

# Rosemount™ 114P Protection Tubes



# Rosemount 114P protection tube

## Product overview

A protection tube is manufactured from metal tubing and sealed with a welded end cap on the tip. The process seal is achieved either by a flange or a machined, threaded fitting welded along the tube. Typically, protection tubes have a uniform stem profile, however some industries have specific non-uniform stem profile requirements.

## Wide range of protection tube options and certificates for any application

- Options for special testing requirements, such as External Hydrostatic Pressure Test (Q5) and Dye Penetration Test (Q73)
- Material Certification option (Q8) to ensure material traceability.

## Experience global consistency and local support from numerous worldwide Emerson manufacturing sites

- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small.
- Experienced Instrumentation Consultants help select the right product for any temperature application and offer advice on best installation practices.
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed.



## Explore the benefits of a Complete Point Solution™ from Emerson

- An “Assemble Sensor to Specific Transmitter” and “Assemble Sensor to Specific Protection Tube” option enables Emerson to provide a Complete Point Solution for measuring temperature, delivering an installation-ready transmitter, sensor, and protection tube assembly.
- Emerson has a complete portfolio of single-point and multi-input temperature measurement solutions, allowing effective measurement and process control with reliable Rosemount products.

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### Contents

Rosemount 114P protection tube.....	2
Selection guide.....	3
Rosemount 114P threaded protection tube.....	4
Rosemount 114P flanged protection tube.....	12
Ordering information details.....	21

# Selection guide

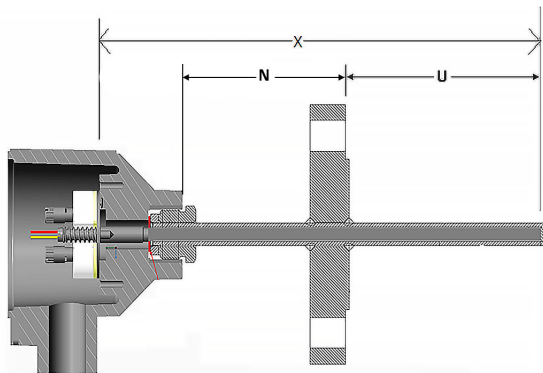
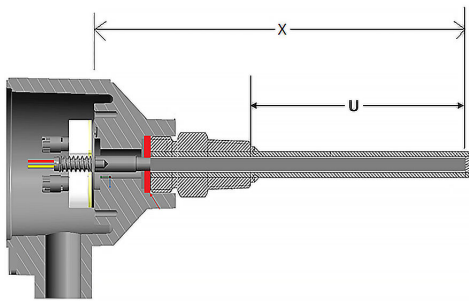
## Ensure sensor fits protection tube

If ordering a replacement sensor and a new connection head is desired, please talk to your Emerson specialist to determine the correct 214C length.

If ordering a replacement sensor and not ordering a new connection head (sensor only), then follow these instructions.

### Procedure

1. Remove the existing sensor from the installation.
2. Measure the sensor length from the tip of the sensor to the bottom of the DIN plate.
3. The resulting length is (X). Use this length to specify the sensor insertion length in the ordering table.



- X. Sensor length
- N. Extension length
- U. Immersion length

# Rosemount 114P threaded protection tube

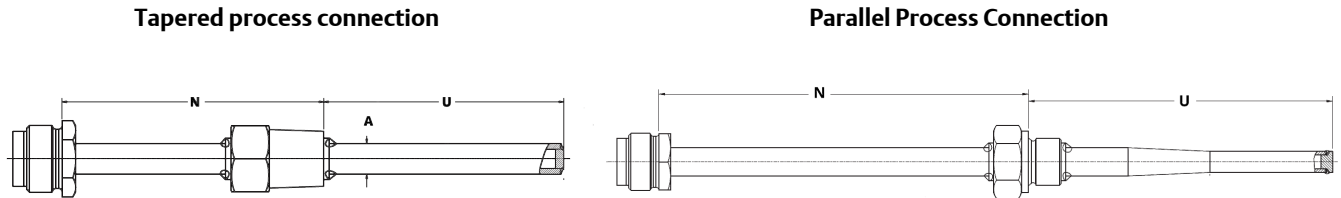


## Threaded protection tube overview

Threaded protection tubes are threaded into a process pipe or tank, allowing for easy installation and removal when necessary. While this is a common mounting method, it has a lower pressure rating than the flange mounting option.

The common options shown in [Figure 1](#) represent a partial offering; reference the [Threaded ordering information](#) for a full list of available options.

**Figure 1: Threaded Protection Tube Components**



- A. Stem diameter
- N. Extension length
- U. Immersion length

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**Note**  
Wetted surface includes engaged threads and immersion length (U).

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## Threaded ordering information

Figure 2: Model Number Ordering Example

Model				Units	Immersion length (U)				Mounting style	Process connection		Stem style	Protection Tube material		Extension length (N)			Instrument connection	Stem Diameter	Options
1	1	4	P	M	0	0	6	0	T	A	A	1	S	C	0	5	0	A	09	Q5
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	XXXXX

The numbers below the model number ordering example correlate to the character place numbers in the second column of the ordering table.

