

## Round Oil-resistive Smartclick Connectors for E2E NEXT Series proximity sensors, that are Resistant to Oil, and that Reduce Installation Work



- Uses unique OMRON technology\*1 and the same PVC cable with increased oil resistance as the E2E NEXT Series proximity sensors. Oil-resistance performance values of 2 years\*2 when used in combination with E2E NEXT Series proximity sensors.
- Oil-resistant robot cables for use with moving parts such as loaders and cableveyors
- OMRON's unique lock mechanism (Smartclick) that is compatible with round M12 connectors.
- Simply insert the Connectors, then turn them approximately 1/8 of a turn to lock.
- A positive click indicates locking.
- IP67, IP69K degree of protection.
- UL approved products.

\*1. PATENTED (as of June, 2021)

\*2. Covered types of oil: Cutting oil specified in JIS K 2241:2000

The oil-resistance performance value (2 years) indicates the median value (=Typ) at product design, and in evaluation testing results of oil-resistance performance. Shipped products will show some variance around this 2 year value in actual usage.



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.



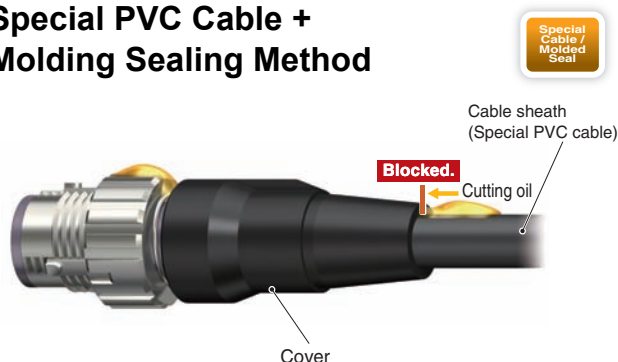
Be sure to read *Safety Precautions* on page 6.

## Features

### Better Cable Oil Resistance, and Improved Overall Oil Resistance with New Rubber Material in Mating Sections

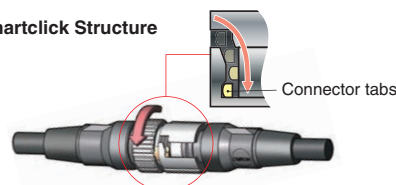
The XS5 NEXT Series uses a special PVC cable that limits deterioration of the cable sheath due to both water-soluble and water-insoluble cutting oil. Omron's proprietary molding technique prevents cutting oil intrusion from mating sections. Moreover, using the same new HNBR/fluoride rubber as in oil-resistant components of connector mating sections helps improve the overall oil resistance.

#### Special PVC Cable + Molding Sealing Method

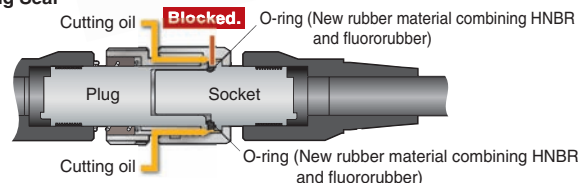


#### Smartclick Structure + O-ring

Unique Smartclick Structure



O-ring Seal



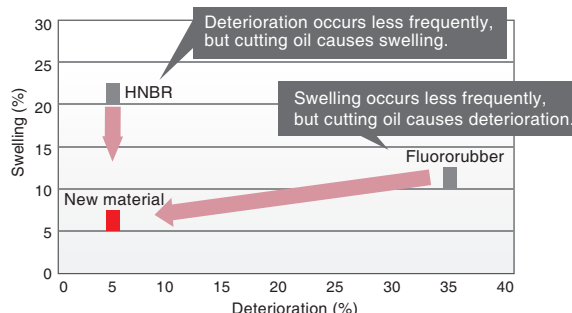
Patented

#### New Rubber Material Combining and Fluororubber

Hydrogenated nitrile butadiene rubber (HNBR), which provides superior resistance to oil, was blended with fluororubber in a unique OMRON compound to develop a new rubber that provides superior resistance to both swelling and deterioration due to cutting oil. It is used in seals for joints and moving sections that prevent ingress to prevent deterioration and destruction of the seal due to cutting oil, resulting in increased oil resistance performance.

