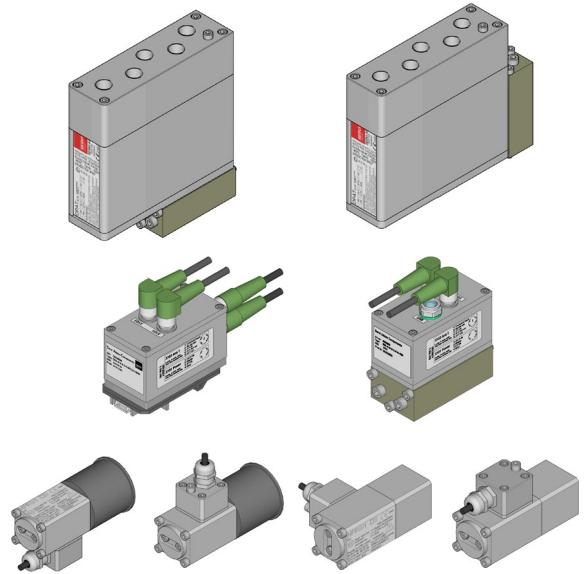


# SAC

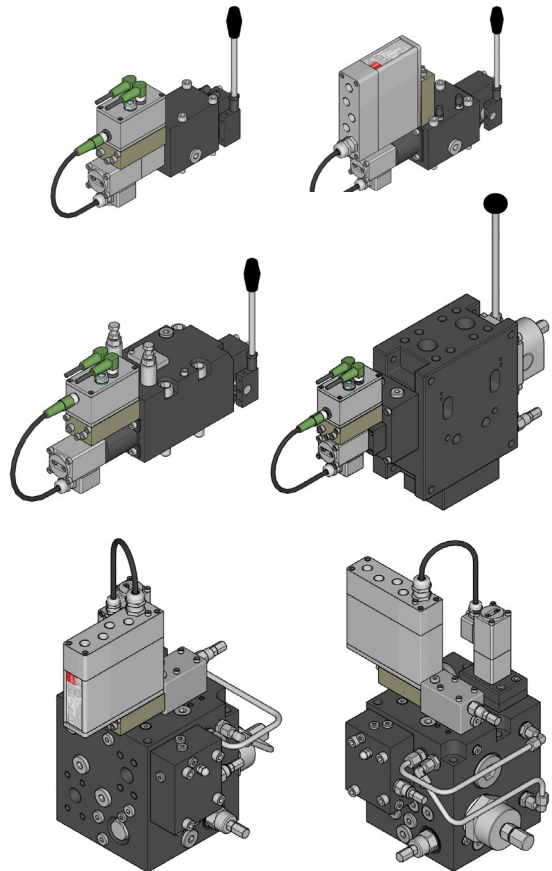
## OPAT-ODC -HPRS

- Unified interfaces
- PID controllers
- BUS compatible
- Symmetric design
- Modular structures



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## 1.1 FEATURES AND TECHNICAL DATA, OPAT

### Features electronic part:

- Fully digitized amplifier and controller approved for use in EX zones, ATEX and IECEx certificates
- PROFIBUS DP /PROFIDRIVE up to 12 Mbaud autodetect
- Single PROFIBUS nodes or multiple PROFIBUS and CAN node concept
- Flexible and reliable system, use of a modern 16-bit CPU with high power reserve
- Analogue inputs for setpoint or feedback usage
- Serial RS485 interface for local parameterization. i.e change of selected parameters “on-the-fly” without interference of function; monitoring of display values and 4-channel oscilloscope with [HCSTool](#) via PC
- Parameterization, monitoring, command and actual values via PROFIBUS
- High resolution and accuracy for analogue signals due to 12-bit A/D-converter
- Digital outputs for comparator or error signal
- Integrated end termination

### Features:

| FEATURE                     | RANGE, CHARACTERISTICS   |
|-----------------------------|--|
| Type approval               | Presafe 14 ATEX 5271X, CE 2460<br>IECEx PRE 14.0036X   |
| Identification              | II 2G Ex eb ib mb IIC T4 Gb  |
| Supply voltage              | 24 VDC SELV DC supply with max. 24 VDC +10%  |
| Max current (External Fuse) | 1 A (10 A)   |
| Solenoid system selection   | 0.15 A; 0.24 A; 0.50 A; 0.63 A; 0.80 A (intermediate values adjustable)  |
| Temperature range           | Ambient: -40° C ... +55° C; Storage < 24 months -40° C ...+55° C<br>Storage > 24 months +5° C ...+25° C (antistatic bag)   |
| EMC                         | The unit complies with the following standards for EMC compatibility:<br>DIN EN 61000-4-2 Electrostatic Discharges<br>DIN EN 61000-4-3 Radiated, Radio-frequency, EM field<br>DIN EN 61000-4-4 Electrical Fast Transient / Burst Immunity<br>DIN EN 61000-4-5 Surge Immunity<br>DIN EN 61000-4-6 Immunity to Conduct Disturbances, Induced by RF Field<br>DIN EN 61000-6-3 Radio disturbances<br>Germany Lloyd VI Terminal voltage<br>- part 7 2003 Radio disturbances |

