truflo®

Distributor
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Quick Start Manual

(Industry's Toughest Built Paddle Wheel Flow Meter)

No Calibration Required

Plug & Play

No K-Factor Programming

TK SERIES

⚠ **Read the User's Manual Carefully before Starting to Use the Unit.**

All TK Series Flow Meters are Factory Calibrated and do not require K-flow Factor Programming.

Manufacturer reserves the right to implement changes without prior notice.

Product Selection

EXAMPLE :

TKP —— 25 —— A —— PVC
(1) (2) (3) (4)

SERIES

TKM = Paddle Wheel Flow Meter with Transmitter
4 -20mA + (Flow Rate NPN Pulse + Totalizer NPN Pulse)
TKP = Paddle Wheel Flow Meter & Flow Totalizer
+ (Flow Rate NPN Pulse + Flow Totalizer NPN Pulse)
TKS = Paddle Wheel Flow Meter with Relay Output
+ (Flow Rate NPN Pulse)

PIPE SIZE

15 = (½") **20** = (¾")
25 = (1") **40** = (1 ½")
50 = (2") **80** = (3") **100** = (4")

COMMUNICATION OR TRANSMITTER

Non = Without Communication
RS = TKP Series with RS-485 MODBUS Selectable
A = TKM Series with Transmitter (4 -20mA) + NPN Pulse Output

BODY MATERIAL

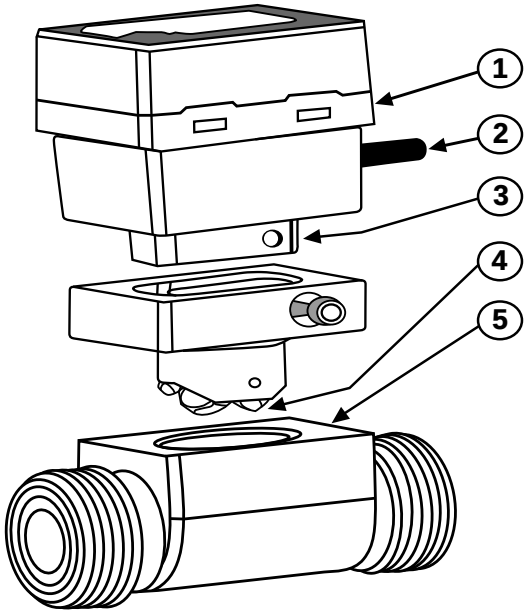
PVC = PVC
PP = Polypropylene
ST = 316 SST (Special Order)

CONNECTION METHOD

STD = Wire Lead (3m) - Other Lengths Available
M12 CONNECTOR-

Parts TK Series

1. Flow Controller
2. Lead Wire
3. Hall Sensor
4. Paddle Wheel
5. Body (PVC, PP, 316 SST)



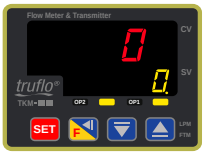
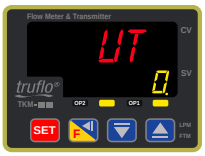
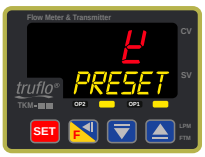
General Data

SPECIFICATION	DESCRIPTION
Fluid	Water or Liquid Chemicals - Viscosity Range: 5-20 centistokes
Accuracy	> ± 1.0% of F.S. @ 20°C (68°F) - Repeatability ± .5% of Full Scale
Max Flow Velocity	10 m/s max - (32.8 ft/s max) (8 ft/s is recommended max Velocity for Plastic Piping)
Min Flow	0.3 m/s min. - (.98 ft/s min)
Operating press	150 psi 10 BAR
Turndown	33:1
Response time	Real Time
Material of Construction	**Paddle :** Tefzel **Body :** PVC/PP/316 **Shaft :** Zirconium Ceramic **Seals :** EPDM/FPM
Operating Temperature	PVC < 60°C (140°F) PP < 80°C (176°F) 316 SST< 120°C (248°F)
Electronics	-13 - 122°F (-25 - 50°C)
Protection Class	IP66 NEMA 4X
Approval	CE Rohs
Operating Voltage	10 - 30VDC

Programming TKP/TKM Model

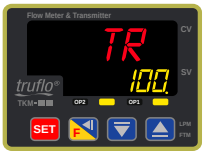
Please Follow Hand To Program

TKP/TKM Series Only

24V DC POWER ONLY	DISPLAY	DESCRIPTION
Step-1 **Home Screen** Press SET + F (Together) [SET] + F HOLD (3 sec)		**TKP/TKM Series Only** **Power On Flow Meter with DC Power** Display will Show **0 Totalizer (Top)** **0 Flow Rate (Bottom)**
Step-2 **Programming of Lock Out Feature** Press SET [SET]		**Programming Lock Out Feature** **TKP/TKM Series** **Lck** = 10 (Unlocked) : Factory Default, IF **Lck** is Changed from the # 10 the Flow Meter will be in Lockout Mode. **LCK 10 (Default)** To Unlock ensure **Lck** # is set to 10.
Step-3 **Programming Units of Flow** Press SET [SET]		**Programming Units of Flow** **TKP/TKM Series Only** Program Flow Units 0,1,2,3 Ut = 0 : (LPM) Ut = 1 : (GPM) Ut = 2 : {Kiloliter (KL)} **UT 1 (Default)**
No Programming Required **Step-4** **Coefficient of Flow Volume** Press SET [SET]		**TKP/TKM Series** K-Factor : 0.1 - 999.9 (K-Factor is Factory Preset) **K-Factor Preset (Do Not Change)** *Divide K Factor BY 3.8 TO CHANGE FROM GPM TO LPM

Step - 5 For Programming 4-20mA Analog Output

TKM (4-20mA) and TKP with (RS 485 Option) Only

Step-5 **Program Range of Transmitter (TKM Series Only)** Press SET [SET]		**TKM + TKP (RS 485 Only)** Programming Analog Transmitter Range Output 4-20mA Range : 0.1 - 999.9 4 mA = 0 20 mA = Entered Number. **TR 100 (Default)** 4 mA = 0 GPM 20mA =100 GPM This can be Change to Conform to Customers Application Ex. Number Changed to 150

Programming NPN Pulse Output (TKP / TKM Series)

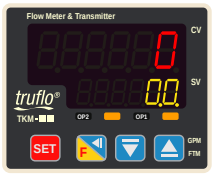
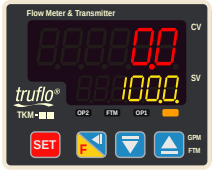
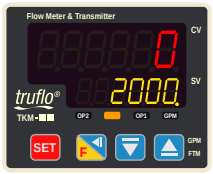
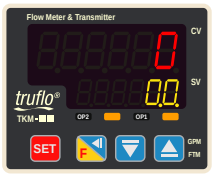
Please Follow Hand To Program

Important

Steps Only Necessary If NPN Pulse Output is Required

TKP/TKM Series Only

TKP/TKM Series Only

FUNCTION OF METER	DISPLAY	DESCRIPTION
Step-1 **Programming Flow Meter** Press Then Press SET SET Press then Press Set & Adjust		**TKP/TKM Series Only** **CV** Display Reads 0 **SV** Display Reads 0 **0** Totalizer Default **0.0** Flow Rate Default **CV = Current Value** **SV = Programmed Value**
Step-2 **Op1** **Programming Flow Rate Pulse Output** Press To Change Value		**TKP/TKM Series Only (Pulse ON-OFF)** **CV** Program Value of (**Flow Rate) Pulse (NPN) Output** Preset Value of Flow Rate Change to a Value that meets your Flow Rate Pulse Output **SV** CV ≥ SV ⟶ Flow Rate Pulse Output ON CV < SV ⟶ Flow Rate Pulse Output OFF **1000 Default** (One Pulse Per Gallon Default) (**Flow Rate) Pulse**
Press SET to Move to Save and Move to Next Screen		
Step-3 **Op2** **Programming Flow total Pulse Output** Press Then Press SET SET		**TKP/TKM Series Only** **CV** Program Value of **Flow Totalizer Pulse (NPN) Output** SV : Preset value of Flow Total **SV** CV ≥ SV ⟶ Flow Rate output ON **2000 Default** this can be Changed to Desired Value Refer to Next Page Programming OP2 Output for Options for Totalizer **Flow Totalizer Pulse (Step #2-Next Page)**
Press SET Button to Move to Save Add Move to Next Screen		
Step-4 **Programming Flow total Pulse Output** Press		**TKP/TKM Series Only** **Return to Home Screen** **0** Totalizer Default **0.0** Flow Rate Default