### Optimizing lead time

The starred offerings (★) represent the most common options and should be selected for the fastest delivery times. The non-starred offerings are subject to additional delivery lead time.

### Required model components

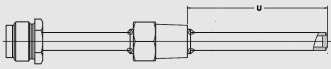
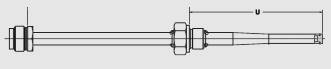
#### Model

Place #s 1-4		Description	Ref. page
★	114P	Protection Tube Standard bore diameter of 7 mm (0.28-in.) and tip thickness of 3 mm (0.12-in.) NAMUR bore diameter reduces down to 6 mm (0.24-in.) with a tip thickness of 5 mm (0.20-in.)	N/A

#### Dimension units

Place # 5		Description	Details	Ref. page
★	M	Metric units (mm)	Specifies the unit of measure for all lengths	<a href="#">page 21</a>

#### Immersion length (U)

Place #s 6-9		Description	Tapered threads	Parallel threads	Ref. page
★	xxxx	xxxx mm, 50 to 2500 mm in 5 mm increments (when ordered with dimension units code M) Example of a 50 mm length: 0050			<a href="#">page 21</a>

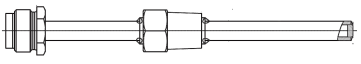
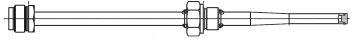
### Mounting style

Place # 10		Description	Ref. page
★	T	Threaded	N/A

### Process connection

Places # 11-12		Description	Thread type	Ref. page
★	AA	½-in. -14 NPT	Tapered threads	
★	AB	¾-in. -14 NPT	Tapered threads	
★	AC	1-in. -11.5 NPT	Tapered threads	
★	AE	R ½ (½-in. BSPT)	Tapered threads	
★	AF	R ¾ (¾-in. BSPT)	Tapered threads	
★	AG	R 1 (1-in. BSPT)	Tapered threads	
★	DA	M20 x 1.5	Parallel threads	
★	DC	M27 x 2	Parallel threads	
★	DD	M33 x 2	Parallel threads	
★	DE	G ½ (½-in. BSPF)	Parallel threads	
★	DF	G ¾ (¾-in. BSPF)	Parallel threads	
★	DG	G 1 (1-in. BSPF)	Parallel threads	
★	DH	G ¾ (¾-in. BSPF)	Parallel threads	
★	DI	M18 x 1.5	Parallel threads	

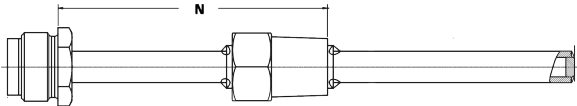
### Stem style

Place # 13		Description	Details	Image	Ref. page
★	1	Straight	Minimum immersion length 2-in. (50 mm)		<a href="#">page 21</a>
★	2	Stepped NAMUR	Minimum immersion length 2-in. (50 mm)		<a href="#">page 21</a>

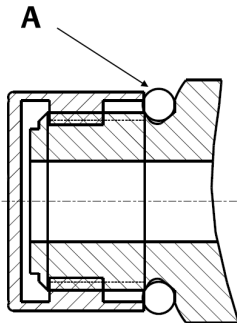
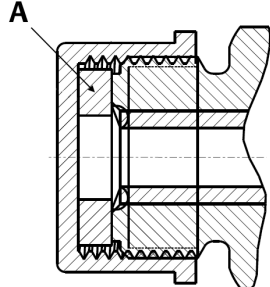
### Protection tube material

Place # 14-15		Description	Details	Ref. page
★	SC	316/316L dual rated		<a href="#">page 21</a>
	SG	316Ti SST		<a href="#">page 21</a>

Extension length (N)

Place #s 16-18		Description	Tapered threads	Ref. page
★	xxx	000 for no extension length		page 22
		xxx mm, 50 to 500 mm in 5 mm increments		
		Example of a 50 mm length: 050		

Instrument connection

Place # 19		Description	Details	Image	Ref. page
★	A	½-14 NPT, Male			page 22
	E	M20 × 1.5, Male	Copper ring included for environmental seal	 <p>A. Copper ring</p>	page 22
	F	M24 × 1.5, Male	Gasket included for environmental seal	 <p>A. Gasket</p>	page 22

Stem diameter

Code	Description	Details	Ref. page
09	9 x 1 mm	Outer diameter x Wall thickness	N/A
11	11 x 2 mm		
12	12 x 2.5 mm		



## Additional options

### Sensor/protection tube assemble to options

Code		Description	Details	Ref. page
★	XT	Hand tight assembly of sensor and protection tube	Ensures the protection tube is threaded into connection head but only hand-tight	<a href="#">page 23</a>
★	XW	Process-ready assembly of sensor and protection tube	Ensures the protection tube is threaded into connection head and torqued for process-ready installation	<a href="#">page 23</a>

### Extended product warranty

Code		Description	Details	Ref. pages
★	WR3	3-year limited warranty	This warranty option extends manufacturer's warranty to three or five years for manufacturer related defects	<a href="#">page 23</a>
★	WR5	5-year limited warranty		<a href="#">page 23</a>