|   |  |
|---|--|
| Connection terminals  | Standard: Front 2,5-H/SA 5-EX / Front 2,5-V/SA 5-EX, screw terminal<br>Optional: SPT 2,5/2-H-5,0-EX / SPT 2,5/2-H-5,0-EX, cage clamp terminal  |
| Twin solenoid   | Rel duty cycle: S1 (one coil), Operating pressure: max 50 bar<br>Surface protection: DIN 509779 Fe//ZnNi8//Cn//TO<br>Inside protection: Completely IP66/67 potted  |
| Analogue Inputs (set values and/or feedback values)<br>Both Master (PB) and slave (SLA) | <u>Analogue 1 (feedback FB1):</u><br>0... ± 10 V; 6... ± 2,5 V; 6... ± 4 V; 7,5... ± 2,5 V 5... ± 3,0 V differential;<br>0/4-20 mA; 12... ± 8 mA;<br>single ended @ 250 Ohm (cable fracture detection selectable where applicable)<br><u>Analogue 2 (as command in mode 1, 3, 4):</u><br>0... ± 10 V; 0... ± 5V differential; 0/4-20 mA; 12... ± 8 mA; single ended.<br><u>Analogue 2 (as feedback in mode 6, 8):</u><br>0... ± 10 V; 6... ± 2,5 V; 6... ± 4 V; 7,5... ± 2,5 V 5... ± 3,0 V differential;<br>0/4-20 mA; 12... ± 8 mA;<br>single ended @ 250 Ohm (cable fracture detection selectable where applicable) |
| Digital input (Master only)   | Enable or PROFIBUS resetting address to 126, by 24 VDC input, selectable logic   |
| Solenoid current (output)   | 2 output stages, each up to max 1,0 A, shortcircuit protected above 1,05 A   |
| Digital Output  | 1 output voltage level 0 V / 24 V high impedance, or comparator positiv or negativ logic.  |
| Reference output  | 1 reference output 10 V (max 10 mA)  |
| Supply output   | 24 V / 200 mA, overload protected (internal fuse). Can also be used as error and/or comparator indication  |
| Interface   | RS232 interface  |
| Status signals  | 2 status LED red/green (Run/OK; Disable; BUS failure; Error)   |
| Current consumption   | At 24 VDC supply, 90 mA @ 0 mA output; 170 mA @ 800 mA output  |
| Digital Interface (BUS)   | Master (model code PB): PROFIBUS DP / Profidrive up to 12 autodetect.<br>Slave: (model code SLA): CAN (proprietary) interface with OPAT Master   |

|                                 |  |
|---------------------------------|--|
| Housing                         | Aluminium EN AW-6060 [AlMgSi] or EN-WA-6082 [AlSi1MgMn], Anodized natural<br>Main housing from extruded profile<br>Bottom plate and LID machined from bar, LID includes integrated form seal<br>All screws in stainless steel A4-70/80 |
| Marking                         | Laser engraved stainless steel plate   |
| Main dimensions                 | BTN: l = 160; h = 175; w = 47 [mm]<br>SDE: l = 145; h = 190; w = 47 [mm]<br>XS: l = 236; h = 145; w = 47 [mm] all without glands   |
| Earthing (located at the LID's) | M5 x 10 screw in A4-70 or A4-80; BTN/SDE: 5 off inside; 1 off outside<br>XS: 7 off inside; 2 off outside   |
| IP protection                   | EN 60529: IP67   |
| Connection to application       | M20 x 1,5 6H, depth 15 mm BTN/SDE: 5 off; XS: 7 off  |
| LED window                      | Potted with optical clear resin, 2 off   |
| EX OPAT User Manual             | Servi doc: <a href="#">1388826</a>   |

## 1.2 FEATURES AND TECHNICAL DATA, HPRS

### Functional Principle

LVDT stands for Linear Variable Differential Transformer. The LVDT is an analog and non-contact sensor with one primary and two secondary coils. An electrical signal is generated by the linear movement of the encoder rod. Attached to the encoder rod is the ferromagnetic core. The core induces a voltage into the secondary coils

### Signal conditioning

An integrated signal conditioner converts the induced voltage into a output signal 4-20 mA. The actual measuring length 15 -21 mm can be tuned by two potentiometers to desired output signal range, default is 4-20 mA

### Advantages

- Absolute measuring principle (position always available)
- Non-contact measuring principle, maximum service life
- Very low linearity deviations
- High repeatability
- Very high resolution with internal signal conversion
- Insensitive to external interference
- Mechanically very robust against external influences
- Pressure tube in stainless steel



| FEATURE                   | RANGE, CHARACTERISTICS   |
|---------------------------|--|
| Type approval             | Presafe 14 ATEX 5124X, CE 2460<br>IECEX PRE 14.0021X   |
| Identification            | II 2G Ex db IIB T6 Gb  |
| Supply voltage            | 24 VDC SELV DC supply with max. 24 VDC +20%  |
| Max Current               | 62 mA  |
| External Fuse             | 100 mA   |
| Temperature range         | Ambient: -40°C ... +55°C; Storage > 24 months +5°C ... +25°C (antistatic bag)                              |
| Measuring principle       | LVDT with integrated electronic  |
| Output Signal             | 4-20 mA (12 mA +/- 8 mA)   |
| Measuring stroke          | 21 mm ( $\pm$ 10,5 mm)   |
| IP protection             | IP67   |
| Measuring principle       | LVDT with integrated electronic  |
| Linearity                 | $\pm$ 0,5 % F.S.   |
| Repeatbility              | $\pm$ 0,1 % F.S.   |
| Output load               | < 500 Ohm  |
| Temperature coefficient   | < $\pm$ 0,05 % F.S. / °C   |
| Adjustments               | Offset and gain by 10 turns potentiometer  |
| Encapsulation             | Sensor housing and cable adaptor: Stainless steel<br>Valve adaptors: Steel with Corridor surface treatment |
| Connection to application | 3-wire +PE 0,5-0,75 mm <sup>2</sup> , flying lead, 0,5; 1,0; 3,0; 10,0 m; with/without shield              |
| EX HPRS User Manual       | Servi doc: <a href="#">1503132</a>   |