- **Op1 & Op2 = 150mA Max Switching Currency Current + Consumption is 60mA Max.**
- **CV = Current Value = Current Flow Rate on Display**
- **SV = Selected Value (Programmed Value Customer Entered)**
- **NPN Pulse is a Relay Transistor**

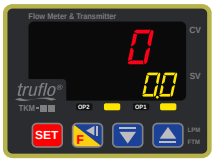
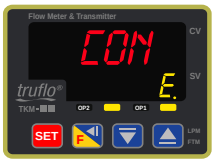
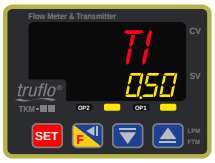
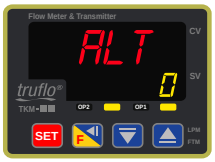
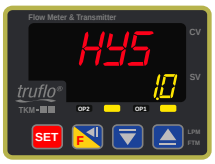
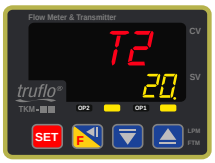
Programming NPN Pulse Control Function (TKP / TKM Model Only)

OP1 = NPN Pulse Output (Flow Rate)
OP2 = NPN Pulse Output (Flow Totalizer)

Please Follow Hand To Program

TKP/TKM Series Only

TKP/TKM Series Only

FUNCTION OF METER	DISPLAY	DESCRIPTION
Step-1 Home Screen (Flow Rate) Press SET [SET] HOLD (3 sec)		**Power On Flow Meter With 10-30 V DC** **0 Flow Totalizer** **0.0 Flow Rate**
Step-2 OP2 Programming OP2 Output Pulse Control (Totalizer) Press SET [SET]		**TKP/TKM Series Only** **Progam (NPN) Pulse Output (OP2) Totalizer** Range E.n.r.c. Con = n : Manual Reset; Con = c : time (1=10 Secs) Auto Reset Using Timer Con = c : time (secs) Auto Reset Using Timer i.e 5 =Pulse On (5 secs) Con = r : Auto Reset when Total Volume Value = Selct Value (SV) Con = E : Pulse Output of Unit volume (Default) = One Gal/Pulse Con = F ----> Paddle Pulse ----> Frequency Max 5 KHZ Con = E (Default)
Step-3 OP2 Programming OP2 Output Pulse Reset Time Press SET [SET]		**TKP/TKM Series Only (Length of Time Pulse relay remains On)** **Program Output NPN Pulse Reset Time For Totalizer** Range : 0 - 999.99 sec **T1 Only Applicable if Con r or Con C are Selected above if (Con = n or E ----> Timer Control ----> will not be an option)** **T1 0.50 Sec (Default)**
Step-4 OP1 Programming (OP1) Output Pulse Option (Flow Rate) Press SET [SET] HOLD (3 sec)		**TKP/TKM Series Only** Program Flow Rate Pulse (NPN) Output (OP1) Range: 0 - 3 CV > SV ----> Pulse (NPN) ON CV < SV - HYS ----> Pulse (NPN) OFF CV > SV ----> Pulse (NPN) ON CV > SV + HYS ----> Pulse (NPN) OFF **ALT 0 (Default) Most Common** **CV = Current Value** **SV = Programmed Value** **Hys = See below**
Step-5 OP1 Programming Hysteresis of Output Flow Rate Pulse Press SET [SET] HOLD (3 sec)		**TKP/TKM Series Only** Program Hysteresis of NPN Output Pulse Range 0.1-999.99 (GAL) Hysteresis **HYS ± 1.0 GPM (Default)** Hys - Hysteresis is a buffer around the Programmed Set Point Example (Example) Liquid Caused by Pump Stopping or Valve Closing i.e.-sloshing
Step-6 OP1 Programming OP1 Power on Delay Time For Initial Start UP (Sec) Press SET [SET]		**TKP/TKM Series Only - Flow Rate** Program Time Delay for NPN Pulse (OP1) on Initial Start Up Range : 0-9999 (Secs) Time Delay of Pulse Output (Flow Rate) **T2 = 20 (Secs) (Default) Flow Rate**

OP1 = NPN Pulse Output (Flow Rate)
OP2 = NPN Pulse Output (Flow Totalizer)

CV = Current Value SV = Programmed Value

Mode of NPN Pulse Output TKP/TKM Models

ALT NO.	DESCRIPTION
ALt = 0	CV > SV ⟶ ON: CV < SV - HyS ⟶ OFF
ALt = 1	CV < SV ⟶ ON: CV > SV + HyS ⟶ OFF
ALt = 2	SV + HyS > CV > SV - HyS ⟶ ON: CV > SV + HyS or CV < SV - HyS ⟶ OFF
ALt = 3	SV + HyS > CV > SV - HyS ⟶ OFF: CV > SV + HyS or CV < SV - HyS ⟶ ON

Current Value = Flow Rate	SV = Selected Value = Programmed Value (Customer)
Hys = Hysteresis ACTS Lika Buffer ± Around Pulse Output (Measured in GPM)	

K-Factors for TK Series Flow Meters (All Models)

Size	LPM	GPM
½"	32.6	124
¾"	18.9	72
1"	14.2	54
1 ½"	5.0	19
2"	2.7	10.3
3"	1.2	4.7
4"	0.6	2.1

Required when programming remote display or controller.

K-Factor Pre Programmed by Factory - No Flow Meter Programming of a K-Factor is required.

Programming TKS Model Only

Please Follow Hand To Program

TKS Series Only

TKS Series Only

FUNCTION OF METER	DISPLAY	DESCRIPTION
Step-1 **Home Screen** Press SET + [SET] + F HOLD (3 sec)		**TKS Series Only** Power Up Flow Meter with DC Power **000.0**
Step-2 **Progamming Lock Output** Press SET [SET]		Programming Lock - Out Secure Feature Lk = 10 (Unlocked Status) - **(Default)** Changing Number will Lock Flow Meter **LK.10 (Default)** **10 = Unlocked** If any other Number is entered the Programming will be restricted
Step-3 **No Programming Required K Value** Press SET [SET]		K-Factor Range : 0.1-999.9 (Depends on Meter Size - Factory Pre-Programmed) Ut = 0 : (LPM) Ut = 1 : (GPM) Ut = 2 : {Kiloliter (KL)} **UT 1 (Default)** K Value Preset (Do Not Change)
Step-4 **Programming Communication Output Type** Press SET [SET]		Programming NPN Pulse Output con.E - Output = 1 Pulse / Gal con.F - Paddle Pulse Output 5KHZ MAX-Remote Display **con.E (Default)**
Step-5 **Programming of Relay Set Point** Press SET [SET]		Programming Relay Setpoint ON - OFF Options Select ALT.0 ALT.1 ALT.2 ALT.3 **ALT.0 (Default)** See Next Page for Relay Alarm Options
Step-6 **Programming Relay Time Delay** Press SET [SET]		Programming Initial Start-Up Relay Time Delay Range : 0-99 sec Delay Time to Power on Alarm Output Relay **T.20 (Default)** (20 Seconds) Initial Start up of Flow Meter or Process (Allows for System Steady State before Relay Switch becomes Active).