### Hydrostatic external pressure test

Code		Description	Details	Ref. page
★	Q5	Standard external pressure test	Verifies structural quality and checks for leaks at protection tube process connection and stem	<a href="#">page 23</a>

### Hydrostatic internal pressure test

Code		Description	Details	Ref. page
★	Q85	Standard internal pressure test	Verify internal structural integrity of protection tube	<a href="#">page 24</a>

### Dye penetration test

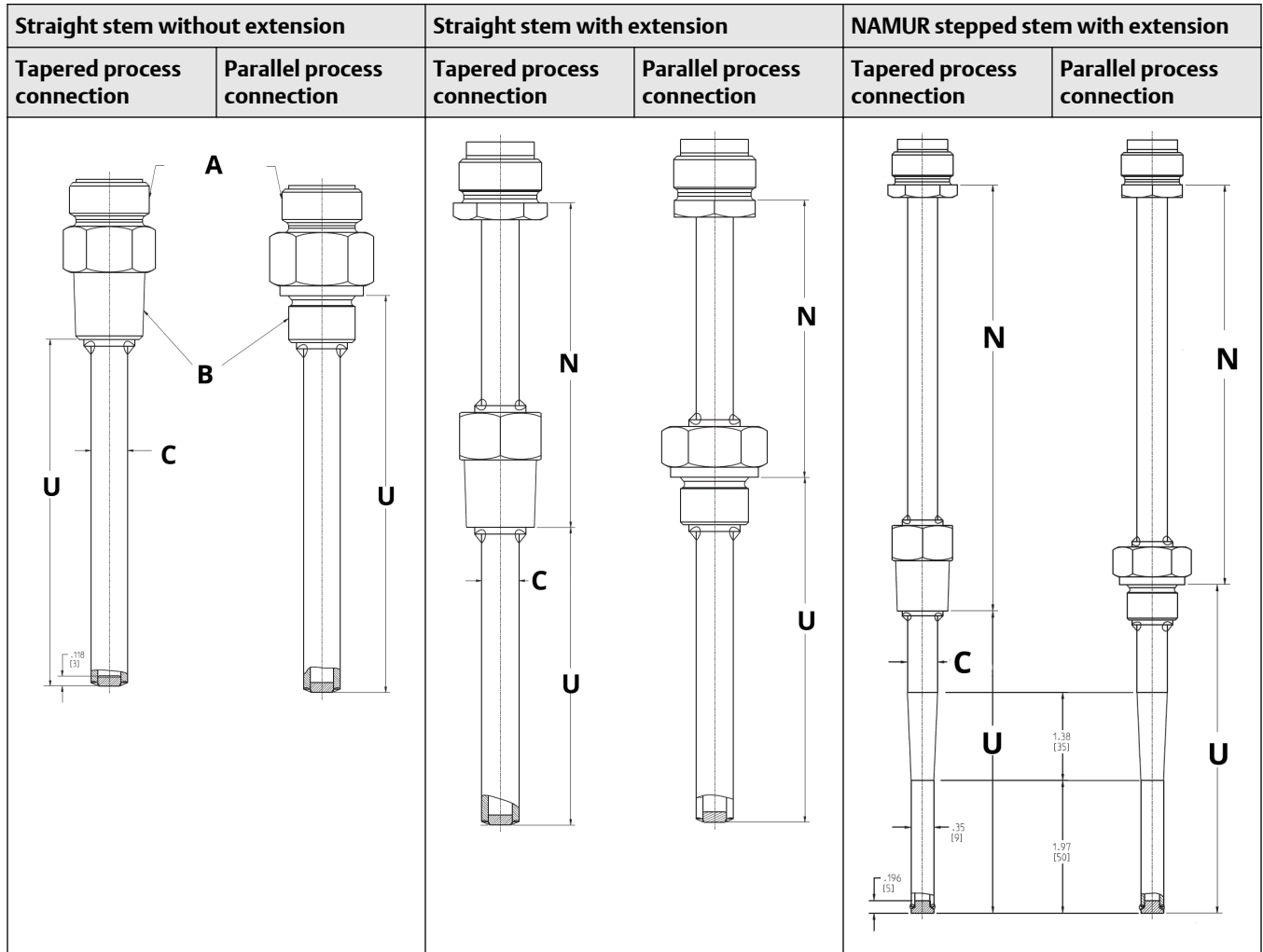
Code		Description	Details	Ref. page
★	Q73	Dye penetration test	Checks quality of material	<a href="#">page 24</a>

### Material certification

Code		Description	Details	Ref. page
★	Q8	Material certification	Certificate for material conformance and traceability in accordance with EN 10204 type 3.1	<a href="#">page 23</a>

## Threaded protection tube drawings

Figure 3: Thread Mount Protection Tube Drawings (Tapered Thread)