|                                     | <b>RANGE, CHARACTERISTICS</b>  |
|-------------------------------------|--|
| Housing Material                    | Sensor housing and Cable adaptor: AISI 316 L<br>Valve adaptor Steel EN 10027-2, 1.0338   |
| Marking                             | Laser engraved into sensorhousing  |
| Main dimensions                     | Sensorhousing with horisontal cableadaptor: l = 68 <sup>1</sup> ; h = 75; w = 44 [mm]<br>Sensorhousing with vertical cableadaptor: l = 68 <sup>1</sup> ; h = 92 <sup>1</sup> ; w = 44 [mm]<br><sup>1</sup> ) Minimum bending radius flying lead not included<br>Valveadaptor dimensions not included |
| Earthing (located at cable adaptor) | M5 x 10 screw in A4 70/80 including spring washer in A4 DIN 128 A4/70  |
| Access for adjustments              | M4 x 8 A4/70 with CU seal ring Ø4 x 8 (2 sets)   |
| Fastening bolts                     | Size 3: Cylinder Head Cap Screw, M5 x 115 A4 70/80<br>Size 5/7: Cylinder Head Cap Screw, M5 x 68 A4 70/80  |
| Cable Gland                         | Shielded cable: Eaton Crouse Hinds ADE 4F, type 5 or 6. M16<br>Non shielded cable: Eaton Crouse Hinds ADE 1F2, type 4 or 5. M16  |

## 1.3 FEATURES AND TECHNICAL DATA, ODC

### Feature electronic part:

- Fully digitized amplifier and controller
- Available with bus interfaces
  - ❖ CANopen 
  - ❖ PROFIBUS (on request) 
- Flexible and reliable system, use of a modern 16bit CPU with high power reserve
- Flexibility due to possible software and hardware extensions and multiple options for customer specific requirements, e.g. connector selections
- Flash-EPROM technology for easy software update or modifications from PC via USB interface
- Variable settings for all kinds of solenoid systems
- Change of selected parameters “on-the-fly” without interference of function; monitoring of display values and 4-channel oscilloscope with [HCSTool](#) via PC
- High resolution and accuracy for analogue signals due to 12-bit A/D-converter
- All kind of customer specific adaptations possible. Just as and we provide the right solution

| FEATURE   | RANGE, CHARACTERISTICS   |
|---|--|
|   | 12 V – 10% ... 32 V + 10, residual ripple < 10 % (max. 50 VA power draw)<br>Power consumption approx. 100 mA @ 24 V (solenoids deactivated)  |
| Solenoid system selection                           | 0.15 A; 0.24; 0.50; 0.63; 0.80 A (intermediate values adjustable; other on request)  |
| Control voltage for digital input                   | (12-32V+/-10%, residual ripple < 10 %, current draw < 20 mA)   |
| Temperature ranges *1                               | Ambient: -25° C ... +80° C; storage -40° C ... +105° C   |
| EMC   | In accordance with applicable standards (CE); Germanischer Lloyd VI-7-2 on request<br>IEC 60533: 11/2010 EMC, Civil ship (General Zone)<br>EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6<br>EN 61000-4-16<br>Surge: 55V 30 ms<br>Isolation between housing and connector terminals > 10 MΩ (50V DC) |
| Analogue inputs (set values and/or feedback valves) | Analogue 1: UB *0,5 with or without signal range fault detection.<br>Analogue 2: +- 10 V, 4 +- 4 V; 0/4-20 mA selectable as command or feedback.<br>Analogue 3: (valve feedback, voltage). Voltage input resistance 240 kΩ; current meas. shunt 205 Ω. e   |
| Digital input                                       | 1 digital input (Enable)   |
| Solenoid current (output)                           | 2 output stages, each for up to max. 1.0 A (with over-energ. and quick de-energization):   |
| Digital output                                      | 1 output, voltage level 0 V / 24 V, 10 mA (ERROR)  |
| Reference output                                    | 1 Reference output 8 V (max. 20 mA), short circuit protected   |
| Supply output f. (external) sensor                  | 24 V / 100 mA; overload protected (Mutifuse). Can also be used as error indication   |
| Interface 1   | Supply voltage   |
| Status signals                                      | 1 status LED's 2 colors at top lid (Run/OK; Enable, Error)   |
| PWM frequency, cycle times                          | Approx. 22 kHz PWM frequency, cycle time 0,255 msec  |

\*1: higher temperatures (storage or during operation) will reduce the life cycle of the product