Programming TKS Model Only

Program Relay Set Point And Relay Delay (Prevents Relay Chatter)

Please Follow Hand To Program

TKS Series Only

TKS Series Only

FUNCTION OF METER	DISPLAY	DESCRIPTION
Step-1 **Home Screen** Press SET [SET] HOLD (3 sec)		Power On Flow Meter - 24VDC **000.0 (Defaut) Home Screen**
Step-2 **Programming Relay Set Point** Press SET [SET]		Programming Relay Set Point. (When Relay Switches) Range : 0.1 - 999.9 GPM **100.0 GPM (Defaut)** Relay will Activate when this Set Point or (Flow Rate) is Reached
Step-3 **Programming Relay Hysteresis** Press SET [SET]		Program Relay Hysteresis - Prevents Relay Chatter -Due to Constant Flow Rate Change around Setpoint in Dynamic Flow Process (Cushion ±) (Prevents Relay **d = Delay 0.10 (Defaut) GPM**

- **In the Programming Stage, the Display will Flash**

Relay ON - OFF Options For TKS Series Only (Not for TKP/TKM Series)

TKS Series Only

ALT NO.	DESCRIPTION
ALt = 0	CV > SV ⟶ Relay ON : CV < SV - d ⟶ Relay OFF
ALt = 1	CV < SV ⟶ Relay ON : CV > SV + d ⟶ Relay OFF
ALt = 2	SV + d > CV > SV - d ⟶ Relay ON: CV > SV + d or CV < SV - d ⟶ Relay OFF
ALt = 3	SV + d > CV > SV - d ⟶ Relay OFF: CV > SV + d or CV < SV - d ⟶ Relay ON

CV = Current Display Value = Flow Rate

SV = Selected Value = Programmed Value

d = (GPM) Hysteresis Measured around Relay Set Point (± Measured in Gallons)

General Terms

1) **K** : Coefficient of Flow Volume, **Note : Factory Set Do Not Change**

2) **tr** : TKM Range of Transmitter - Flow Rate 4-20 mA ⟶ 4mA = 0 20mA = Max Range
TKP - RS 485 Option

3) **NPN :** Transistor Relay - No Moving Parts

5) **Con :** Output Control of Flow Total OP2, Con = n ⟶ Manual Reset
Con = C - Time Reset (1=10 Secs) ⟶ Auto Reset, Con = r ⟶ Auto Reset,
Based on Volume (GPM) Con = E ⟶ Pulse Output of Unit Volume,
Con = F ⟶ Pulse Output of Paddle = 5 KHZ Max

Important

Totalizer Reset TKP/TKM
To Reset the Flow Totalizer to Zero Press

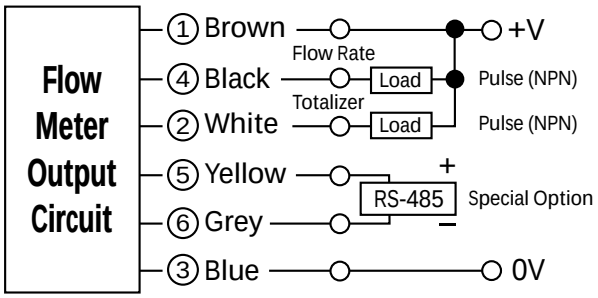
for (3 sec)

Important

Standard Pipe Size

Pipe Size (O.D.)	ANSI (ID) (Inches)		DIN (ID) (mm)	Flow Rate (LPM) / USGPM	
	Sch (40)	Sch (80)		0.3m/s min.	10m/s max.
DN15 (1/2")	0.62	0.55	Ø20	3.5 / 1.0	120 / 32
DN20 (3/4")	0.82	0.74	Ø25	5.0 / 1.5	170 / 45
DN25 (1")	1.00	0.96	Ø32	9.0 / 2.5	300 / 79
DN40 (1 ½")	1.40	1.50	Ø50	25.0 / 6.5	850 / 225
DN50 (2")	2.00	1.90	Ø63	40.0 / 10.5	1350 / 357
2 ½	2.50	2.30	Ø75	60.0 / 16	1850 / 357
DN80 (3")	3.10	2.90	Ø78	90.0 / 24	2800 / 739
DN100 (4")	4.00	3.80	Ø96.50	125.0 / 33	4350 / 1149

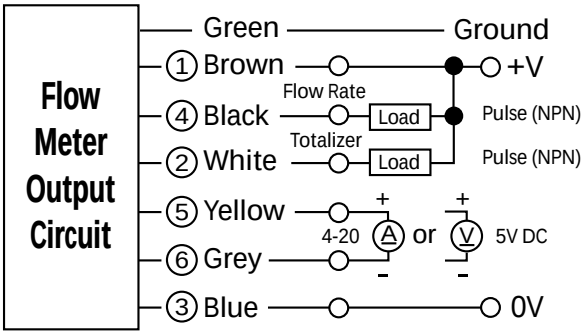
MODEL TKP
FLOW RATE + FLOW TOTALIZER + NPN PULSE



- **Yellow & Grey with RS485 (Only) Black Wire can be Changed for Flow Total Limit Output or Unit Volume Pulse Output**

Brown	10 - 30 VDC (+)	Yellow	(+) RS-485 (OPT)
Blue	0V (-)	Grey	(-) RS-485 1 OPT RS485 is a Special Order Item
White	Totalizer Pulse Output NPN	Black	Flow Rate Pulse Output (NPN)

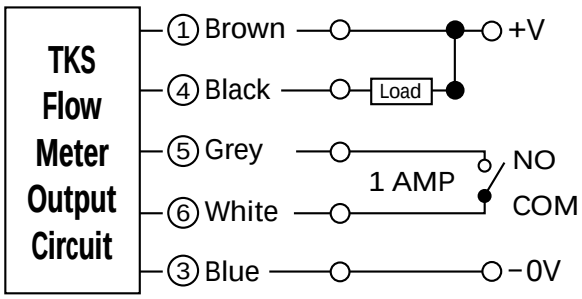
MODEL TKM(4-20mA Or 0-5V DC + NPN Pulse)
FLOW RATE + FLOW TOTALIZER + PULSE



- **Black Wire can be Changed for Flow Total Limit Output or Unit Volume Pulse Output**

Brown	10 - 30 VDC (+)	Yellow	+ (4-20mA) or (0-5V)
Blue	0V (-)	Grey	Totalizer Output NPN (4-20mA or 0 - 5V DC) (4-20mA Default -0-5VDC Option-Special Order)
White	Totalizer Pulse Output NPN	Black	Flow Rate Pulse Output NPN

MODEL TKS NPN
(FLOW RATE - RELAY + PULSE)



- **Black Wire is a Unit Volume NPN Pulse Output-1 pulse for every gallon**

Brown	10 - 30 VDC (+)	White	COM
Blue	0V (-)	Grey	NO
Black	Flow Rate Pulse Output (NPN)		1 Amp

NOTES

TKP - Yellow & Grey wires with RS - 485 Option Only

Current output (4 - 20mA) : 120 Ω max.
Voltage output (0 - 5V) : 10K Ω min.