A. Instrument connection

B. Process connection

C. Stem diameter

N. Extension length

U. Immersion length

Code	Code T, threaded mounting style	Hex (Wrench) size [mm]	Thread specification
	<b>Process Connection "P"</b>		
AA	½-in.-14 NPT	24	SAE AS 71051
AB	¾-in.-14 NPT	32	
AC	1-in.-11.5 NPT	36	
AE	R ½ (½-in. BSPT)	24	ISO 7/1 (BS 21)
AF	R ¾ (¾-in. BSPT)	32	
AG	R 1 (1-in. BSPT)	36	
DI	M18 x 1.5	24	BS 3643
DA	M20 x 1.5	27	
DC	M27 x 2	36	
DD	M33 x 2	41	
DH	G ⅝ (⅝-in. BSPF)	24	ISO 228/1 (BS2779)
DE	G ½ (½-in. BSPF)	27	
DF	G ¾ (¾-in. BSPF)	36	
DG	G 1 (1-in. BSPF)	41	

Code	Code T, threaded mounting style	Hex (Wrench) size [mm]	Thread specification
	<b>Instrument Connection</b>		
A	½-in.-14 NPT	25	SAE AS 71051
E	M20 x 1.5	27	BS 3643
F	M24 x 1.5	24	

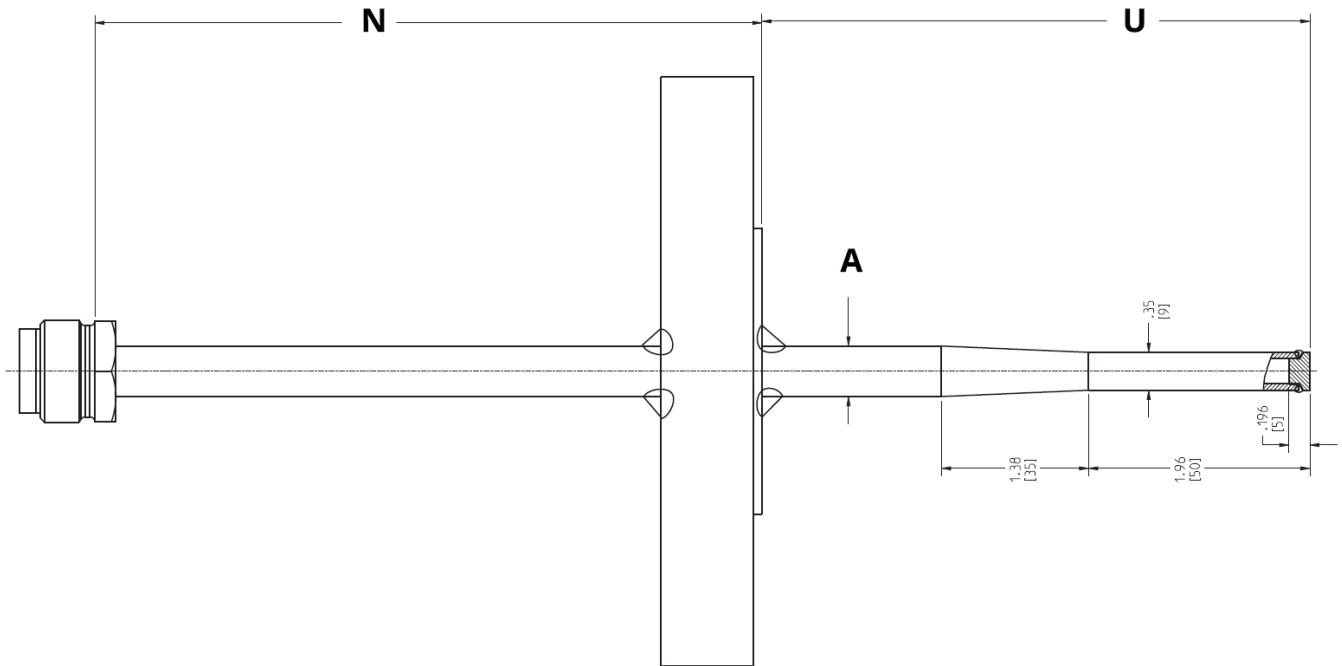
## Rosemount 114P flanged protection tube



### Flanged protection tube overview

All Rosemount flanged protection tubes are manufactured with flanges in accordance with ASME B16.5 or EN 1092-1. The flange-to-stem weld is in accordance to ASME Section IX. There is also full traceability with material certifications available on request.

Figure 4: Flanged protection tube components



- A. Stem diameter
- N. Extension length
- U. Immersion length

**Note**  
Wetted surface includes flange face and immersion length (U).

## Flanged ordering information

Figure 5: Model Number Ordering Example

Model				Units	Immersion length (U)				Mounting style	Process connection		Stem style	Protection Tube material		Extension length (N)			Instrument connection	Stem Diameter	Options
1	1	4	P	M	0	0	6	0	F	A	A	1	S	C	0	5	0	A	09	Q5
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	XXXXX

The numbers below the model number ordering example correlate to the character place numbers in the second column of the ordering table.

### Optimizing lead time

The starred offerings (★) represent the most common options and should be selected for the fastest delivery times. The non-starred offerings are subject to additional delivery lead time.