## Feature housing part

- Housing made from extruded profile for main part of housing with machined bottom plate and lid
- Very rigid and high mechanical strength due to special design and usage of high quality aluminum
- Very good corrosion protection
  - ❖ aluminum seawater resistant
  - ❖ additional surface treatment
  - ❖ all screws in stainless steel
- Housing height can be adapted to specific requirements
- Bottom plate depending can be customized to customer requirements. Version available for specific twin solenoid for [Hawe PSL/PSV valves](#)
- Lid adaptable to all kinds of connectors. Standard are M12 connectors.
- Due to symmetrical design very versatile and universal adaptable to all kind of applications, mounting and connecting situations (all on request)
- Bottom plate and lid with special groove for form seal for high protection classification → up to IP69K possible
- Very wide variety of connection versions possible (e.g.):
  - ❖ M12 connectors (top side lid or small side of housing)
  - ❖ AMP Junior timer (top side lid mounted)
  - ❖ Deutch (top side lid mounted)
  - ❖ EN175301-803/Ex DIN 43650 (top side lid mounted)
  - ❖ Cable glands M12 or M16, also in stainless steel (small side mounted)
  - ❖ flying leads

## Housing:

| FEATURE                   | RANGE, CHARACTERISTICS   |
|---------------------------|--|
| Housing                   | Aluminum EN AW-6060 (AlMgSi) or EN AW-6082 (AlSi1MgMn)<br>additional protected with treatment<br>Main housing extruded profile cut to length and machined<br>Bottom plate and top lid machined from blocks including form seals<br>All screws in stainless steel (quality A4)  |
| Main dimensions           | l = 89,8; h = 53,5; w = 47 (mm) standard version without connectors  |
| Vibrations                | EN 60060-2-6: tests Fc: vibration sinusoidal 10g ms<br>(10-2000Hz; test 3 x 100h per axis)   |
| Shock                     | EN 60068-2-27: tests Ea: shock 30g, 11ms, half sine  |
| IP protection             | EN 60529: max. IP69k (depending on connectors)   |
| Salt spray                | EN 60068-2-52 (IEC68-2-52) Level 1   |
| Connection to application | M 12 connectors (standard version); depending on configuration up to 6 connectors<br>Position of connectors: 4 / 5 x M12 connectors top side; 2 x 2 connectors small side all depending on configuration or application requirements<br>Other possible connectors (on request):<br>AMP junior timer; Deutsch; EN 175301-803 / Ex DIN 43650 (top side lid mounted)<br>Cable glands M12 or M16 also available in stainless steel (small side mounted)<br>Flying leads. |
|                           | Version «Hawe PSL/PSV» --> direct mounting on twin solenoid and internally connected<br>Mounting on other solenoids on request<br>Cable connection via cable glands, M12 connectors or flying lead possible  |

## 2. INTRODUCTION

SAC is a concept for multiple versions of digital control of conventional and specialized regulations systems for industrial and mobile applications, including versions for Explosive areas, Ex Zone 1.

SAC can control and regulate all conventional proportional solenoids, e.g. hydraulic valves with a current draw of up to 2.5 A. It can be controlled by a number of different control signals, both analogue and digital (BUS), and has sensor inputs for valve and/or process closed loop regulation.

The units have modular design and can easily be adapted to a range of interfaces, but it is specifically prepared and adjusted for direct mounting (onboard) on Hawe PSL/PSV series, Servi HSV 600 series and MB block proportional valves.

SAC is well suited for outdoor use, including marine environments, and has a robust design to withstand vibrations, temperature fluctuations and electronic noise (EMC).

### **Typical applications and usage:**

Proportional valves with/without feedback as:

- directional – direct and pilot operated
- flow control valves
- pressure reducing valves
- pressure regulating valves
- cartridge valves
- valves without feedback used in applications with process value feedback (e.g. position, pressure, velocity, rpm etc.)
- Speed regulating systems (i.e speed related sprayers)
- mechanical regulation systems (i.e electric disc brakes)
- systems for EX zones (i.e petroleum industry)
- systems for hydro power plants (i.e turbine control)
- systems for inductive fields (i.e steel and metal industries)

## Regulation improvements for the proportional valve

Upgrading conventional proportional valves with SAC (Servi Addon Components) increase the regulating performance significantly.

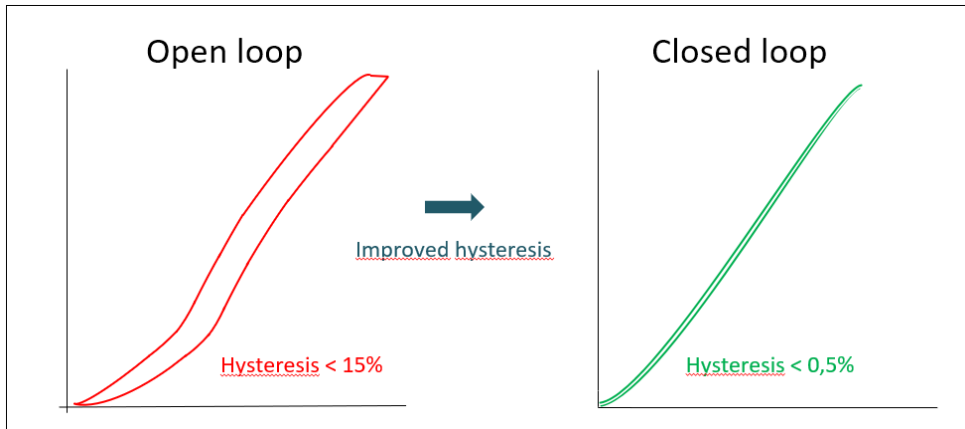
By upgrading the valve with spool position sensor (WA or HPRS) and activate the electronic controller PID regulator the hysteresis, response time and repeatability are improved.