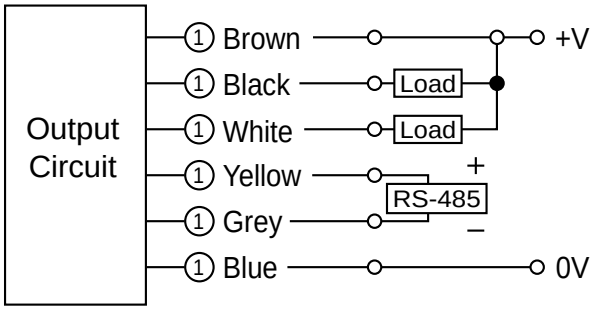
NOTE - DC Power Only

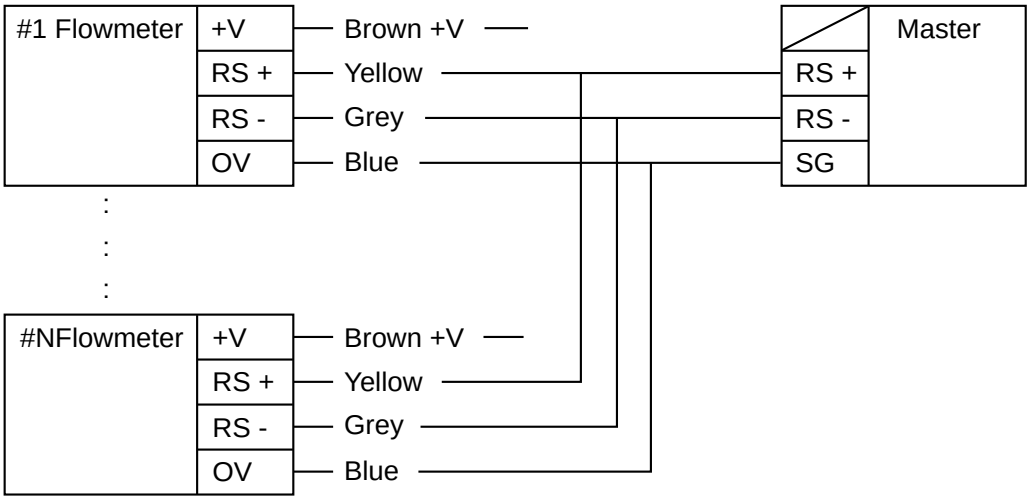
TKM Series (0-5VDC) Optional 4-20mA is Standard

Instruction Manual / RS-485
RS-485 Modbus Protocol -IV

Thank you very much for using Truflo TK series flow meter Please read this instruction manual before operating it to avoid from the malfunction.

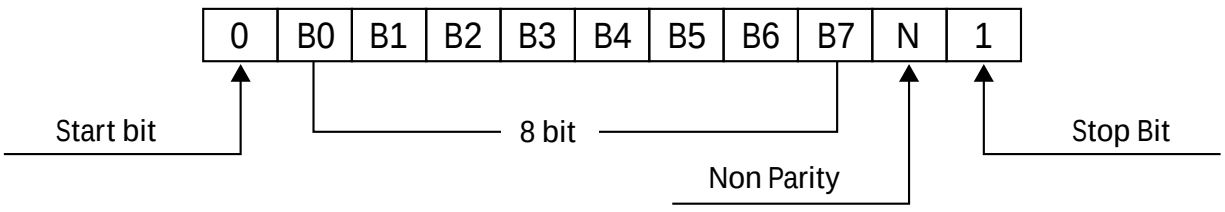
Connection Diagram





Communication Standard	EIA-RS 485	Communication Speed	9600 or 19200 or 38400 bps
Communication Mode	RS=0 : 「MODBUS- RTU mode」 RS=1 : 「MODBUS-ASCII mode」	Communication Station No.	ID No. = 01 ~ 99 (01H ~ 63H)

Configuration of Communication (8N1)



(Max Fluid Velocity should NOT EXCEED 8 ft/sec)

RS-485 communication
Address of parameter register

Address No.	Parameter	Description	Read Write	Decimal point	Range of Data
00H 01H	Lck	Lock setting	R / W	0	0 ~ 9999
00H 01H	Ut	Unit selecting	R / W	0	0 ~ 3
00H 01H	k	K value setting	R / W	1	0.1 ~ 999.9
00H 01H	t r (iLo word)	Transmitter range	R / W	1	0.1 ~ 9999.9
00H 01H	t r (iHi word)				
00H 01H	SPn	Transmitter span	R / W	3	0.000 ~ 9.999
00H 01H	OSt (iLo word)	Transmitter offset	R / W	3	0.000 ~ 999.999
00H 01H	OSt (iHi word)				
00H 01H	Con*	Control mode	R / W	0	0 ~ 3
00H 01H	t 1	Reset time	R / W	2	0.1 ~ 999.9
00H 01H	ALt	Output status (LPM Op 1)	R / W	0	0 ~ 3
00H 01H	HYS	Hysteresis (LPM)	R / W	1	0.1 ~ 999.9
00H 01H	t 2	Delay time (OP1)	R / W	0	0 ~ 99
00H 01H	r S*	RS-485 mode	R / W	0	0 ~ 1
00H 01H	bPS*	Baud rate	R / W	0	0 ~ 2
00H 01H	I d	Station No.	R	0	0 ~ 99
00H 01H	SV1 (Lo word)	Flow rate setting	R / W	1	0.0 ~ 99999.9
00H 01H	SV1 (Hi word)				
00H 01H	SV2 (Lo word)	Flow volume setting	R / W	0	0 ~ 999999
00H 01H	SV2 (Hi word)				
00H 01H	PV (Lo word)	Flow rate value	R	1	0.0 ~ 99999.9
00H 01H	PV (Hi word)				
00H 01H	CV (Lo word)	Flow volume value	R / W	0	0 ~ 999999
00H 01H	CV (Hi word)				
00H 01H	Output status*	Out1 & Out2 output status	R	0	0 ~ 3

Decimal point FAll value of the parameter is processed to integer, Ex. 「123.4」 「1234」

「Con*」 : 「0」 = 「n」, 「1」 = 「r」, 「2」 = 「c」, 「3」 = 「E」

「ur S*」 : 「0」 = 「Modbus - RTU mode」, 「1」 = 「Modbus - ASCII mode」

「bPS*」 : 「0」 = 「9600」, 「1」 = 「19200」, 「2」 = 「38400」

Output Status****

Data	Out1	Out2	Data	Out1	Out2	Data	Out1	Out2	Data	Out1	Out2
00H 00H	Off	Off	00H 01H	On	Off	00H 02H	Off	On	00H 03H	On	On

Remarks

Symbol	ASCII code	Description	Symbol	ASCII Code	Description	Symbol	ASCII Code	Description
@	40	Start code	C	43	Hex	4	34	Hex / BCD
R	52	Read	D	44	Hex	5	35	Hex / BCD
W	57	Write	E	45	Hex	6	36	Hex / BCD
CR	0D	Stop code	F	46	Hex	7	37	Hex / BCD
-	2D	Minus	1	31	Hex / BCD	8	38	Hex / BCD
A	41	Hex	2	32	Hex / BCD	9	39	Hex / BCD
B	42	Hex	3	33	Hex / BCD	:	3A	Hex

(Max Fluid Velocity should NOT EXCEED 8 ft/sec)

Message format

MODBUS RTU	Read command :	Station No.	Function code	Address	Batches of Data	CRC
	Read response :	Station No.	Function code	Data byte counts	Data	CRC

MODBUS ASCII	Read command :	Start code	Station No.	Function code	Address	Data	LRC	Stop code
	Read response :	Start code	Station No.	Function code	Address	Data	LRC	Stop code

Function code

Function code	Function	Description
03H	Read	To read the data on register
06H	Write (Single word)	To write the preset value on register
10H	Write (Double word)	To write the preset value on register
08H	Diagnose	To diagnose the error of message format

Ex : 「Read the CV value (flow volume) of No.01 flow meter ; CV=123456 (01E240H) (Liters)」and
「Write the K value (K factor) of No.01 flow meter ; K=123.4 (04D2H) 」
「Write the SV1 value (Flow rate setting) of No.01 flow meter; SV1=12345.6 (01E240H)」
(Station No= 01H,CV address = 22H/23H,CV = 123456 (01E240H) , K address = 03H,K=123.4 (04D2H)
(SV1 address = 14H/15H, SV1 = 123456 (01E240H)

Communication mode : 「RS = 0 : MODBUS . RTU code」					
Read command	Station No.	Function code	Address	Batches of data	CRC
	01H	03H	00H 22H	00H 02H	64H 01H
Read response	Station No.	Function code	Data byte counts	Data	CRC
	01H	03H	04H	E2H 40H 00H 01H	E2H A3H
Write command	Station No.	Function code	Address	Data	CRC
	01H	06H	00H 03H	04H D2H	FBH 57H
Write response	Station No.	Function code	Address	Data	CRC
	01H	06H	00H 03H	04H D2H	FBH 57H
Write command	Station No.	Function code	Address	Data	CRC
	01H	10H	00H 14H	E2H 40H 00H 01H	56H 69H
Write response	Station No.	Function code	Address	Data	CRC
	01H	10H	00H 14H	E2H 40H 00H 01H	56H 69H