### Required model components

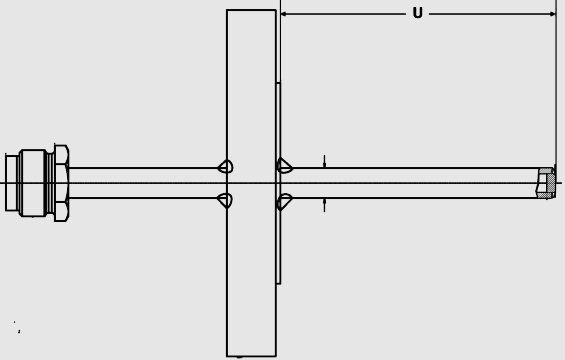
#### Model

Place # 1-4		Description	Details	Ref. page
★	114P	Protection tube	Standard bore diameter of 7mm (0.28 in) and tip thickness of 3mm (0.12in) NAMUR bore diameter reduces down to 6mm (0.24in) with a tip thickness of 5mm (0.20in)	N/A

#### Dimension units

Place # 5		Description	Details	Ref. page
★	M	Metric units (mm)	Specifies the unit of measure for all lengths	<a href="#">page 21</a>

**Immersion length (U)**

Place # 6-9	Description		Ref. page
★	xxxx xxxx mm, 50 to 2500 mm in 5 mm increments (when ordered with dimension units code M) Example of a 50 mm length: 0050		page 21

**Mounting style**

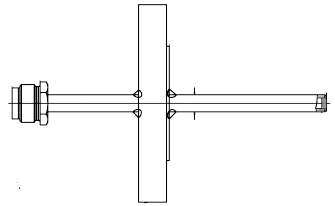
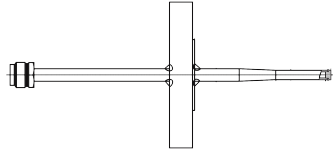
Place # 10	Description	Details	Ref. page
★	F	Flange	Weld refers to welding of the flange to protection tube stem N/A

**Process connection**

Place # 11-12	Flange weld (F)	Ref. page	
★	AA	1-in. Class 150	N/A
★	AB	1½-in. Class 150	N/A
★	AC	2-in. Class 150	N/A
★	AD	3-in. Class 150	N/A
★	AH	1-in. Class 300	N/A
★	AJ	1½-in. Class 300	N/A
★	AK	2-in. Class 300	N/A
★	AL	1-in. Class 600	N/A
★	AM	1½-in. Class 600	N/A
★	FE	DN 20/PN 40	N/A
★	GE	DN 25/PN 16/25/40	N/A
★	JE	DN 40/PN 16/25/40	N/A
★	KC	DN 50/PN 16	N/A
★	KE	DN 50/PN 40	N/A
★	GG	DN 25/PN 100	N/A
★	GM	DN 32/PN 40	N/A
★	JG	DN 40/PN 100	N/A

Place # 11-12		Flange weld (F)	Ref. page
★	KF	DN 50/PN 63	N/A
★	KG	DN 50/PN 100	N/A
★	MC	DN 80/PN 16	N/A
★	ME	DN 80/PN 25/40	N/A
★	NC	DN 100/PN 10/16	N/A

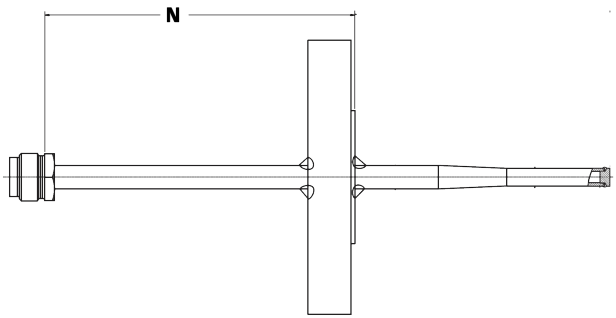
**Stem style**

Place # 13		Description	Details	Image	Ref. page
★	1	Straight	Minimum immersion length is 50 mm (2-in.)		page 21
★	2	Stepped (NAMUR)	Minimum immersion length is 50 mm (2-in.)		page 21

**Protection tube material**

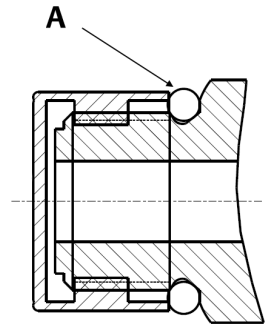
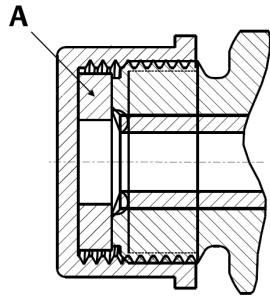
Place # 14-15		Description	Details	Ref. page
★	SC	316/316L dual rated		page 21
	SG	316Ti SST		page 21

**Extension length (N)**

Place #s 16-18		Description	Tapered threads	Ref. page
★	xxx	000 for no extension length		page 22
		xxx mm, 50 to 500 mm in 5 mm increments		
		Example of a 50 mm length: 050		



**Instrument connection**

Place # 19		Description	Details	Image	Ref. page
★	A	½-14 NPT, Male	Female threads		<a href="#">page 22</a>
	E	M20 × 1.5, Male	Copper ring included for environmental seal	 <p>A. Copper ring</p>	<a href="#">page 22</a>
	F	M24 × 1.5, Male	Gasket included for environmental seal	 <p>A. Gasket</p>	<a href="#">page 22</a>