SAC is compatible with a large variety of valves, making it a very versatile product for most applications in offshore, marine, industrial and mobile

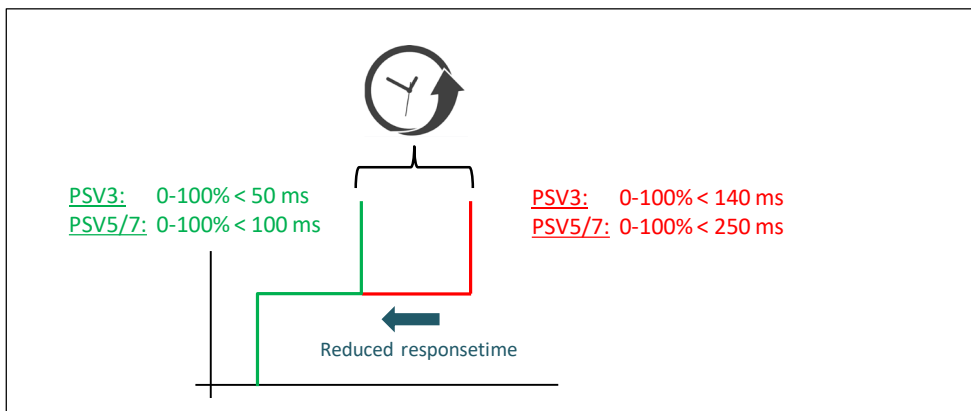
Easy assembly allows efficient and safe upgrading in the field

### Typical improved regulation characteristics:

#### Hysteresis



#### Responsetime

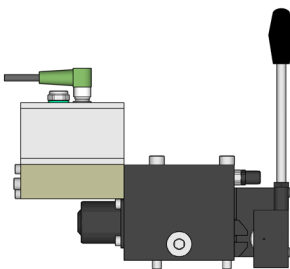


### 3. ORDER INFORMATION

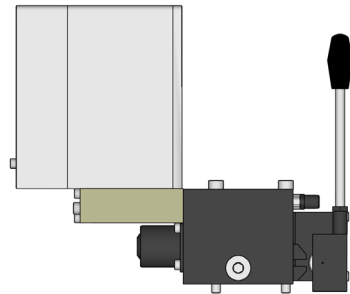
SAC as OBE (On Board Electronic) for Hawe PSL/PSV, Servi HSV 600 or MB serie valve blocks has the SAC article-number integrated into the product model coding. SAC is directly mounted to the housing of the valve / block and can be with or without spool feedback sensor.

**SAC- OBE versions (see further examples page 14-32)**

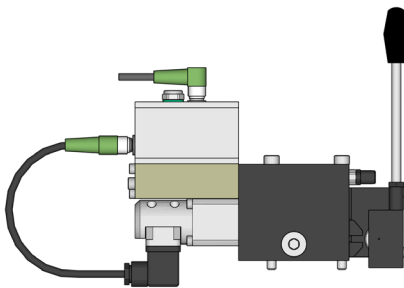
ODC without feedback



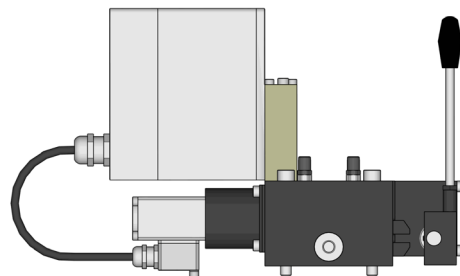
OPAT without feedback



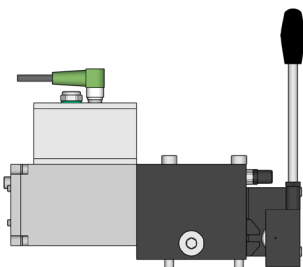
ODC with WA external feedback



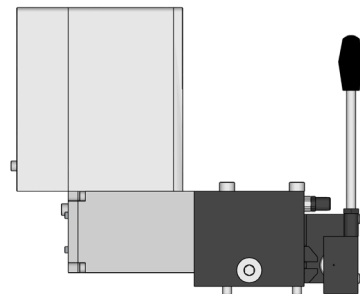
OPAT with HPRS external feedback



ODC with internal feedback



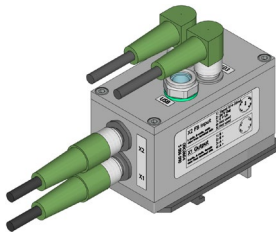
OPAT with internal feedback



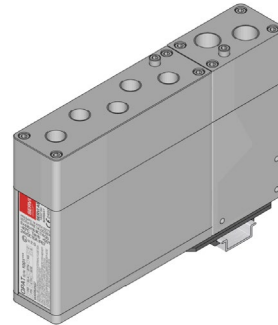
**SAC - Standalone versions:**

OPAT/ODC-XS means “stand alone” and no solenoid is directly mounted to the unit. SAC in this case can be mounted independent from the controlled axis - with or without feedback sensor from the valve and/or the process