Communication mode : 「RS = 1 FMODBUS . ASCII code」							
Read command	Start code	Station No.	Function code	Address	Batches of data*	LRC	Stop code
	3AH	30H 31H	30H 33H	30H 30H 32H 32H	30H30H 30H32H	42H 36H	0DH 0AH
Read response	Start code	Station No.	Function code	Data byte counts**	Data	LRC	Stop code
	3AH	30H 31H	30H 33H	30H 34H	*1	33H 43H	0DH 0AH
Write command	Start code	Station No.	Function code	Address	Data	LRC	Stop code
	3AH	30H 31H	30H 33H	30H 30H 30H 33H	*2	39H 43H	0DH 0AH
Write response	Start code	Station No.	Function code	Address	Data	LRC	Stop code
	3AH	30H 31H	30H 33H	30H 30H 30H 33H	*2	39H 43H	0DH 0AH

Data byte counts** : 2 ASCII code byte = 1 data byte

*1 : 45H 32H 34H 30H 30H 30H 30H 31H (4 data bytes) *2 : 30H 34H 44H 32H (2 data bytes)

(Max Fluid Velocity should NOT EXCEED 8 ft/sec)

Calculation of「FCS」

(RS = 0 FMODBUS . RTU code) : FCS = CRC .16 (Cyclic redundancy check)
Procedure of CRC-16 calculation

1. To load FFH FFH to the 16 bit CRC register
2. To exclusive OR (*) the first byte of the message format with the low order byte of the 16 bit CRC register, then put the result in the 16 bit CRC register.
3. To shift the CRC register one bit to right (toward the LSB) and fill the MSB with zero.
4. To repeat the step 3 If the carry flag is 0 (LSB is 0), Exclusive OR the CRC register with A001H which is the value of polynomial if the carry flag is 1 (LSB is 1), then put the result in the 16 bit CRC register.
5. To repeat the step3 and 4 until the 16 bit CRC register is shifted 8 times
6. To repeat from step 2 to step 5 for the next byte of the message format until final byte of message is completed. (Except the CRC bytes)
7. To get the CRC value by changing the high order and low order byte of the final CRC register.

(RS = 1 FMODBUS . ASCII code) FFCS = LRC
Procedure of LRC calculation

1. To add all bytes in the message format, excluding the start code「F」and ending code (0DH 0AH), then put this value in an 8-bit field.
2. To get a Two's complement from this 8-bit field. it is named「Y」(8-bit field also)
3. To get the LRC value by changing the Hex code to ASCII code from the「Y」.

Error response code

Message format

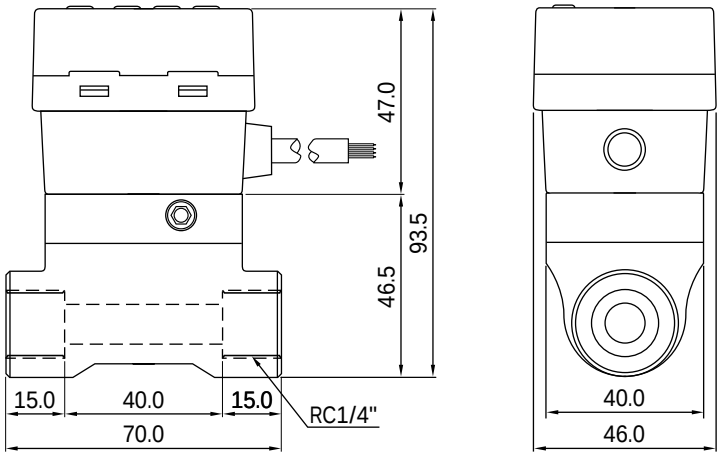
RS = 0 FMODBUS . RTU code				
Function	**Station No.**	**Function code**	**Error code**	**FCS**
Read	01H ~ 63H	83H	01H ~ 05H	CRC-16
Write	01H ~ 63H	86H	01H ~ 05H	CRC-16

RS = 1 FMODBUS . ASCII code						
Function	**Start code**	**Station No.**	**Function code**	**Error code**	**FCS**	**Stop code**
Read	3AH	30H 31H ~ 36H 33H	38H 33H	30H 31H ~ 30H 35H	LRC	0DH 0AH
Write	3AH	30H 31H ~ 36H 33H	38H 36H	30H 31H ~ 30H 35H	LRC	0DH 0AH

Error code					
Code		**Description**	**Code**		**Description**
MODBUS – RTU	01H	Command error	MODBUS – RTU	03H	Data overflow error
MODBUS – ASCII	03H 31H		MODBUS – ASCII	30H 33H	
MODBUS – RTU	02H	Address overflow error	MODBUS – RTU	04H	Data error
MODBUS – ASCII	30H 32H		MODBUS – ASCII	30H 34H	
MODBUS – RTU	05H	CRC or LRC error			
MODBUS – ASCII	30H 35H				

(Max Fluid Velocity should NOT EXCEED 8 ft/sec)

