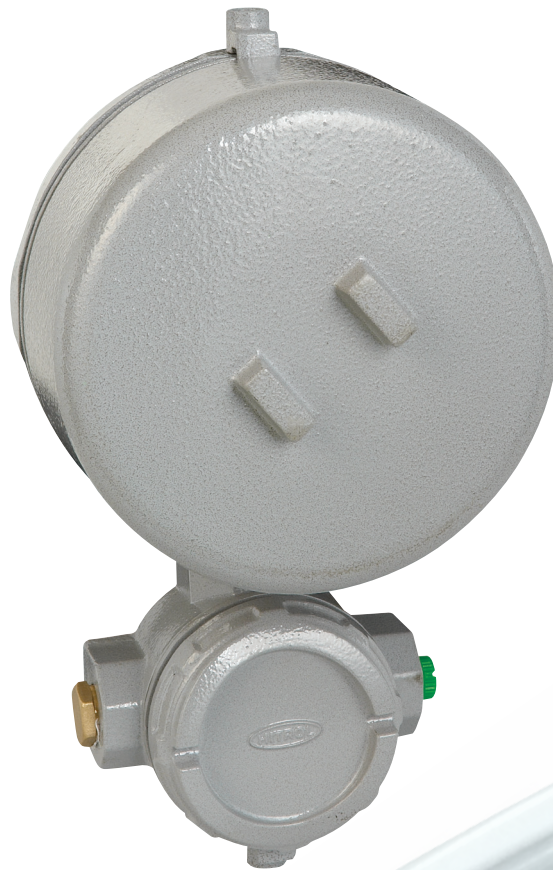
Always The Best Solution by
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OPERATING MANUAL

HAT-5000 SERIES

LEVEL SWITCH FOR TANK LEVEL GAUGE



OVERVIEW

HAT-5000 series is an alarm contact switch which can be used for tank level gauges, HLT-1000/2000 series and maximum 4 alarm contacts are available.

FEATURES

- Simple and Trouble-Free operation
- Adjustable alarm contacts for whole measuring range
- Easy mounting and low cost
- Max. 4 limit alarm contacts are available.