ODC-XS

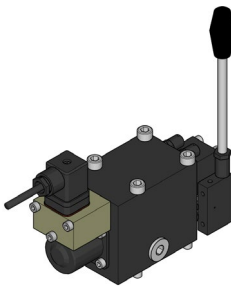


OPAT-XS

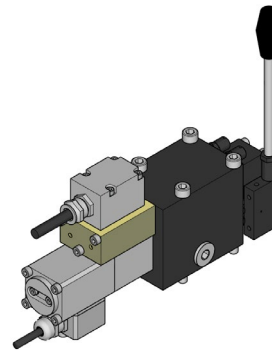


**Valve examples for standalone versions:**

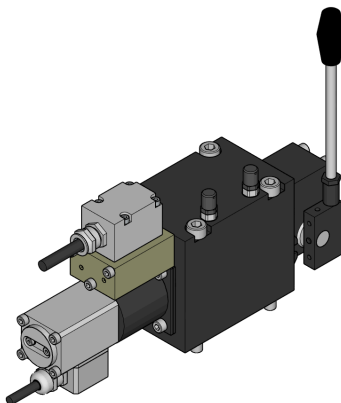
SLF3 without feedback



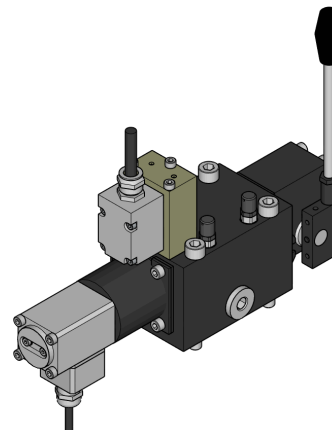
SLF3 with HPRS feedback



SLF5AC with HPRS feedback



SLF5 with HPRS feedback



### 4.1 ORDERING CODE OPAT

OPAT Modelcode

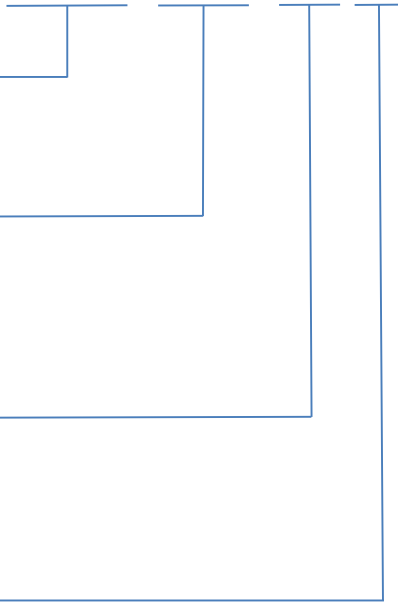
**OPAT - BTN PB S**

**Product Identifier**  
OPAT

**Unit Identifier**  
BTN = Twin solenoid at unit bottom  
SDE = Twin solenoid at unit side  
XS = No twin solenoid (stand alone)

**BUS Identifier**  
PB = PROFIBUS/DRIVE (OPAT Master)  
SLA = CAN (OPAT slave, proprietary)  
PN = PROFINET (on request)  
ETH = ETHERNET IP (on request)  
XX = Other (on request)

**Terminal Identifier**  
S = Screw clamp cable connection  
C = Spring cage (on request)



#### Available product numbers OPAT

| Product number | Description                              |
|----------------|--|
| OPAT001        | Servi EX Modul, OPAT-BTNPB, Screw clamp  |
| OPAT002        | Servi EX Modul, OPAT-BTNSLA, Screw clamp |
| OPAT003        | Servi EX Modul, OPAT-SDEPB, Screw clamp  |
| OPAT004        | Servi EX Modul, OPAT-SDESLA, Screw clamp |
| OPAT005        | Servi EX Modul, OPAT-XSPB, Screw clamp   |
| OPAT006        | Servi EX Modul, OPAT-XSSLA, Screw clamp  |

#### Example OPAT marking

**OPAT s/n: 1001001**

|                             |                              |                              |                                       |                            |
|-----------------------------|------------------------------|------------------------------|---------------------------------------|----------------------------|
| <input type="checkbox"/> PB | <input type="checkbox"/> SLA | <input type="checkbox"/> BTN | <input type="checkbox"/> XS           | <input type="checkbox"/> C |
| <input type="checkbox"/> PN | <input type="checkbox"/> ETH | <input type="checkbox"/> SDE | <input checked="" type="checkbox"/> S |                            |

**WARNING!**  
SHALL BE CONNECTED TO EXTERNAL FUSE 10A  
PROTECT FROM DIRECT HEAT  
ONLY USE CABLES RATED FOR 90°C OR HIGHER  
MAX SOLENOID CURRENT 800mA  
DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT - DO NOT OPEN WHEN NON-INTRINSICALLY SAFE CIRCUITS ARE ENERGIZED

PRESAFE 14 ATEX 527X  
 IECEx PRE14.0036X  
 Ex eb I b mb IIC T4 Gb  
 -40°C Tamb +55°C  
 24VDC 10A IP67  
 II 2 G

