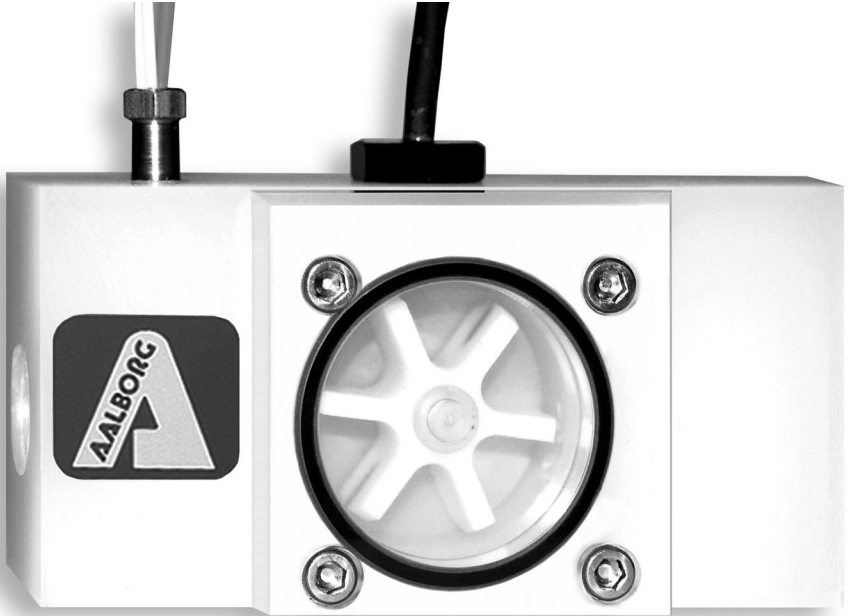


OPERATING MANUAL

PADDLE WHEEL METER



AALBORG®

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CAUTION:

This product is not intended to be used in life support applications!

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1. UNPACKING THE PWM

1.1 Inspect Package for External Damage

Your Paddle Wheel Meter was carefully packed in a sturdy cardboard carton, with anti-static cushioning materials to withstand shipping shock. Upon receipt, inspect the package for possible external damage. In case of external damage to the package contact the shipping company immediately.

1.2 Unpack the Paddle Wheel Meter

Open the carton carefully from the top and inspect for any sign of concealed shipping damage. In addition to contacting the shipping carrier please forward a copy of any damage report to your distributor or Aalborg® directly. When unpacking the instrument please make sure that you have all the items indicated on the Packing List. Please report any shortages promptly.

1.3 Returning Merchandise for Repair

Please contact the customer service representative of your distributor or Aalborg® if you purchased your Paddle Wheel Meter directly, and request a **Return Authorization Number (RAN)**. **Equipment returned without an RAN will not be accepted.** Aalborg® reserves the right to charge a fee to the customer for equipment returned under warranty claims if the instruments are tested to be free from warranted defects.

Shipping charges are borne by the customer. Items returned "collect" will not be accepted!

It is mandatory that any equipment returned for servicing be purged and neutralized of any dangerous contents including but not limited to toxic, bacterially infectious, corrosive or radioactive substances. No work shall be performed on a returned product unless the customer submits a fully executed, signed SAFETY CERTIFICATE. Please request form from the Service Manager.

2. PWM PADDLE WHEEL METERS

2.1 Principles of Operation

PWM liquid flow meters consist of a meter body that is installed in-line in a conduit system. Inside, between the inlet and the outlet connections is a rotary wheel with permanent magnets embedded at 180 degrees in paddles. Fluid flowing through the meter causes the paddle to spin. A magnetic sensor picks up the frequency of pulses, and the readings are proportional to the liquid flow taking place. The number of pulses per unit time interval and a K-factor (pulses/unit of flow) facilitate determining the volumetric rate of flow through the meter.

$$F = \frac{NP \cdot 60}{T_{INT} \cdot K_F}$$

T_{INT} - Pulse measurement interval [sec].

NP - Number of pulses per measurement interval T_{int} .