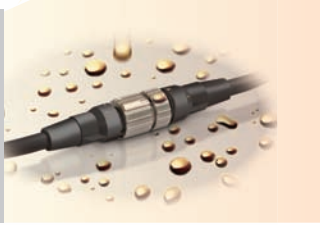
"PATENTED" means that OMRON obtained a patent in Japan.

This new material combines the benefits of HNBR and fluororubber



P67G quality and Omron's Oil Resistance Component Evaluation System for two years of proven oil resistant capability


Oil resistance: 2 years\*



(Illustration)

IP67G	
Oil type	N3 (water-insoluble cutting oil)
Evaluation time	48 hours
Evaluation temperature	Room temperature
Dilution concentration	---
Criteria	Appearance and performance

OMRON's Oil-resistant Component Evaluation Standards	
Oil type	A1 (water-soluble cutting oil)
Evaluation time	1,000 hours of machining
Evaluation temperature	55 °C
Dilution concentration	Undiluted
Criteria	Appearance, performance, and no label text loss

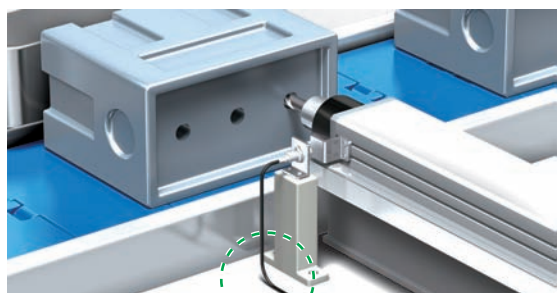


(Illustration)

\* Applicable oil types: specified in JIS K 2241:2000  
“2-year oil resistance” refers to median values (=Typical values) of the product designs and the oil-resistance performance evaluation results.  
Products to be shipped will have around 2 years of oil resistance; actual oil resistance will vary depending on the product.

Varied product lineup to suit the application

**Fixed Parts**    XS5□-D421-□8□-X



Fixed installation

**Moving Parts**    XS5□-D421-□8□-XR



Installation with moving parts such as loaders and cableveyors

Model Number Structure

Model Number Legend

Use this legend when determining the product specifications from the model number. When ordering, use a model number from the table in **Ordering Information**.

XS5□-D 4 2 1 - □ 8 □ - X□  
1 2 3 4 5 6 7 8 9

- 1. Type**  
W: Connectors connected to cable, socket and plug on cable ends  
F: Connectors connected to cable, socket on one cable end

**2. Mating Section Form**  
D: A-coding (for DC sensor)

**3. Connector Poles**  
4: 4 poles

**4. Contact Plating**  
2: Gold plating

**5. Cable Connection Direction**  
XS5W 1: Straight (Socket)/Straight (Plug)  
XS5F 1: Straight
- 6. Cable Length**  
C: 1 m  
D: 2 m  
E: 3 m  
G: 5 m  
J: 10 m

**7. Connections (Numbers inside circles are terminal numbers)**  
8: ① Brown, ② White, ③ Blue, ④ Black

**8. Connectors on One End/Both Ends**  
0: Sockets on One Cable End  
1: Socket and Plug on Cable Ends

**9. Cable Specifications**  
X: Oil-resistant PVC cable  
XR: Oil-resistant PVC robot cable

Smartclick is a trademark or registered trademark of OMRON Corporation in Japan and other countries.