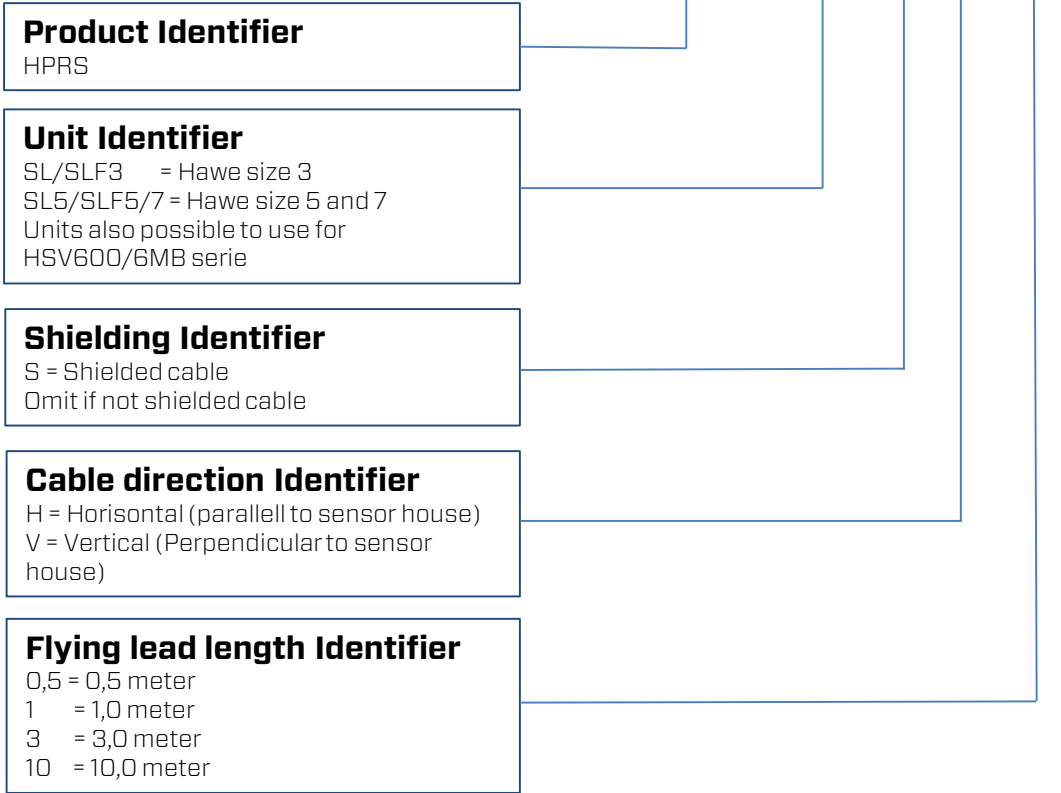
**SERVI AS**  
1402 Ski  
NORWAY



## 4.2 ORDERING CODE HPRS

HPRS Modelcode

**HPRS SL3 S H 10**



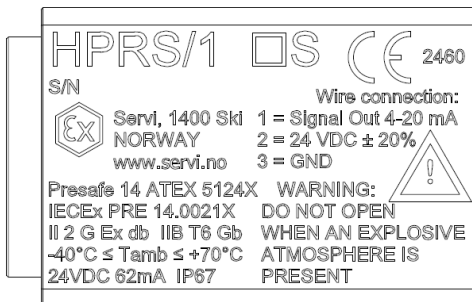
### Available product numbers HPRS

| Product number | Description  |
|----------------|--|
| HPRS101        | HPRS SL/SLF3, Horizontal, Unshielded cable, 0,5 m  |
| HPRS102        | HPRS SL/SLF3, Horizontal, Unshielded cable, 1,0 m  |
| HPRS103        | HPRS SL/SLF3, Horizontal, Unshielded cable, 3,0 m  |
| HPRS104        | HPRS SL/SLF3, Horizontal, Unshielded cable, 10,0 m |
| HPRS105        | HPRS SL/SLF3, Horizontal, Shielded cable, 0,5 m    |
| HPRS106        | HPRS SL/SLF3, Horizontal, Shielded cable, 1,0 m    |
| HPRS107        | HPRS SL/SLF3, Horizontal, Shielded cable, 3,0 m    |
| HPRS108        | HPRS SL/SLF3, Horizontal, Shielded cable, 10,0 m   |
| HPRS109        | HPRS SL/SLF3, Vertical, Unshielded cable, 0,5 m    |
| HPRS110        | HPRS SL/SLF3, Vertical, Unshielded cable, 1,0 m    |
| HPRS111        | HPRS SL/SLF3, Vertical, Unshielded cable, 3,0 m    |
| HPRS112        | HPRS SL/SLF3, Vertical, Unshielded cable, 10,0 m   |

Available product numbers HPRS cont

| Product number | Description  |
|----------------|--|
| HPRS113        | HPRS SL/SLF3, Vertical, Shielded cable, 0,5 m        |
| HPRS114        | HPRS SL/SLF3, Vertical, Shielded cable, 1,0 m        |
| HPRS115        | HPRS SL/SLF3, Vertical, Shielded cable, 3,0 m        |
| HPRS116        | HPRS SL/SLF3, Vertical, Shielded cable, 10,0 m       |
| HPRS117        | HPRS SL/SLF5-7, Horizontal, Unshielded cable, 0,5 m  |
| HPRS118        | HPRS SL/SLF5-7, Horizontal, Unshielded cable, 1,0 m  |
| HPRS119        | HPRS SL/SLF5-7, Horizontal, Unshielded cable, 3,0 m  |
| HPRS120        | HPRS SL/SLF5-7, Horizontal, Unshielded cable, 10,0 m |
| HPRS121        | HPRS SL/SLF5-7, Horizontal, Shielded cable, 0,5 m    |
| HPRS122        | HPRS SL/SLF5-7, Horizontal, Shielded cable, 1,0 m    |
| HPRS123        | HPRS SL/SLF5-7, Horizontal, Shielded cable, 3,0 m    |
| HPRS124        | HPRS SL/SLF5-7, Horizontal, Shielded cable, 10,0 m   |
| HPRS125        | HPRS SL/SLF5-7, Vertical, Unshielded cable, 0,5 m    |
| HPRS126        | HPRS SL/SLF5-7, Vertical, Unshielded cable, 1,0 m    |
| HPRS127        | HPRS SL/SLF5-7, Vertical, Unshielded cable, 3,0 m    |
| HPRS128        | HPRS SL/SLF5-7, Vertical, Unshielded cable, 10,0 m   |
| HPRS129        | HPRS SL/SLF5-7, Vertical, Shielded cable, 0,5 m      |
| HPRS130        | HPRS SL/SLF5-7, Vertical, Shielded cable, 1,0 m      |
| HPRS131        | HPRS SL/SLF5-7, Vertical, Shielded cable, 3,0 m      |
| HPRS132        | HPRS SL/SLF5-7, Vertical, Shielded cable, 10,0 m     |

