

# ASCO™ Operators

for potentially explosive atmospheres and high corrosive ambient  
Ex d, Ex e mb, Ex ia - 316L stainless steel

## Series WSCR / WSCREM WSCRIS

### Features and Benefits

- Full 316 stainless steel construction, suitable for high corrosive environments
- NACE compliant including the solenoid enclosure internals
- Fullfilling the latest relevant ATEX and IECEx standards for both Gas and Dust
- Passed Lloyds register type approval vibration test 1 and 2 (IEC 60068-2-6)
- Easy electrical connection by means of screw terminals
- Peak voltage suppression diodes are standard in DC solenoids
- The flameproof Ex d enclosure is provided with a 1/2" NPT or M20 x 1.5 threaded entry hole for a broad range of cable glands
- The Ex ia enclosure is standard supplied with a blue Ex e plastic cable gland and the Ex e mb in metal
- Ingress protection degree IP66 / IP67

### Construction

|                    |                 |
|--------------------|-----------------|
| Solenoid enclosure | AISI 316L SS    |
| Bonnet             | AISI 316L SS    |
| Core & tube        | Stainless steel |
| Springs & plugnut  | Stainless steel |
| Nameplate          | AISI 316L SS    |
| Coil connection    | AISI 316L SS    |
| Fasteners & screws | AISI 316L SS    |

### Safety code

|               |   |
|---------------|---|
| <b>WSCR</b>   | II 2G Ex d IIC Gb T6..T3 (gas)<br>II 2D Ex tb IIIC Db IP66/67 85°C to 200°C (dust)    |
| <b>WSCREM</b> | II 2G Ex e mb IIC Gb T6..T3 (gas)<br>II 2D Ex tb IIIC Db IP66/67 85°C to 200°C (dust) |
| <b>WSCRIS</b> | II 2G Ex ia IIC Gb T6 (gas)<br>II 2D Ex tb IIIC Db IP66/67 85°C (dust)                |

### Electrical Characteristics

#### Standard voltages\*:

DC (=): 24V - 48V

AC (~): 24V - 48V - 115V - 230V / 50 Hz

(Other voltages and 60 Hz on request)

\* Intrinsically Safe construction only 24V/DC

**NOTE:** Refer to page 3 for more detailed electrical characteristics information.

### Temperature classification tables

The minimum allowable ambient temperature is -60°C<sup>(1)</sup> for the operator.

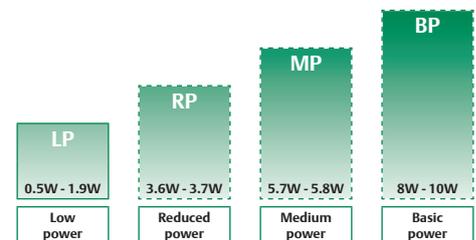
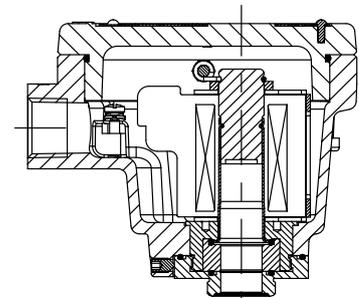
Select the requested "T" classification from the temperature classification tables, respecting the maximum ambient temperature and cold (20°C) electrical holding power values.