**Stem diameter**

Code	Description	Details	Ref. page
09	9 x 1 mm	Outer diameter x Wall thickness	N/A
11	11 x 2 mm		
12	12 x 2.5 mm		

**Additional options**

**Sensor/protection tube assemble to options**

Code	Description	Details	Ref. page
★ XT	Hand tight assembly of sensor and protection tube	Ensures the protection tube is threaded into connection head but only hand-tight	<a href="#">page 23</a>

Code		Description	Details	Ref. page
★	XW	Process-ready assembly of sensor and protection tube	Ensures the protection tube is threaded into connection head and torqued for process-ready installation	<a href="#">page 23</a>

**Extended product warranty**

Code		Description	Details	Ref. pages
★	WR3	3-year limited warranty	This warranty option extends manufacturer’s warranty to three or five years for manufacturer related defects	<a href="#">page 23</a>
★	WR5	5-year limited warranty		<a href="#">page 23</a>

**Hydrostatic external pressure test**

Code		Description	Details	Ref. page
★	Q5	Standard external pressure test	Verifies structural quality and checks for leaks at protection tube process connection and stem	<a href="#">page 23</a>

**Hydrostatic internal pressure test**

Code		Description	Details	Ref. page
★	Q85	Standard internal pressure test	Verify internal structural integrity of protection tube	<a href="#">page 24</a>

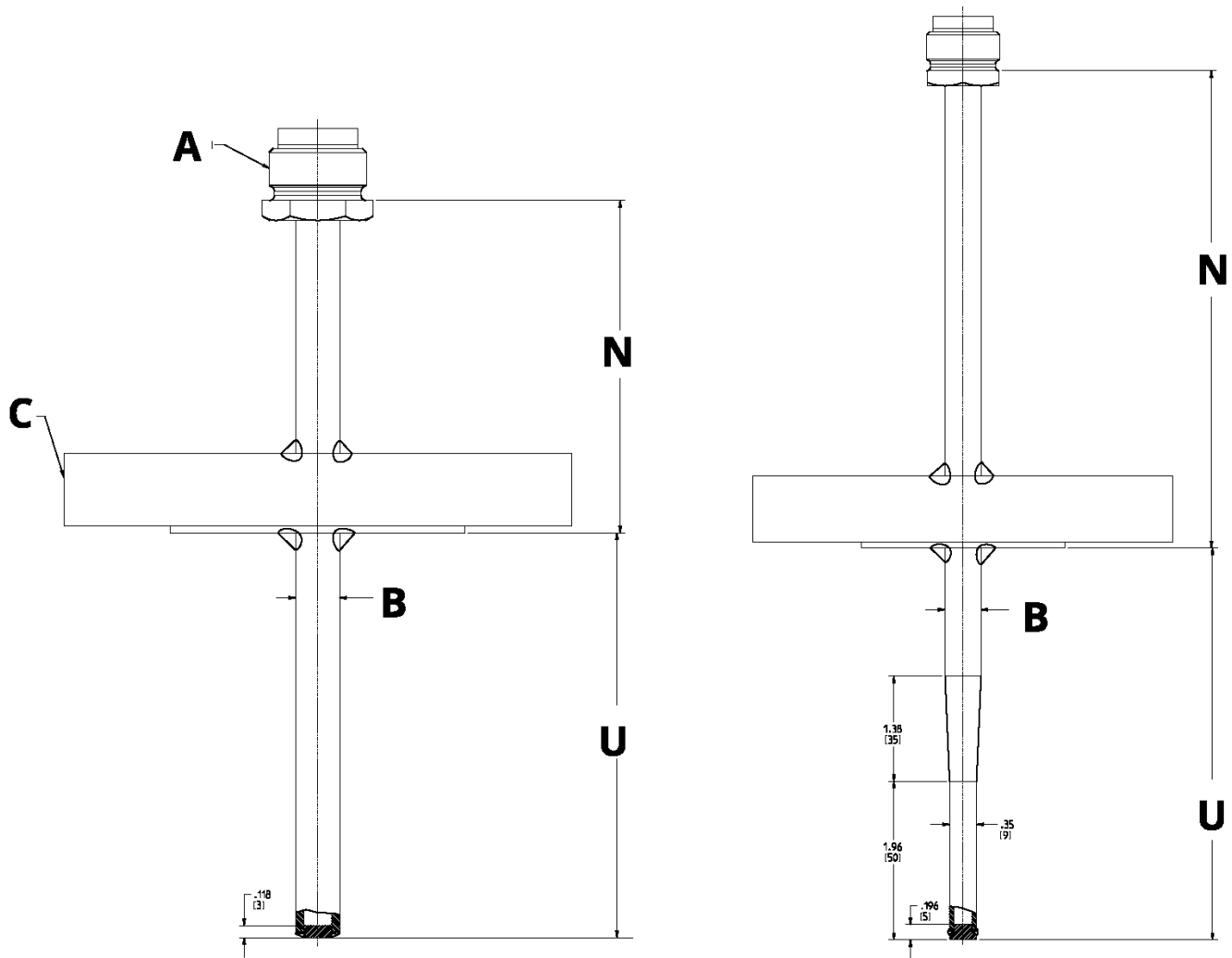
**Dye penetration test**

Code		Description	Details	Ref. page
★	Q73	Dye penetration test	Checks quality of material	<a href="#">page 24</a>