## Ordering Information

### Connectors

Type	Cable outer diameter (mm)	Cable specifications	Cable length (m)	Model	UL
Socket and Plug on Cable Ends	6 dia.	Oil-resistant PVC cable	1	XS5W-D421-C81-X	UL2238 certified (File no. E207683)
			2	XS5W-D421-D81-X	
			3	XS5W-D421-E81-X	
			5	XS5W-D421-G81-X	
			10	XS5W-D421-J81-X	
	6 dia.	Oil-resistant PVC robot cable	1	XS5W-D421-C81-XR	
			2	XS5W-D421-D81-XR	
			3	XS5W-D421-E81-XR	
			5	XS5W-D421-G81-XR	
			10	XS5W-D421-J81-XR	
Sockets on One Cable End	6 dia.	Oil-resistant PVC cable	1	XS5F-D421-C80-X	
			2	XS5F-D421-D80-X	
			3	XS5F-D421-E80-X	
			5	XS5F-D421-G80-X	
			10	XS5F-D421-J80-X	
	6 dia.	Oil-resistant PVC robot cable	1	XS5F-D421-C80-XR	
			2	XS5F-D421-D80-XR	
			3	XS5F-D421-E80-XR	
			5	XS5F-D421-G80-XR	
			10	XS5F-D421-J80-XR	

### Accessories (Sold Separately)

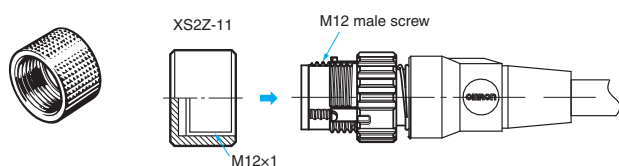
#### Connector Covers

##### Water-resistive Covers

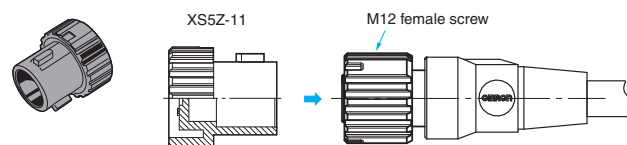
Model	Material	Suitable connector		Remarks
		Model	Mounting portion	
XS2Z-11	Brass/nickel plated	XS5W	M12 male screw	This provides IP67 levels of protection. When mounting the Water-resistive Cover to a Connector, be sure to apply a torque range between 0.39 and 0.49 N·m to tighten the Water-resistive Cover.
XS5Z-11	PBT	XS5F/XS5W	M12 female screw	This provides IP67 levels of protection. This uses the Smart click mechanism. There's no need to keep track of locking torque.

##### Water-resistive Covers

###### XS2Z-11



###### XS5Z-11

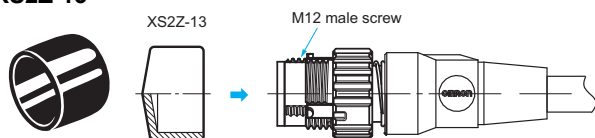


##### Dust Covers

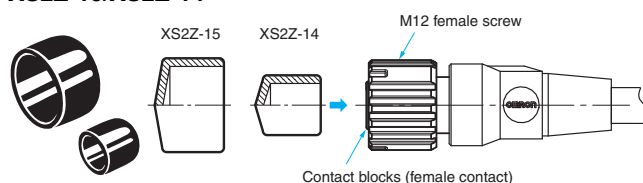
Model	Material	Suitable connector		Remarks
		Model	Mounting portion	
XS2Z-13	Rubber/black	XS5W	M12 male screw	The Dust Cover is for dust prevention and does not ensure IP67 degree of protection. When mounting the Dust Cover to a connector, be sure to press the Dust Cover onto the Connector until the Connector is fully inserted into the Dust Cover.
XS2Z-14		XS5F/XS5W	Contact blocks (female contact)	
XS2Z-15			M12 female screw	