MODEL



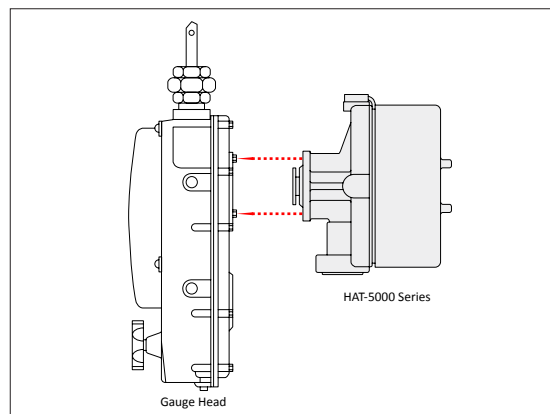
HAT-500□



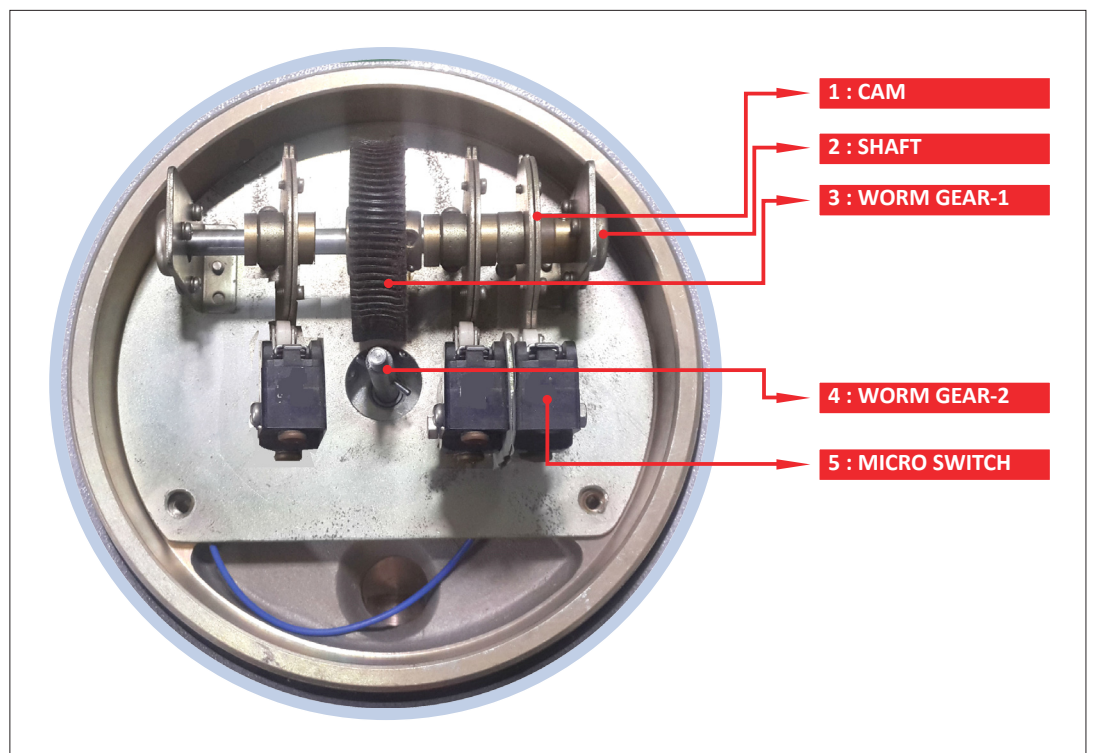
HAT-500□-Ex

□ : Number of contact

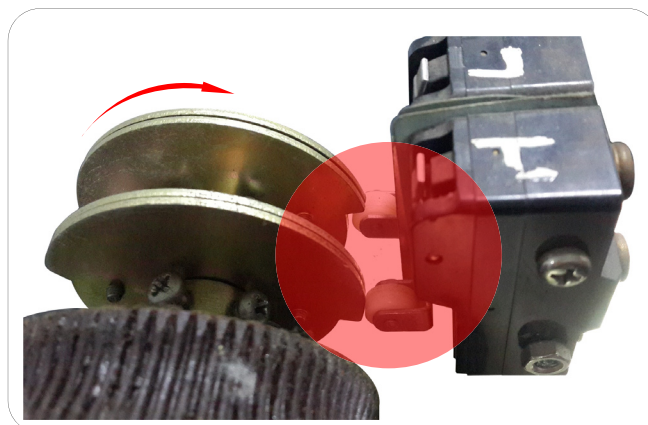
OPERATING PRINCIPLE



When the Worm Gear-2 (4) which is connected to the sprocket of gauge head rotates, the Worm Gear-1 (3) starts to rotate then Shaft (2) is rotated with a reduced revolution count according to the gear ratio of Worm Gear-1 (3). As per rotation of Shaft (2), CAM (1) rotates and operates Micro Switch (5) when it arrives at fixed setting point.

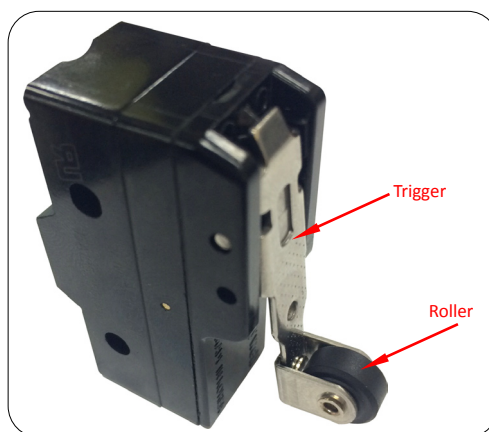


1. GENERAL



On the CAM, there is no device which can change the direction of the rotation. So, it should be checked according to the site condition before setting. It is convenient when maintenance if you memo the direction of rotation and angle of the CAM. Generally, CAM rotates about 330° for whole operating range.

However, there is a difference of rotation angle per product but it is designed to have no problem on the operation.



According to a mechanical specification of micro switch, "A" contact is a normally open (NO) contact as roller is not pushed and trigger is not operated. So, if "A" contact is required, CAM should be set at the point where to push the roller and operate the trigger. On the other hand, "B" contact is a normally close contact (NC) as roller is pushed and trigger is operated. So, CAM should be set on the contrary to "A" contact.

2. CALCULATION OF ROTATION ANGLE

Rotation angle of CAM for each setting point can be calculated as below.