Dimensions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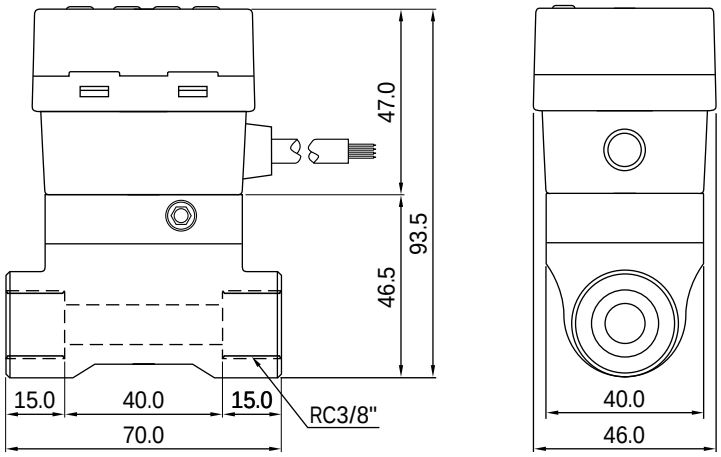
93.5
46.5
15.0
40.0
15.0
70.0
RC1/4"
40.0
46.0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46.5
15.0
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15.0
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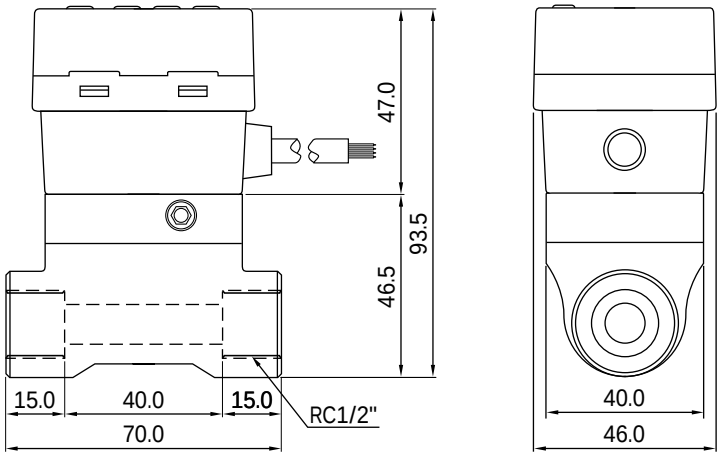
RC3/8"
40.0
46.0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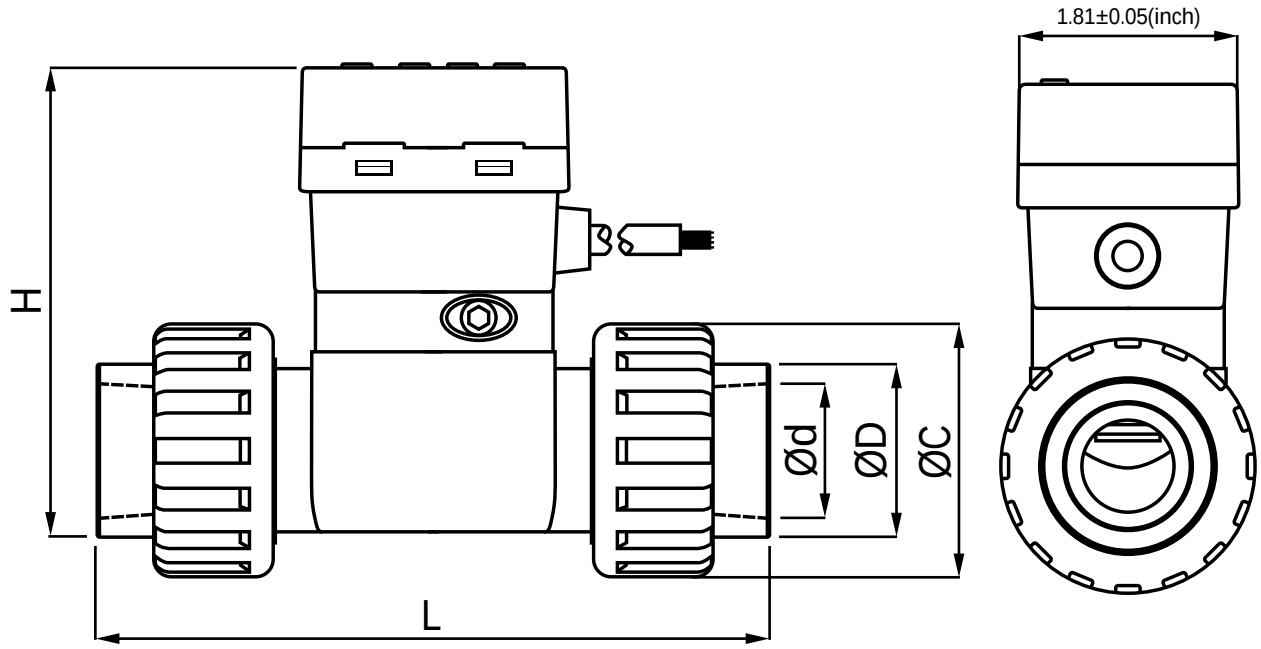
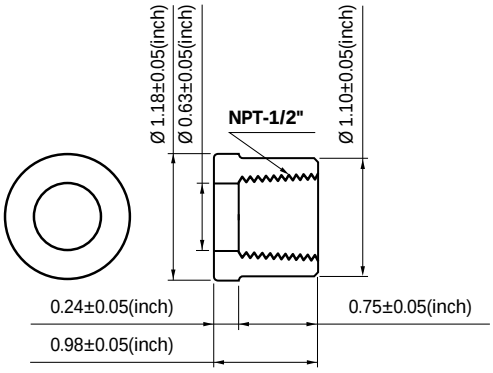
15.0
70.0
RC1/2"
40.0
46.0

Dimensions

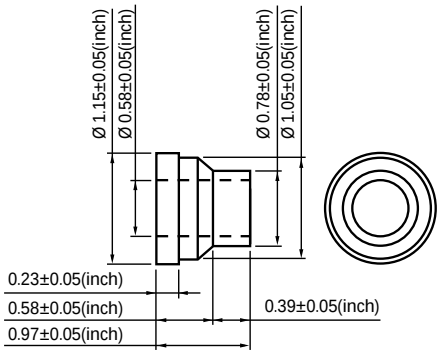


Pipe Size	H (inch)	L (inch)	Ød (inch)	ØD (inch)	ØC (inch)
(1/2") DN (15)	4.09±0.05	5.48±0.05	0.84±0.05	1.07±0.05	1.61±0.05
(3/4") DN (20)	4.17±0.05	6.12±0.05	1.05±0.05	1.36±0.05	2.08±0.05
(1") DN (25)	4.30±0.05	6.76±0.05	1.32±0.05	1.68±0.05	2.36±0.05
(1-1/2") DN (40)	5.02±0.05	7.66±0.05	1.91±0.05	2.33±0.05	3.26±0.05
(2") DN (50)	5.56±0.05	8.39±0.05	2.38±0.05	2.86±0.05	4.33±0.05

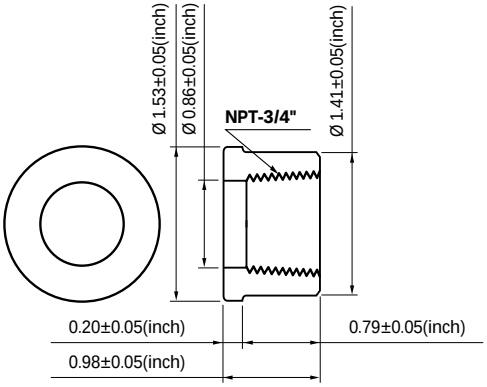
½" DN15-UNION-NPT-PP



½" DN15-UNION-NPT-PP SDR 11 IR FUSION



3/4" DN20-UNION-NPT-PP



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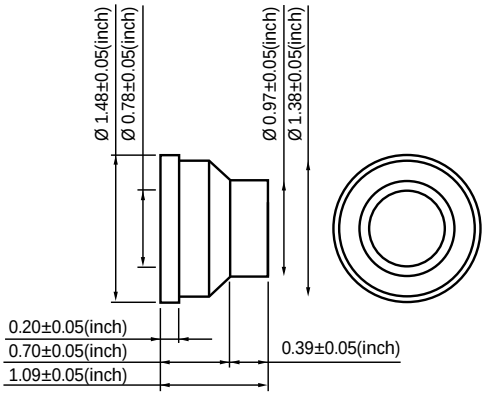
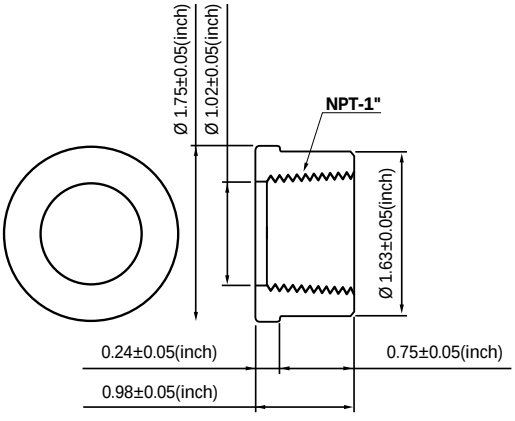


1" DN25-UNION-NPT-PP



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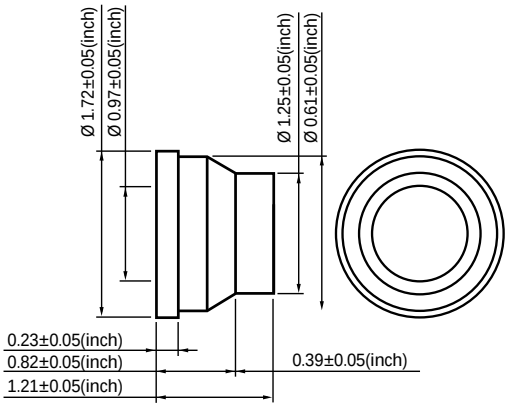
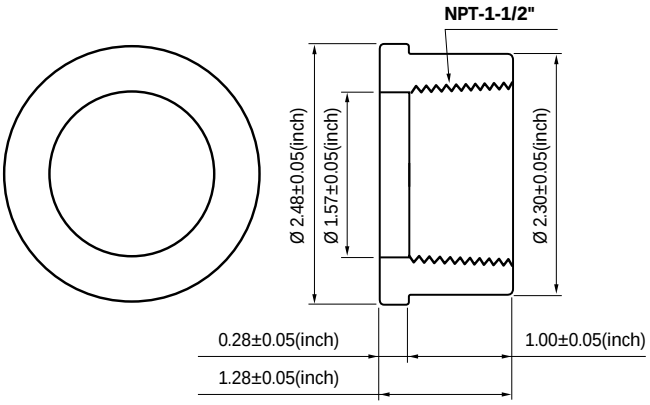