##### Dust Covers

###### XS2Z-13



###### XS2Z-15/XS2Z-14



## Ratings and Specifications

Rated current	4 A
Rated voltage	250 VDC
Contact resistance (connector)	40 mΩ max. (at 20 mV max., 100 mA max.)
Insulation resistance	1,000 MΩ min. (at 500 VDC) *1
Dielectric strength (connector)	1,500 VAC for 1 minute (leakage current: 1 mA max.)
Degree of protection	IP67 (IEC60529) IP69K (ISO20653 (formerly DIN Standard 40050 PART9)) OMRON's Oil-resistant Component Evaluation Standards *2 (Cutting oil type JIS K 2241:2000-specification cutting oil, at 35°C or below)
Insertion tolerance	50 times
Lock strength	Tensile: 100 N/15 s, Torsion: 1 N·m/15 s
Cable holding strength	Tensile: 100 N/15 s, Torsion: 1 N·m/15 s
Lock operating force	0.1 to 0.25 N·m
Ambient operating temperature range	-25 to +70°C *3
Ambient humidity range	20 to 85%RH

\*1. State at shipping.

\*2. "OMRON's Oil-resistant Component Evaluation Standards" are OMRON's own durability evaluation standards.

Protection performance with oil-resistive connector (XS5F/W-X) correctly mated.

This performance does not apply if an oil-resistive connector (XS5F/W-X) is missing, and cord wiring is exposed.

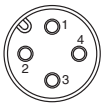
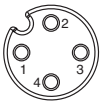
\*3. Use the robot cable within a temperature range of 0 to 70°C to avoid the wire breakage when moving.

## Materials and Finishes

Item	Model	XS5F/W-X	XS5F/W-XR
		Oil-resistant PVC cable	Oil-resistant PVC robot cable
Contacts		Copper alloy/Gold plating	
Fixtures		Zinc alloy/Nickel plating	
Fixtures (Lock) *		Stainless	
Pin block		PBT resin	
O-ring		Material combining HNBR and fluororubber	
Cover		PBT resin	
Cable		UL 758 (AWM) 6 mm dia. AWG20	UL 758 (AWM) 6 mm dia. AWG21

\* Only plug

## Connector Pinout Diagram (from Mating Side)

Item	No. of poles	4 poles
A-coding (For DC sensors)	Male (plug) contacts	
	Female (socket) contacts	

Connection Combinations

		Plug	Smartclick Plug Connectors	M12 Plug Connectors
Socket	OMRON model No.		XS5H, XS5G, XS5W (plug side), XS5R (plug side), XS5M *	XS2H, XS2G, XS2W (plug side), XS2R (plug side), XS2M *
Smartclick Socket Connectors	XS5F, XS5C XS5W (socket side), XS5R (socket side), XS5P *		⊙	○
M12 Socket Connectors	XS2F, XS2C, XS2W (socket side), XS2R (socket side), XS2P *		○	○

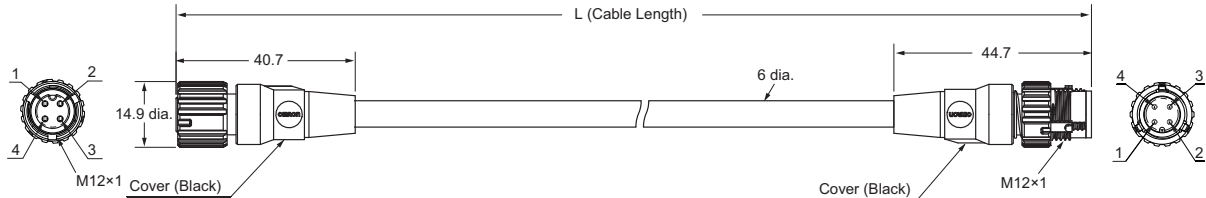
\* XS2P/XS5P and XS5M, XS2M cannot mate with each other.

Note: ⊙: Connected by twisting.  
○: Connected by screwing.