**Material certification**

Code		Description	Details	Ref. page
★	Q8	Material certification	Certificate for material conformance and traceability in accordance with EN 10204 type 3.1	<a href="#">page 23</a>

### Flanged protection tube drawings



- A. Instrument connection
- B. Stem diameter
- C. Process connection
- N. Extension length
- U. Immersion length

Code	Code F, flanged mounting style	Hex (Wrench) size [mm]	Thread specification
	<b>Instrument Connection</b>		
A	½-in.-14 NPT	25	SAE AS 71051
E	M20 x 1.5	27	BS 3643
F	M24 x 1.5	24	
	<b>Process Connection "P"</b>		
AA	1-in. Class 150		

Code	Code F, flanged mounting style	Hex (Wrench) size [mm]	Thread specification
AB	1 ½-in. Class 150		
AC	2-in. Class 150		
AD	3-in. Class 150		
AH	1-in. Class 300		
AJ	1 ½-in. Class 300		
AK	2-in. Class 300		
AL	1-in. Class 600		
AM	1 ½-in. Class 600		
FE	DN 20/PN 40		
GE	DN 25/PN 16/25/40		
GG	DN 25/PN 100		
GM	DN32/PN40		
JE	DN 40/PN 16/25/40		
JG	DN 40/PN 100		
KC	DN 50/PN 16		
KE	DN 50/PN 40		
KF	DN 50/PN 63		
KG	DN 50/PN 100		
MC	DN 80/PN 16		
ME	DN 80/PN 25/40		
NC	DN100/PN10/16		

# Ordering information details

## Dimension units

Back to Threaded ordering information: [Dimension units](#)

Back to Flanged ordering information: [Dimension units](#)

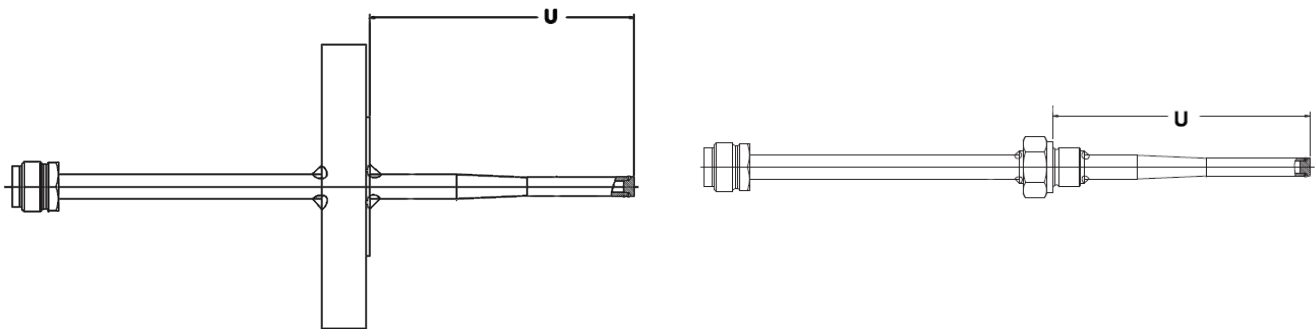
The Rosemount 114P Protection tube is specified in millimeters (M).

## Immersion length (U)

Back to Threaded ordering information: [Immersion length \(U\)](#)

Back to Flanged ordering information: [Immersion length \(U\)](#)

The immersion length refers to the length of the protection tube stem beginning underneath the process connection to the tip of the protection tube.



U. Immersion length

## Stem style

Back to Threaded ordering information: [Stem style](#)

Back to Flanged ordering information: [Stem style](#)

### Straight style protection tube

Straight style protection tubes have the same diameter along the entire immersion length. Due to the large tip diameter, there is more mass to heat which slows the thermal response of the measurement assembly.

### Stepped style (NAMUR) protection tube

This profile improves time response due to having less mass at the tip of the protection tube. All NAMUR style protection tubes require an extension length to be selected. Immersion lengths shorter than 115 mm will not be a stepped profile due to manufacturing limitations but a straight profile with an 8 mm stem diameter.

## Protection tube material

Back to Threaded ordering information: [Protection tube material](#)

Back to Flanged ordering information: [Protection tube material](#)

The material of construction is typically the first consideration in choosing a protection tube for any given application. Three factors affect the choice of material:

1. Chemical compatibility with the process media to which the protection tube will be exposed.
2. Temperature limits of the material.
3. Compatibility with the process piping material to minimize corrosion.

It is important the protection tube conforms to the design specs of the pipe or vessel it will be inserted into to ensure structural and material compatibility. The original process design most likely included temperature, pressure, and corrosive considerations as well as cleaning procedures, and conformance with codes or standards. Since an installed protection tube essentially becomes part of the process, these original design considerations also apply to the protection tube and will drive the protection tube material of construction and mounting type selection. International pressure vessel codes are explicit about the types of materials and methods of construction allowed.