AC (~) or DC (=) Full wave rectified

| Surface temperature |    | Ambient/medium <sup>(2)</sup> temperature<br>(°C) | Power level<br>(W) |         | Cable temperature<br>(°C) |         |
|---------------------|----|---|--------------------|---------|---------------------------|---------|
| D                   | G  |   | Ex d               | Ex e mb | Ex d                      | Ex e mb |
| T80°C               | T6 | 25  | 8.5                | 8.5     | 60                        | 60      |
|                     |    | 40  | 6.0                | 6.0     | 65                        | 65      |
|                     |    | 60  | 3.0                | 3.0     | 75                        | 75      |
| T95°C               | T5 | 25  | 11.5               | 11.5    | 70                        | 70      |
|                     |    | 40  | 8.5                | 8.5     | 75                        | 75      |
|                     |    | 60  | 5.0                | 5.0     | 80                        | 80      |
| T130°C              | T4 | 75  | 3.0                | 3.0     | 90                        | 90      |
|                     |    | 25  | 19.5               | 19.5    | 85                        | 85      |
|                     |    | 40  | 16.0               | 16.0    | 90                        | 90      |
|                     |    | 60  | 11.5               | 11.5    | 100                       | 100     |
| T195°C              | T3 | 75  | 8.5                | 8.5     | 110                       | 110     |
|                     |    | 100   | 4.5                | 6.0     | 120                       | 115     |
|                     |    | 25  | 27.0               | 27.0    | 100                       | 105     |
|                     |    | 40  | 23.0               | 23.0    | 110                       | 110     |
|                     |    | 60  | 18.0               | 18.0    | 115                       | 115     |
|                     |    | 75  | 15.0               | 15.0    | 125                       | 125     |
|                     |    | 100   | 9.5                | 11.5    | 135                       | 130     |

<sup>(1)</sup> -40°C for the Intrinsically Safe construction WSCRIS

<sup>(2)</sup> Make sure that the selected ambient temperature does not exceed the allowable valve temperature characteristics as specified on the appropriate valve catalogue sheets.



POWER LEVELS - cold electrical holding values (watt)

DC (=) WSCRIS solenoids; Ex ia

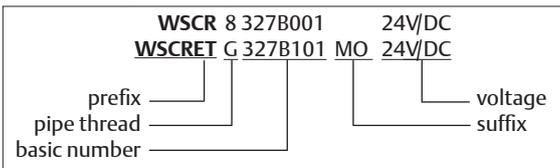
| Power level (watt)    | Insulation class | Maximum ambient <sup>(1)</sup> temp. "T" classification |                     |                     |
|-----------------------|------------------|---|---------------------|---------------------|
|                       |                  | T6 (G)<br>85°C (D)                                      | T5 (G)<br>100°C (D) | T4 (G)<br>135°C (D) |
| <b>Low power (LP)</b> |                  |   |                     |                     |
| 0.5                   | H                | 60°C  | -                   | -                   |

**Prefix table**

| Prefix |   |   |   |   |   |   | Description   | Power level |    |    |    |
|--------|---|---|---|---|---|---|---|-------------|----|----|----|
| 1      | 2 | 3 | 4 | 5 | 6 | 7 |   | LP          | RP | MP | BP |
| W      | S | C | R |   |   |   | Flameproof 316L SS (EN/IEC 60079-0+1+31)*                         | ●           | ●  | ●  | ●  |
| W      | S | C | R | E | M |   | Increased Safety / Encapsulated 316L SS (EN/IEC 60079-0+7+18+31)* | ●           | ●  | ●  | ●  |
| W      | S | C | R | I | S |   | Intrinsically Safe 316L SS (EN/IEC 60079-0+11+31)*                | ●           | -  | -  | -  |
|        |   |   | E | T |   |   | Threaded conduit/hole (M20 x 1.5)                                 | ●           | ●  | ●  | ●  |
|        |   |   | T |   |   |   | Threaded conduit (1/2" NPT)                                       | ●           | ●  | ●  | ●  |

● Available feature

\* ATEX solenoids are also approved according to EN 13463-1 (non electrical valves)

**Ordering examples valves:****Product selection guide***(The selection can only be made in conjunction with the appropriate valve catalogue sheet)***STEP 1**

Select basic valve catalogue number, including pipe thread identification letter from one of the specification tables on the separate catalogue pages.

**Example: 8327B102****STEP 2**

Select voltage. Refer to standard voltages on page 1.

**Example: 24V/DC****STEP 3**

Select solenoid prefix (combination). Refer to the prefix table on this page and respect the indicated power level, cold electrical holding values and "T" classification mentioned on page 1.