K_F - K-Factor indicated on PWM Meter [Pulse/Gal]

F - PWM Meter volumetric flow rate [Gal/Min]

3. SPECIFICATIONS

WETTED MATERIALS		
	POLYPROPYLENE UNITS	PVDF UNITS
BODY	Polypropylene	PVDF
LID	Acrylic	PVDF
PADDLE WHEEL	PVDF	PVDF
SHAFT	Nickel Tungsten Carbide	Zirconia Ceramic
BEARINGS	Sapphire Jewels	Sapphire Jewels
O-RINGS	EPDM	PTFE
PLATINUM RTD	316 stainless steel casing	316 stainless steel casing

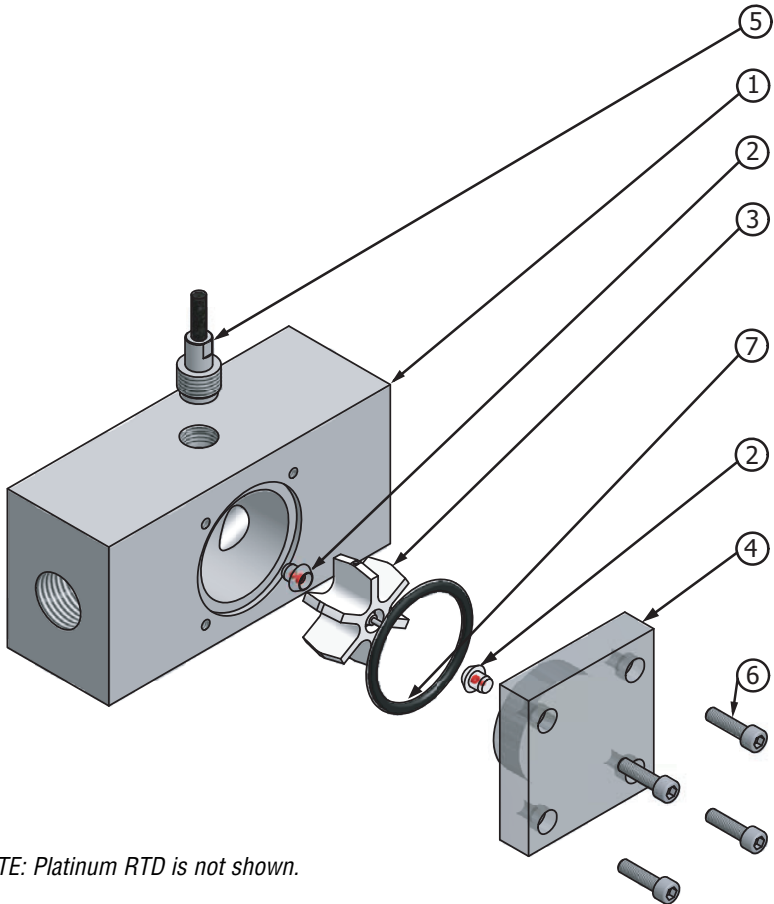
SPECIFICATIONS	
ACCURACY	±1% FS.
MAX TEMPERATURE	60 °C (140 °F).
MAX PRESSURE	10 bar (150 psi).
POWER	5 to 24 Vdc @ 2 mA.
OUTPUT SIGNAL	NPN open collector (load 30 mA max).
DIMENSIONS	56H x 108L x 53D mm (2.2 x 4.25 x 2.2") Without RTD and flow sensor.
CABLE	Flow signal 1.8 m (6') or optional 3.7m (12'). RTD 12 inch long cable.
RTD	Platinum 0.00385 TCR, meets EN 60751, Class B.