**Table 1: Materials**

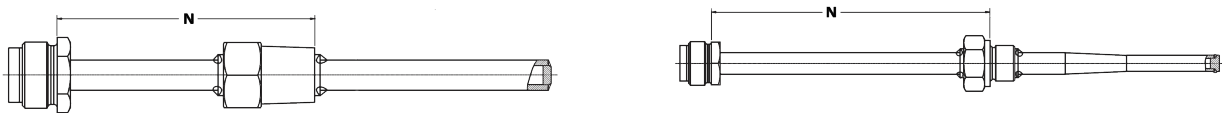
Code	Tube, Washers	End caps, threaded fittings	Flange material
SC	316/316L SST UNS S31600/S31603 DIN 1.4401/1.4404 ASTM A269 (Seamless)	316/316L SST UNS S31600/S31603 DIN 1.4401/1.4404 ASTM A479	316/316L SST UNS S31600/S31603 DIN 1.4401/1.4404 ASTM A182 or A240
SG	316Ti SST UNS S31635 DIN 1.4571 ASTM A213 or A312 (Seamless)	316Ti SST UNS S31635 DIN 1.4571 ASTM A479	316Ti SST UNS S31635 DIN 1.4571 ASTM A182 or A240

## Extension length (N)

Back to Threaded ordering information: [Extension length \(N\)](#)

Back to Flanged ordering information: [Extension Length \(N\)](#)

Extension length is the non-wetted distance between the process connection and instrument connection of the protection tube.



## Instrument connection

Back to Threaded ordering information: [Instrument connection](#)

Back to Flanged ordering information: [Instrument connection](#)

Thread	Specification
½-14 NPT	SAE-AS 71051
M20 x 1.5	BS 3643
M24 x 1.5	

## Sensor/protection tube assemble to options (XT, XW)

Back to Threaded ordering information: [Sensor/protection tube assemble to options](#)

Back to Flanged ordering information: [Sensor/protection tube assemble to options](#)

### XT

This option is selected when a Rosemount 214C Sensor is ordered with the Rosemount 114P Protection tube. This ensures a hand-tight connection between the protection tube and the connection head.

### XW

This option is selected when a Rosemount 214C Sensor is ordered with the Rosemount 114P Protection tube. This ensures a process-ready connection between the protection tube and the connection head.

## Extended product warranty (WR3, WR5)

Back to Threaded ordering information: [Extended product warranty](#)

Back to Flanged ordering information: [Extended product warranty](#)

The extended product warranty options are available in three or five year coverage plans. In the model string, order option codes WR3 for a three year extended warranty or WR5 for a five year warranty. This coverage is an extension of the manufacturer's limited warranty and states that the goods manufactured or services provided by seller will be free from defects in materials or workmanship under normal use and care until the expiration of the applicable warranty period.

## Material selection (Q8)

Back to Threaded ordering information: [Material certification](#)

Back to Flanged ordering information: [Material certification](#)

Material certificate and traceability in accordance with EN 10204 Type 3.1 Inspection Certificate. The certificate provided will document the heat code, chemical analysis, and testing required by material standards.

## Standard external hydrostatic pressure test (Q5)

Back to Threaded ordering information: [Hydrostatic external pressure test](#)

Back to Flanged ordering information: [Hydrostatic external pressure test](#)

Q5		External pressure test		
Test protection tube externally at room temperature for a minimum duration of 10 minutes. Certify water before testing to ensure chloride content < 30 ppm. Certificate must include chloride content, hydrostatic test pressure value, duration, and result. Certificate must be provided with each protection tube that passed the test.				
ASME flanged protection tube		EN flanged protection tube		Threaded protection tube
Class	External hydrostatic pressure (psi)	Nominal pressure (PN)	External hydrostatic pressure (bar)	External hydrostatic pressure (psi)
150	425	16	40	1500
300	1100	40	100	
600	2175	63	158	
		100	250	

<b>Q5</b>	<b>External pressure test</b>
Test pressure for ASME flanges meet the system hydrostatic requirements per ASME B16.5. Test pressure for EN flanges are 2.5x the max allowable pressure per EN 1092.1.	

**Threaded protection tubes**

1500 psi

**Standard internal hydrostatic pressure test (Q85)**

Back to Threaded ordering information: [Hydrostatic internal pressure test](#)

Back to Flanged ordering information: [Hydrostatic internal pressure test](#)

This test is performed at room temperature for a minimum of 10 minutes to 3000 psi. The water used here is certified to ensure a chloride content of less than 30 ppm. The certificate provided will document the chloride content, hydrostatic test level, duration, and results.

**Dye penetration test (Q73)**

Back to Threaded ordering information: [Dye penetration test](#)

Back to Flanged ordering information: [Dye penetration test](#)

Dye or liquid penetration testings are performed by ASME Level II or III trained inspectors. These tests are all done in accordance to ASME Section V, Article 6 with an acceptance criteria per ASME Section III, Div 1 NB-2546. The certificate will document the inspectors name, dye penetration acceptance criteria, and test result.

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