*NOTE: Make sure that the ambient temperature does not exceed the allowable valve temperature characteristics.***Example WSCR:****60°C ambient****Basic Power (BP) 8W****II 2G Ex d IIC Gb T4****II 2D Ex tb IIIC Db IP66/67 T135°C****STEP 4**

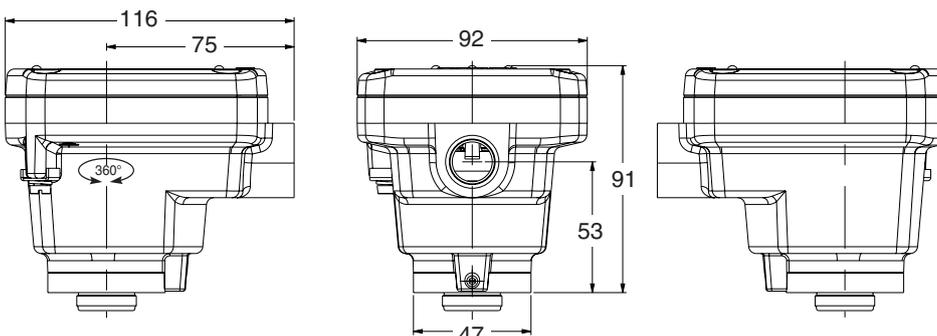
Final catalogue / ordering number.

**Example:****WSCR 8327B102 24V/DC****Additional options**

- Special moulded-in solid state components for peak voltage suppression and/or AC (~) rectification
- Cable glands (Flameproof cable entry devices for cable 8.5-16 mm or 9-12 mm) refer to section 14

**Installation**

- Multi language installation/maintenance instructions are included with each valve
- The solenoid operators can be mounted in any position without affecting operation
- Any Ex d IIC approved cable entry device can be fitted in the 1/2" NPT (M20 x 1.5 as an option) threaded entry hole, refer to the nameplate for identification of the maximum cable temperature
- The WSCREM solenoids are fitted with stainless steel cable gland for cables with o.d. from 7.2 to 11.7 mm
- The WSCRIS solenoids are supplied with plastic blue cable gland for cables with o.d. from 7 to 12 mm
- Internal and external earthing connection terminals
- The operator can be rotated 360° to select the most favourable position for cable entry

**Dimensions (mm), Weight (kg)**

| Prefix  | Weight |
|---------|--------|
| WSCR*   | 2.25   |
| WSCREM* |        |
| WSCRIS* |        |

\* Without cable gland

Safety parameters

| prefix option         | safety parameters        |                |                |                |                |
|-----------------------|--------------------------|----------------|----------------|----------------|----------------|
|                       | U <sub>i</sub><br>= (DC) | I <sub>i</sub> | P <sub>i</sub> | L <sub>i</sub> | C <sub>i</sub> |
|                       | (V)                      | (mA)           | (W)            | (mH)           | (µF)           |
| <b>Low power (LP)</b> |                          |                |                |                |                |
| WSCRIS                | < 32                     | 500            | 1.5            | 0              | 0              |

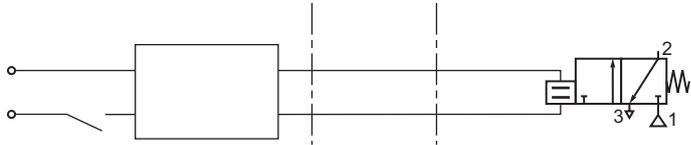
Compatibles barriers

Located in safe areas, these interfaces allow to feed the intrinsically safe solenoid valves located in explosive areas. This equipment must be ordered from its respective manufacturers, specifying that they are intended to feed intrinsically safe solenoid operators:

WSCRIS : II1G Ex ia IIC T6 Ga, II 2D Ex tb IIIC T85°C Db IP66/67

| WSCRIS  |                      |        |
|---|----------------------|--------|
| II 2G Ex ia IIC Gb T6 (gas) / II 2D Ex tb IIIC Db IP66/67 85°C (dust) |                      |        |
| Suppliers   | Barrier reference    | WSCRIS |
| ABB   | DO910S/B/N           | x      |
| BARTEC  | 07-7331-2305/1000    | x      |
| G.M. international  | D5048S               | X      |
|   | D5049S               | X      |
|   | D1048S               | X      |
|   | D1049S               | X      |
| MTL   | MTL4521              | X      |
|   | MTL5521              | X      |
|   | MTL4521L             | X      |
|   | MTL5522              | X      |
|   | MTL4523              | X      |
|   | MTL5523              | X      |
|   | MTL4523L             | X      |
|   | MTL4523R             | X      |
|   | MTL4523V             | X      |
|   | MTL5523V             | X      |
|   | MTL4524              | X      |
|   | MTL5524              | X      |
|   | MTL4524S             | X      |
|   | MTL4525              | X      |
|   | MTL5525              | X      |
|   | MTL5521T             | X      |
|   | MTL4523VL            | x      |
|   | MTL5523VL            | x      |
| MTL5523   | X                    |        |
| Pepperl + Fuchs   | KCD0-SD3-Ex1.1045    | X      |
|   | KCD0-SD3-Ex1.1245    | X      |
|   | KCD0-SD-EX1.1245     | X      |
|   | KCD2-SLD-EX1.1045    | X      |
|   | KCD2-SLD-EX1.1245    | X      |
|   | KFD0-SD2-EX1.1045    | X      |
|   | KFD0-SD2-EX1.1180    | X      |
|   | KFD0-SD2-EX2.1045    | X      |
|   | KFD0-SD2-EX2.1245    | X      |
|   | KFD2-SL2-EX1         | X      |
|   | KFD2-SL2-EX1.B       | X      |
|   | KFD2-SL2-EX1.LK      | X      |
|   | KFD2-SL2-EX1.LK.1045 | X      |
|   | KFD2-SL2-EX2         | X      |
|   | KFD2-SL2-EX2.B       | X      |
|   | KCD0-SD3-Ex1.1245.SP | X      |
|   | KCD0-SD-Ex1.1245.SP  | X      |
|   | KFD2-SL2-Ex1.LK-Y1   | X      |
|   | HIC2871A             | X      |
|   | HIC2873              | x      |
|   | HIC2877              | x      |
|   | HIC2883              | X      |
|   | HID2872              | X      |
|   | HID2876              | X      |
|   | LB-2103 AR/ER        | X      |
|   | LB-2112 AR/ER        | X      |
|   | FB-2203              | X      |
|   | FB-2212              | X      |
|   | FB-2216              | X      |
|   | FB6216               | X      |
| FB2213  | X                    |        |
| FB2201  | X                    |        |

Example of use with a Zener barrier installed in a non-hazardous zone: safe area (RS interface) cable explosive area



Electrical Characteristics

Standard voltages

DC (=): 24V nominal

A minimum current of 32mA is necessary for optimal performance. The minimum series resistance required is 200 Ohms. The nominal value of the resistance of the R<sub>coil</sub> is 32 Ohms (at 20°C).

Intrinsically Safe Coil Calculations

The following application information will allow the calculation of the loop current for the ASCO intrinsically safe solenoid.

Definitions:

- V<sub>supply</sub> = The supply voltage to the barrier.
- T<sub>ambient</sub> = The ambient temperature in degrees C.
- R<sub>barrier</sub> = The maximum barrier end to end resistance.
- R<sub>loop</sub> = The maximum resistance in lead wire
- R<sub>coil</sub> = The resistance of the solenoid coil at T<sub>ambient</sub>
- $R_{coil} = 32 \Omega \cdot \frac{(T_{amb} + 234)}{254}$
- I<sub>loop</sub> = Loop current in the circuit:
- $I_{loop} = \frac{(V_{supply} - 3.2)}{(54 + R_{coil} + R_{loop} + R_{barrier})}$

This current must always be greater than or equal to 32mA for proper operation of the solenoid valve.