FLOW RATE FOR PWM					
METER SIZES	FLOW RATE H ₂ O		Inlet/Outlet Ports Female NPT	Max Pressure Drop	
	[L/min]	Gal/min		Bar	PSI
PWM4	0.15-18.9	0.04-5	3/8"	1	15
PWM6	0.3-37.6	0.08-10	1/2"	1.4	20
PWM8	0.6-64.4	0.15-17	3/4"	1.4	20
PWM10	1.3-132.5	0.35-35	1"	1.4	20

PADDLE WHEEL MODEL NUMBERS			
POLYPROPYLENE	POLYPROPYLENE with RTD	PVDF	PVDF with RTD
PWM4P	PWM4PR	PWM4T	PWM4TR
PWM6P	PWM6PR	PWM6T	PWM6TR
PWM8P	PWM8PR	PWM8T	PWM8TR
PWM10P	PWM10PR	PWM10T	PWM10TR

4. PARTS

PARTS LIST			
	PARTS	PWMP MATERIALS	PWMT MATERIALS
1	LOWER BLOCK	POLYPROPYLENE	PVDF
2	JEWEL BEARING (2 required)	PVDF SAPPHIRE	
3	PADDLE WHEEL	PVDF & NICKEL TUNGSTEN CARBIDE	PVDF & ZIRCONIA CERAMIC
4	LID	ACRYLIC	PVDF
5	SENSOR	NOT WETTED PART	
6	SCREW 8-32 (4 required)	STAINLESS STEEL	
7	O-RING	EPDM	PTFE
8	RTD (Not Shown)	STAINLESS STEEL CASING	



NOTE: Platinum RTD is not shown.

5. INSTALLATION

PWM Paddle Wheel Meters are available with or without optional RTD (Resistance Thermometer Device) probes. NPT female inlet and outlet port sizes are shown in the table in the flow rate on the preceding page.

It is necessary to include an upstream straight pipe of at least five times the inside diameter of the line.

Installation horizontally or vertically is acceptable.

The magnetic sensor requires 5-24 VDC power (30 mA max. load).

Flow sensor connection configuration: RED - 5-26 VDC power (+)
BLACK - POWER (-), COMMON
GREEN - SENSOR NPN OPEN COLLECTOR OUTPUT

“pull-up” resistor is necessary for PLC input with current sourcing. Recommended value: 2.2 K Ohm for 24 VDC input.

PWM meters supplied with (four wire) RTD options are connected using the stainless steel temperature sensor adapter supplied.

6. MAINTENANCE

6.1 Sensors

In rare instances, due to electrical damage, the pulse sensor needs to be replaced by unscrewing it and installing a replacement (hand tight).

The RTD /adapter subassembly is replaceable using a wrench.

6.2 Paddle Wheel Disassembly

Bearings are highly susceptible to careless disassembly and reassembly practices. The nickel Tungsten Shaft of the Wheel is supported at each end by sapphire bearings to minimize friction and facilitate very low flow rate measurements.

The Wheel may be uninstalled by holding the Lid in place, and removing the four mounting screws, very carefully to prevent damaging the sapphire Bearings at each end of the Shaft. If the Bearings are shattered, they need to be replaced.

Reassembly is made ensuring that the Shaft ends are inserted gently into the sapphire Bearings. Check to see if the wheel is free to spin before the Lid Bearing is installed. While holding the Lid in place, blow into the meter to verify that the Wheel is free to spin. Finally the Lid is reinstalled using the four mounting screws.



CAUTION: Never use compressed air or gases to test the meter, as this would damage the Bearings.

WARRANTY

Aalborg® Paddle Wheels are warranted against parts and workmanship for a period of one year from the date of purchase. It is assumed that equipment selected by the customer is constructed of materials compatible with gases used. Proper selection is the responsibility of the customer. It is understood that gases under pressure present inherent hazards to the user and to equipment, and it is deemed the responsibility of the customer that only operators with basic knowledge of the equipment and its limitations are permitted to control and operate the equipment covered by this warranty. Anything to the contrary will automatically void the liability of Aalborg® and the provisions of this warranty. Defective products will be repaired or replaced solely at the discretion of Aalborg® at no charge. Shipping charges are borne by the customer. This warranty is void if the equipment is damaged by accident or misuse, or has been repaired or modified by anyone other than Aalborg® or factory authorized service facility. This warranty defines the obligation of Aalborg® and no other warranties expressed or implied are recognized.

*The selection of materials of construction, is the responsibility of the customer.
The company accepts no liability.*

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