* Equation

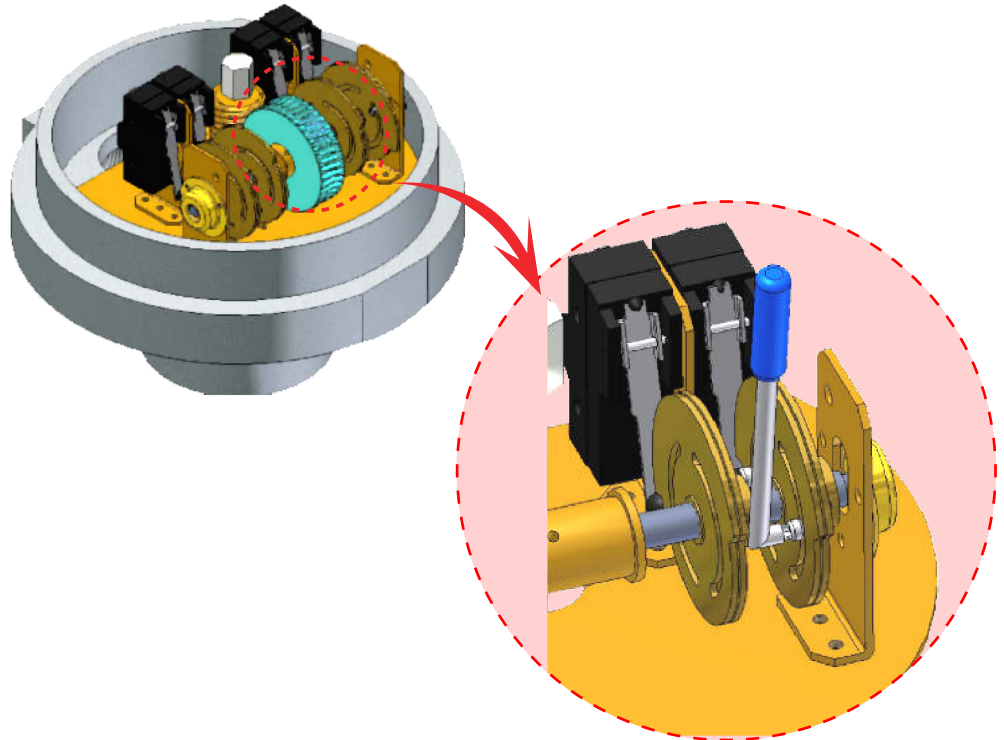
$$\text{Rotation count of Drum} \times \text{Worm Gear Ratio} \times 360^\circ = \text{CAM Angle}$$

For example, worm gear ratio of the tank level gauge with 20M measuring length is 1 : 80 and the drum in the gauge head rotates 66 rev. ($20000\text{mm}/303 = 66 \text{ rev.}$ 303-outside diameter of drum) if the tank is fully occupied (20M), and it rotates a shaft 0.825 rev. ($66 \times 1/80 = 0.825$) due to worm gear ratio. So, the CAM angle can be calculated to 297° ($0.825 \times 360^\circ = 297^\circ$). Therefore, CAM angle of each setting point can be calculated as above and please refer to below example.

(Example) If the setting point is LL=5M, L=10M, H=15M and HH=18M)

LL (5M)	L (10M)	H (15M)	LL (18M)
$5000\text{mm} / 303 = 16.5$	$10000\text{mm} / 303 = 33$	$15000\text{mm} / 303 = 49.5$	$18000\text{mm} / 303 = 59.4$
$16.5 \times 1/80 = 0.2$	$33 \times 1/80 = 0.41$	$49.5 \times 1/80 = 0.61$	$59.4 \times 1/80 = 0.74$
$0.2 \times 360^\circ = 74^\circ$	$0.41 \times 360^\circ = 149^\circ$	$0.61 \times 360^\circ = 223^\circ$	$0.74 \times 360^\circ = 267^\circ$
CAM Angle = 74°	CAM Angle = 149°	CAM Angle = 223°	CAM Angle = 267°