1½" DN40-UNION-NPT-PP



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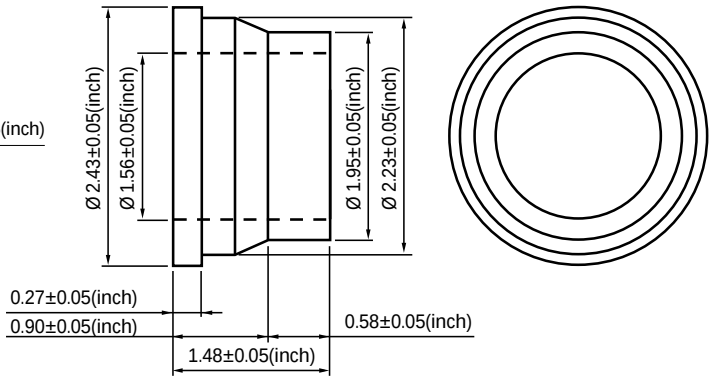
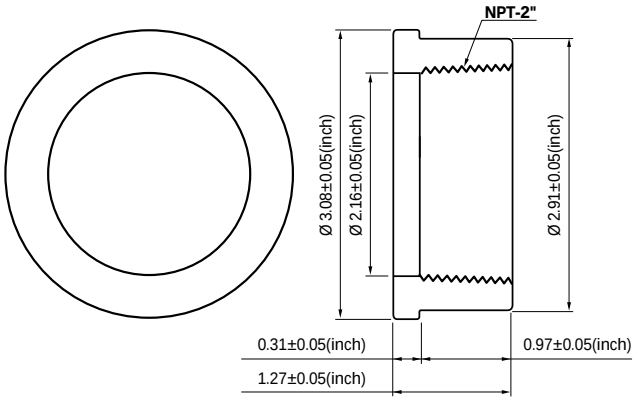
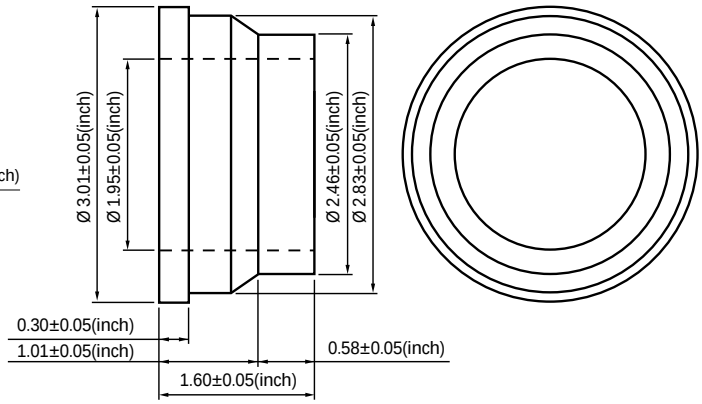