Electronic enhanced “IS” solenoid

- Normal operating voltage: 24 Volts, DC +/-10%
- Maximum allowable “off” state current to the valve must be < 1 mA
- Maximum capacitor charge time: 2 seconds
- Minimum time between cycles: 2 seconds
- Minimum drop current to reset electronic coil: 2 mA
- Important:** A minimum series resistance of 200 Ohms is required in wiring if a safety barrier is not used

In accordance with the zone classification and the national legislation of each country, apply the certification procedures for the connection of IS-rated products with associated equipment. All information subject to change without notice. All responsibility for the use of products from other suppliers and the possible modifications of their characteristics is disclaimed.

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**Compatibles barriers**

| WSCRIS   |  |        |
|--|--|--------|
| II 2G Ex ia IIC Gb T6 (gas)/ II 2D Ex tb IIIC Db IP66/67 85°C (dust) |  |        |
| Suppliers  | Barrier reference                        | WSCRIS |
| Stahl  | 9176/ 10- 16- 00s                        | X      |
|  | 9176/ 20- 16- 00s 1 canal                | X      |
|  | 9176/ 20- 17- 00s 1 canal                | X      |
|  | 9176/ 20- 15- 00s 2 canaux               | X      |
|  | 9176/ 20- 16- 00s 2 canaux               | X      |
|  | 9176/ 20- 17- 00s 2 canaux               | X      |
|  | 9175/ 10- 16- 11s                        | X      |
|  | 9175/ 20- 16- 11s 1 canal                | X      |
|  | 9276/ 10- 21- 40- 00k                    | x      |
|  | 9276/ 10- 21- 40- 00s                    | x      |
|  | 9276/ 10- 21- 60- 00k                    | X      |
|  | 9276/ 10- 21- 60- 00s                    | X      |
|  | 9276/ 10- 24- 48- 00k                    | X      |
|  | 9276/ 10- 24- 48- 00s                    |        |
|  | 9275/ 10- 24- 48- 11s                    |        |
| Turck  | IMX12-DO01-1U-1U-PR/ 24VDC/CC            | X      |
|  | MX12-DO01-1U-1U-0/24VDC/CC               | X      |
|  | IMX12-DO01-2U-2U-0/ 24VDC                | X      |
|  | IMX12-DO01-2U-2U-0/ 24VDC/CC             | X      |
|  | IMX12-DO01-2U-2U-PR/ 24VDC               | X      |
|  | IMX12-DO01-1U-1U-0/ 24VDC                | X      |
|  | IMC-DO-11EX/L                            | X      |
|  | IMX12-DO01-2U-2U-PR/ 24VDC/CC            | X      |
| Phoenix contact  | MACX MCR-EX-SL-SD-21-60-LP-SP - 2924100  | X      |
|  | MACX MCR-EX-SL-SD-21-60-LP - 2865515     | X      |
|  | MACX MCR-EX-SL-SD-24-48-LP - 2865609     | X      |
|  | MACX MCR-EX-SL-SD-21-40-LP-SP - 2924139  | X      |
|  | MACX MCR-EX-SL-SD-21-40-LP - 2865764     | X      |
|  | MACX MCR-EX-SL-SD-24-48-LP-SP - 2924126  | X      |
|  | MACX MCR-EX-SL-SD-24-48-LFD-SP - 2906156 | X      |
|  | MACX MCR-EX-SL-SD-24-48-LFD - 2906155    | X      |
|  | MACX MCR-EX-SL-SD-23-48-LFD-SP - 2924870 | X      |
|  | MACX MCR-EX-SL-SD-23-48-LFD - 2924867    | X      |
|  | PI-EX-SD-21-40 - 2865913                 | X      |
|  | PI-EX-SD-24-48 - 2865298                 | X      |
| PI-EX-SD-21-60 - 2865188   | X  |        |
| WAGO   | 750-535                                  | X      |
|  | 750-535/040-000                          | X      |
|  | 750-539                                  | X      |

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