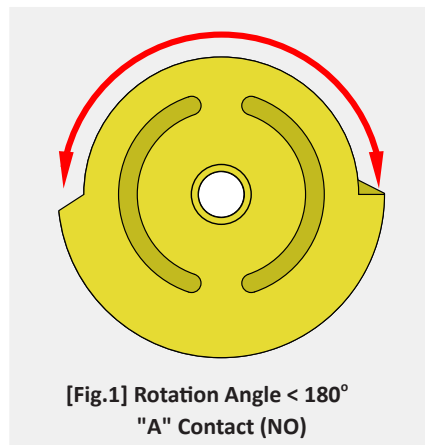
3. SETTING OF CAM ANGLE



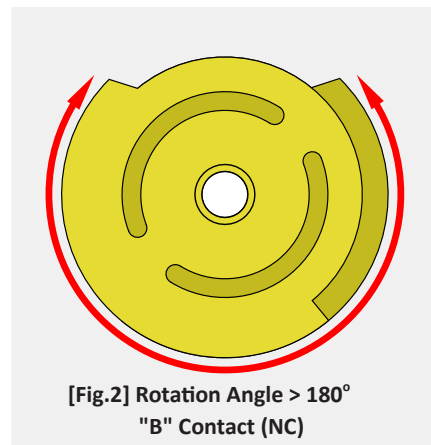
- Step 1 : Prepare a special tool for fastening or unfastening of bolt.
- Step 2 : Calculate each CAM angle and making a note.
- Step 3 : Unfasten the bolt to adjust the CAM angle.
- Step 4 : Adjust the CAM angle for each setting point and screw the bolt tightly.
- Step 5 : Lift up the float to each setting point to confirm the operation of micro switch and check if micro switch is operated by CAM.
- Step 6 : If not, adjust the CAM angle slightly after unfastening of bolt.
- Step 7 : Fasten the bolt to fix the CAM angle.
- Step 8 : Fasten the CAM on the shaft.
- Step 9 : Go back to step 5 to set another CAM angle.

4. HOW TO SELECT THE CONTACT FORM

If the calculated CAM angle is less than 180° , CAM angle should be set using an inner angle according to [Fig.1] and contact form of micro switch will be used "A" contact (NO). Conversely, if the calculated CAM angle is larger than 180° , CAM angle should be set using an outer angle according to [Fig. 2] and contact form of micro switch will be used "B" contact (NC).

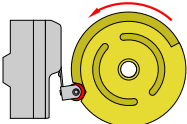
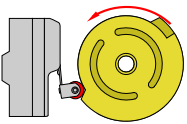
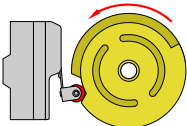
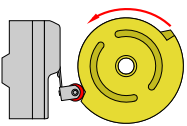
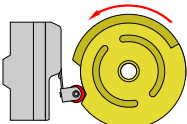
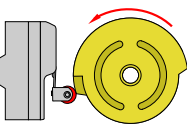
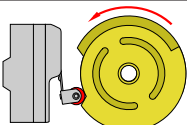
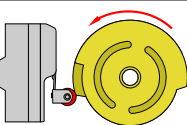
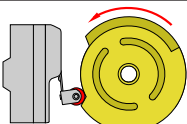
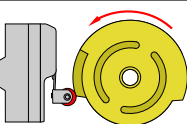
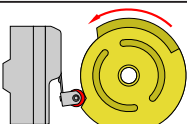
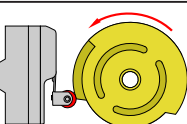
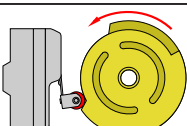
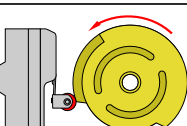
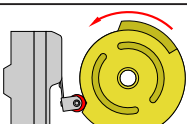
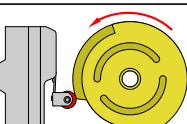
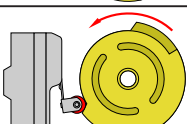
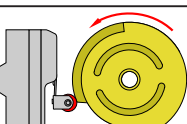
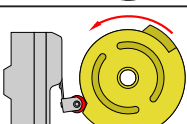
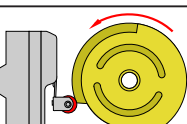


[Fig.1] Rotation Angle $< 180^\circ$
"A" Contact (NO)



[Fig.2] Rotation Angle $> 180^\circ$
"B" Contact (NC)

4. CAM ANGLE AND CONTACT FORM (IN CASE OF 20M MEASURING LENGTH)

Setting Point	CAM Angle	Contact Form	CAM	Setting Point	CAM Angle	Contact Form	CAM
1M	15°	"A" (NO)		11M	163°	"A" (NO)	
2M	30°	"A" (NO)		12M	178°	"A" (NO)	
3M	45°	"A" (NO)		13M	193°	"B" (NC)	
4M	59°	"A" (NO)		14M	208°	"B" (NC)	
5M	74°	"A" (NO)		15M	223°	"B" (NC)	
6M	89°	"A" (NO)		16M	238°	"B" (NC)	
7M	104°	"A" (NO)		17M	252°	"B" (NC)	
8M	119°	"A" (NO)		18M	267°	"B" (NC)	
9M	134°	"A" (NO)		19M	282°	"B" (NC)	
10M	149°	"A" (NO)		20M	297°	"B" (NC)	

WARRANTY

Warranty and After Sales Service

Warranty of the product is 2 years after shipment and it can be warranted for malfunction occurred under use in normal condition, but it maybe charged regardless of warranty period in case that after sales service is requested not for malfunction of the product.

After sales service can be requested at our website or to our factory.

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