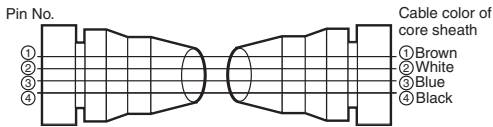
Dimensions

(Unit: mm)

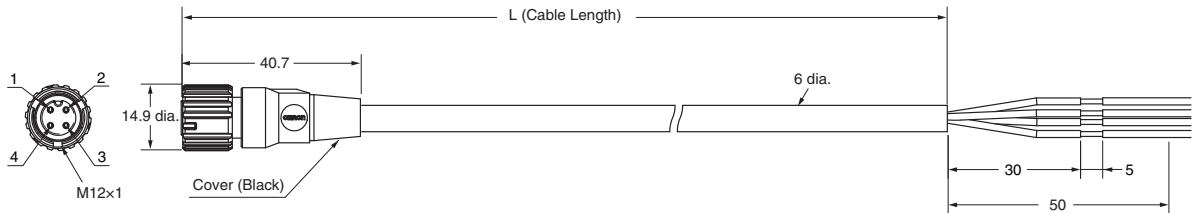
Both end connector type  
XS5W-D421-□81-X  
XS5W-D421-□81-XR



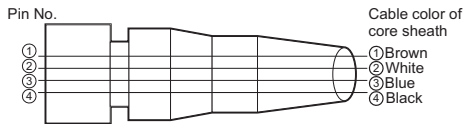
Wiring Diagram for 4 Cores



One end connector type  
XS5F-D421-□80-X  
XS5F-D421-□80-XR



Wiring Diagram for 4 Cores



## Safety Precautions

### Meaning of Display

<b>Precautions for Safe Use</b>	Supplementary comments on what to do or avoid doing, to use the product safely.
<b>Precautions for Correct Use</b>	Supplementary comments on what to do or avoid doing, to prevent failure to operate, malfunction, or undesirable effects on product performance.

### Precautions for Safe Use

#### Degree of Protection

Do not use the product if its protective capabilities have been compromised, such as through swelling or cracks to housing or seal materials.

If products in this state continue to be used, then cutting oil or other contaminants may enter the product, leading to breakages or damage from fire.

#### Connector Connection and Disconnection

- When connecting or disconnecting Connectors, be sure to hold the Connectors by hand.
- Do not hold the cable when disconnecting Connectors. Check the alignment using the slot in the polarity key.
- Do not wiring the Connector when your hands are wet. Malfunctions or device damage may occur when power is supplied to a device.
- When mating Connectors, be sure to insert the plug all the way to the back of the socket before attempting to lock the Connectors. After you lock a Connector, always confirm that it is mated properly.
- Do not use tools of any sort to mate the Connectors. Always use your hands. Pliers or other tools may damage the Connectors.
- When you replace a Connector, make sure that there is no liquid, cutting oil, or other foreign matter on the mating surfaces before you mate the Connector.

#### Disposal

Dispose of this product as industrial waste.

### Precautions for Correct Use

- Do not use the Connectors in an atmosphere or environment that exceeds the specifications.
- Always turn OFF the power supply before wiring. Failure to turn OFF the power supply may lead to electric shock or damage to devices.
- As usage in environments in which cutting oil is used may impact service life and performance, ensure the following requirements are met.
  - Usage with cutting oil requirements as defined in specifications.
  - Usage at a dilution ratio as recommended by cutting oil manufacturers.
  - Usage immersed in oil or water is prohibited.
 The cutting oil used may have a different impact on product service life. Ensure that the product is used only after confirming with the customer that there has been no deformation or deterioration of seal material from the cutting oil.
- The mating coupler will impact the oil-resistance performance values (years). Confirm mating of the couplers before use.

### Mating Combinations

	XS5□R	XS5□-X/XR	Other XS5/ XS2 Series
XS5□R	Oil-resistance performance values 4 years	Oil-resistance performance values 2 years	Water-resistance
XS5□-X/XR	Oil-resistance performance values 2 years	Oil-resistance performance values 2 years	Water-resistance
Other XS5/XS2 Series *	Water-resistance	Water-resistance	Water-resistance

\* Oil-resistant (polyurethane) cable products (XS5F-P, XS5H-P, XS5W-P) as well as oil-resistant (polyurethane) robot cables (XS5F-PR, XS5W-PR) are excluded. Please consult with OMRON for details of these products.