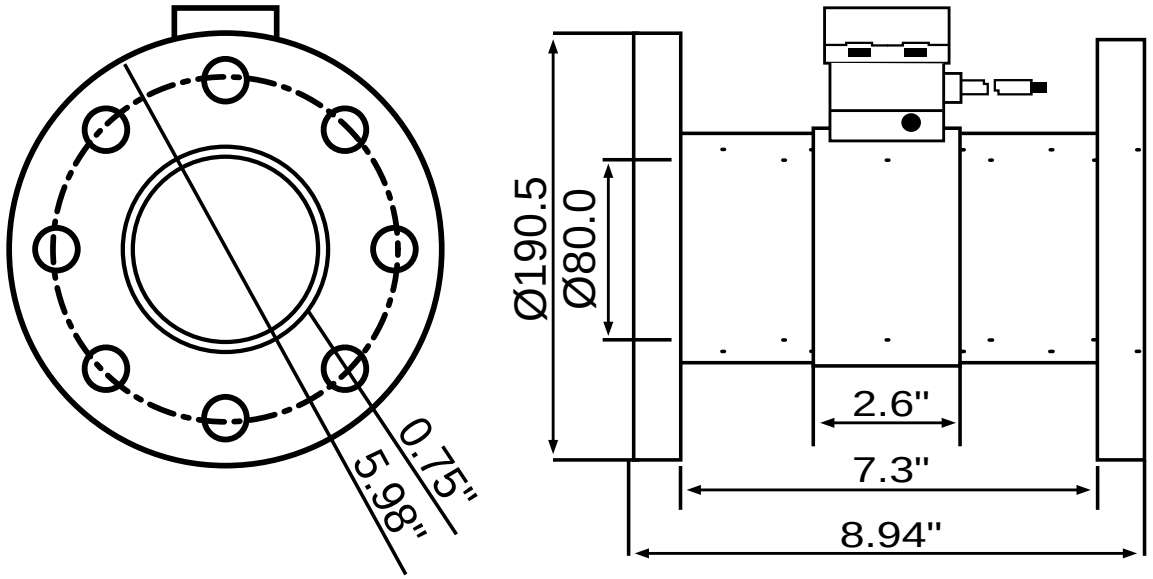
2" DN50-UNION-NPT-PP



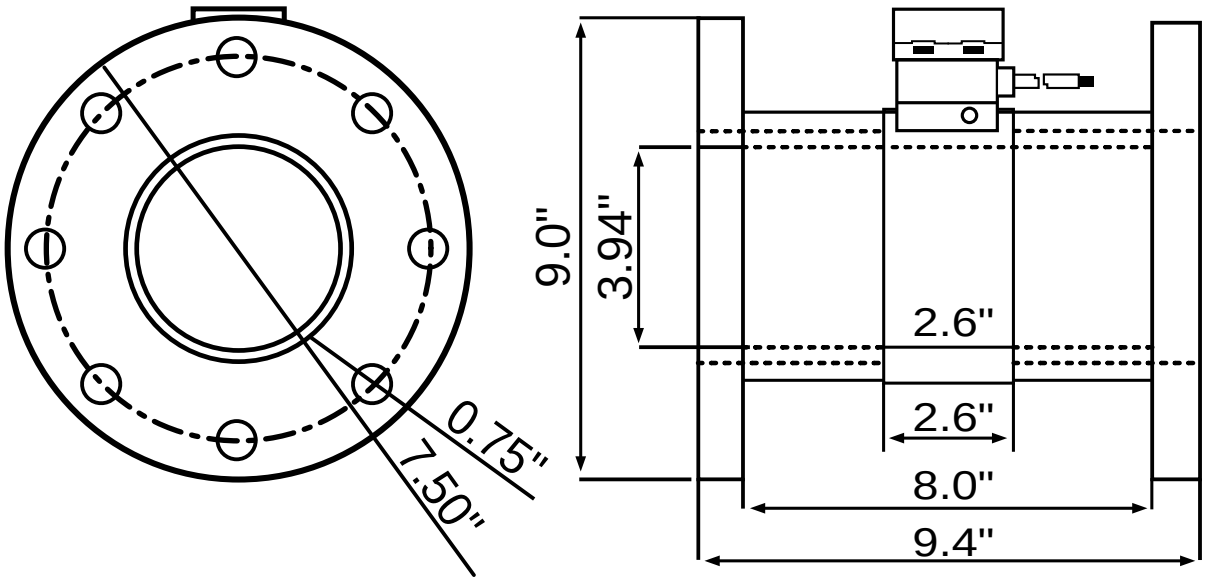
2" DN50-UNION-NPT-PP SDR 11 IR FUSION



3" ANSI JIS

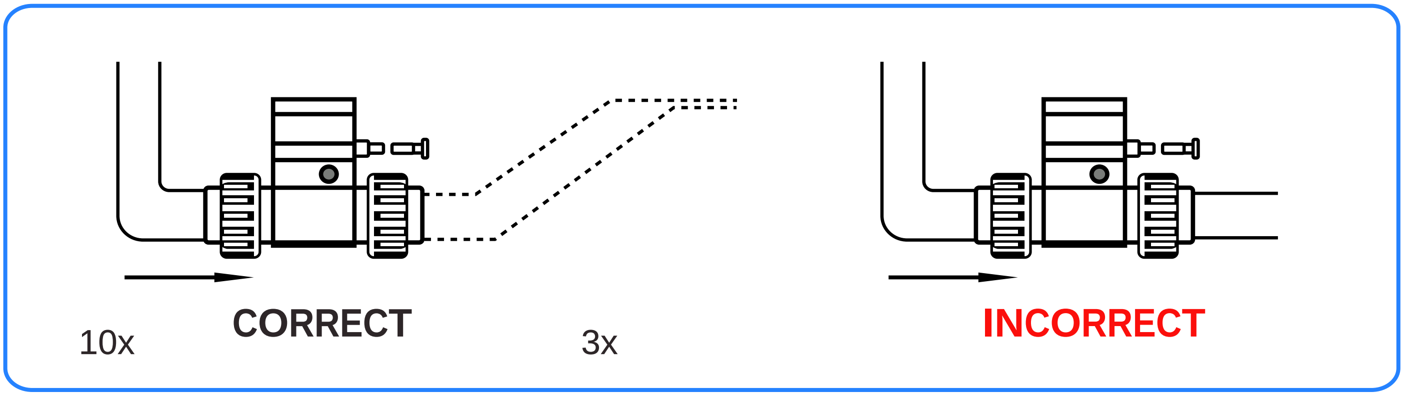


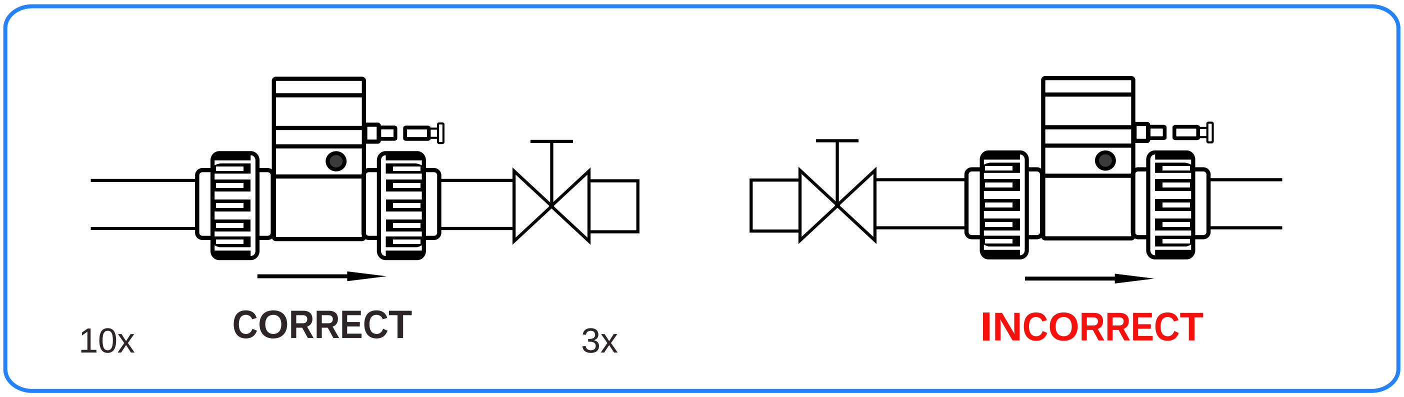
PVC 4" ANSI JIS

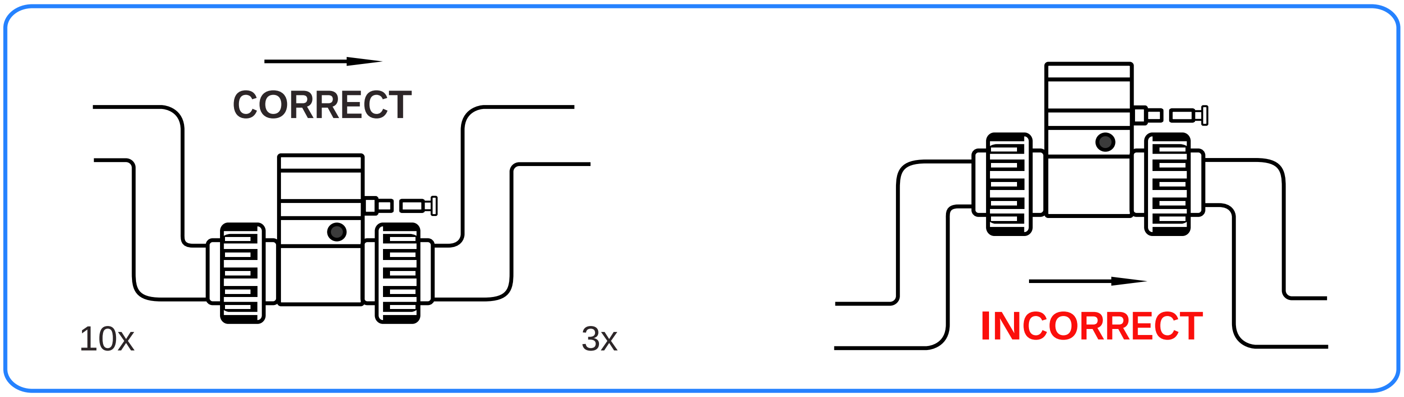


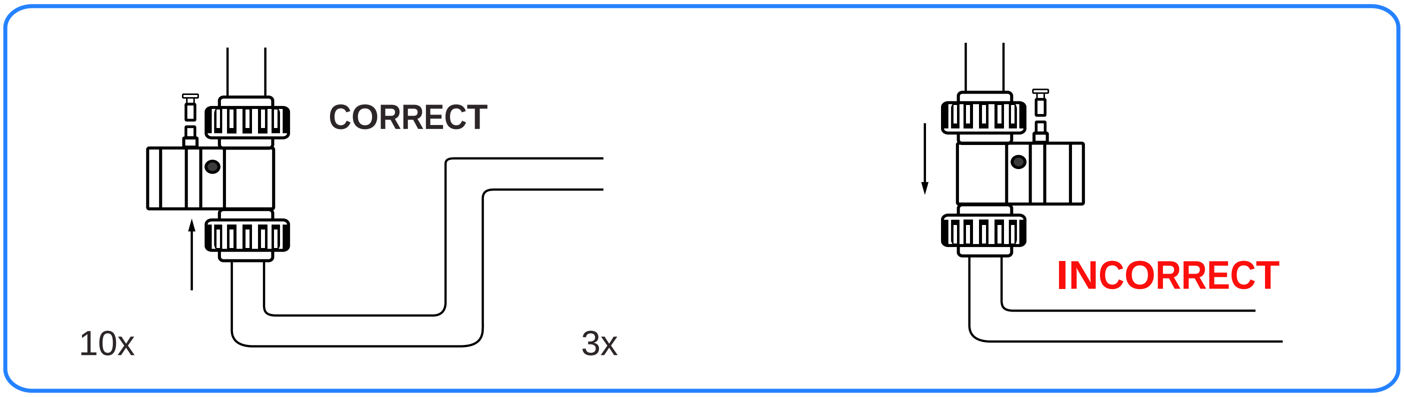
Remarks : Different Options Are Available

Installation Positions









Installation Positions

Please make sure the pipe is filled with the fluid under normal operation.

TK Series can be installed in a horizontal or vertical direction.

Please ensure enough length of straight pipe to avoid turbulence that can effect readings.

Note: Min 10x Pipe Diameters Upstream 3x Pipe Diameters Downstream.

A Plastic Basket Strainer, Bag Filter or Y Strainer Filtering Device upstream to Avoid the Paddle Wheel from being damaged by the solids or fibers - max 10% Particle Size - Not to Exceed .5mm Cross Section or Length.

Please do not flush the pipe after the Flow Meter is installed with Compressed Air this may damage the ceramic shaft and will Void Warranty

truflo®

Specifications may be modified without notice in advance.

For More Information Visit Truflosales.com