- Environments with corrosive gases and high temperature and humidity can cause bad connections and damage through corrosion, leading to degraded performance, therefore do not use these products in such environments.
- Do not pull on the Connectors or cables with excessive force.
- Do not step on or place any objects on the Connectors. Doing so may damage the Connectors.
- Lay the cable where it will not be stepped on to prevent the wires in the cable from being disconnected and to protect the Connectors from being damaged. If the cable must be placed where it will be stepped on, install a protective cover.
- At installation, if not installing sensors or switches, and not mating plug connectors, then use water-resistant covers (XS5Z-11, XS2Z-11) or dust-resistant covers (XS2Z-13/14/15) in order to ensure correct connector mating.

### Wiring

- Do not wire cables in environments in which the cable terminal sections will be subject to fluids such as water or cutting oil.
- When wiring cables, ensure this is carried out in accordance with the wiring diagram.
- Lay the cables so that external force is not applied to the Connectors. Otherwise, the degree of protection (IP67G) may not be achieved.

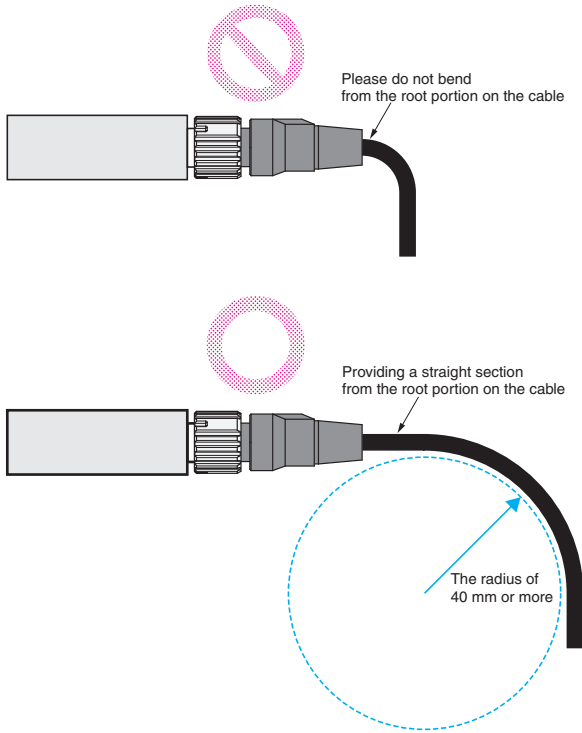
### Degree of Protection (IP67)

- The degree of protection of Connectors (IP67) is not for a fully watertight structure. Do not use the Connectors underwater.
- Do not step on or place any objects on the Connectors. Doing so may damage the Connectors.



## Setup

- Do not install the Connectors with a load placed directly on the joint or at the point where the wires connect to the Connector. The Connector may be damaged or the wires in the cable may be disconnected.
- If bending cables, ensure that these use a minimum bend radius of 40 mm.



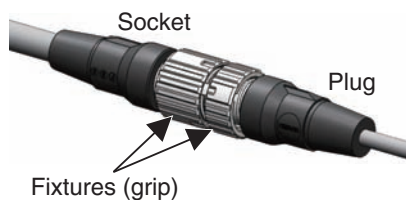
## Connecting

### 1. Connecting the XS5 Plug and Socket

- Align the projection on the plug cover with the polarity key on the socket, then insert the plug all the way in.



- Hold the knurled socket grip, then insert the projection on the plug into the groove of the socket.



- Turn the knurled grips of the socket clockwise approximately 1/8 turn in respect to the plug. A click will indicate that the Connectors are locked. The locking condition can also be confirmed by the alignment marks on the plug and socket.



### 2. Connecting the XS5 and XS2

- Align the projection on the plug cover with the polarity key on the socket, then insert the plug all the way in.
- In the same way as when connecting two XS2 Connectors, screw the knurled grip in the clockwise direction.
- When mating the products to XS2 or other M12 Connectors, tighten the lock to a torque of 0.39 to 0.49 N-m.

## Terms and Conditions Agreement

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(a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

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NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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### Change in Specifications.

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

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