Example HPRS marking



### 4.3 ORDERING CODE ODC

ODC Modelcode

**ODC - 1 - 1 - 0 - 1 - 0 - M - 1100TR**

**Product Identifier**  
ODC

**Valve Identifier**  
0 = Twin solenoid, valve not defined  
1 = Hawe SL(F)3  
2 = Hawe SL5-SLF7  
3 = Hawe SLF5AC  
4 = Hawe SLF5<sup>1</sup>  
5 = ODC-XS (stand alone)  
6 = Hawe SLF5-FP<sup>2</sup>  
7 = Servi HSV600  
8 = Servi MB-serie

**Valve feedback**  
0 = None  
1 = AUH (internal Hall effect sensor)<sup>3</sup>  
2 = AUL (internal LVDT sensor)<sup>3,\*</sup>  
3 = WA (external Hall effect sensor)  
4 = HPRS (external LVDT sensor)  
5 = Other (to specify)

**Process feedback**  
0 = None  
1 = Voltage/current (HCStool setting)  
2 = Other (to specify)

**Setpoint type (not BUS)**  
0 = None  
1 = Voltage/current (HCStool setting)  
2 =  $U_b * 0.5 \pm U_b * 0.25$  (Ana 1 only)  
3 = PWM input  
4 = Other (to specify)

**BUS interface**  
0 = None  
1 = CANopen  
2 = Other (to specify)

**Connector Type**  
M = M12  
D = Deutsch  
I = ITT  
A = AMP  
C = Other (to specify)

**Connector position and direction**  
See table O1

1 Plate mounted with "classic" perpendicular oriented twin solenoid  
2 FP regulation for SLF5 both classic and AC version  
3 5AC on request  
\* On request

| Connector Position and Direction |  | Front = valve side |
|----------------------------------|--|--------------------|
| CODE                             | DESCRIPTION  | FIGURE             |
| 1000                             | Power on Top 1)<br>(Only with CANopen)   |                    |
| 2000                             | Power on housing side<br>(Only with CANopen)                                   |                    |
| 1100                             | Power and command on top   |                    |
| 1120                             | Power and command on top, valve feedback on housing side                       |                    |
| 1122                             | Power and command on top, valve and process feedback on housing side           |                    |
| 1020                             | Power and valve feedback on housing side (only with CANopen)                   |                    |
| 1022                             | Power on Top, Valve and process feedback on housing side (only with CANopen 1) |                    |
| 2200                             | Power and command on side  |                    |
| 2220                             | Power, command and valve feedback on housing side                              |                    |
| 2202                             | Power, command and process feedback on housing side 2)                         |                    |
| TR                               | Top connector(s), default opposite direction                                   |                    |
| SR                               | Sided connector(s), default opposite direction                                 |                    |
| S000                             | Other (to specify)   |                    |

1) Ana 1 default not in use (but active)

Table 01

2) Process feedback in front

## Product numbers ODC

ODC units can be delivered in both **specific** and **no specific** parametrized versions. The parameter settings is saved in a file (“.dat”) for easy download to the unit. The parameterization files are categorized as follows:

- CSP - Common Specific Parameterization
- ISP - Individual Specific Parameterization
- NSP - No Specific Parameterization
- NIP - No Individual Parameterization

| Product Version              | File Category | Description   |
|------------------------------|---------------|---|
| Specific Parameterization    | CSP           | <b>For open loop valves</b> ready to use. Parameters can be common for same type/size of valve, but are specific to each size. Unit with this parameters can be used as sparepart without further parameterization  |
|                              | ISP           | <b>For closed loop valves</b> where individual calibration of the valve feedback signal and trimming of the spool overlap compensation are required. The parameterization made during testing of complete valve is individual and only valid for the actual valve. The parameter (.dat) file is stored and can be supplied on request for all complete valve sections delivered from Servi. Optional linearization can also be included in this file category |
| No Specific Parameterization | NSP           | <b>For open loop valves</b> , contain only basic parameter and further parameterization to actual valve/system is needed. Existing dat-files determined for actual valve can be downloaded to the unit via HCSTool, see <a href="#">SAC parameterfiles</a>  |
|                              | NIP           | <b>For closed loop valves</b> , sparepart or retrofit purpose. The ODC unit is tested to equivalent valve acc model code, but individual calibration and trimming as for ISP file type must be made at site for the actual valve. It is strongly recommended to store the dat file after tune.  |

## Variants of Specific parameterization:

### Complete valve banks or valve sections assembled with SAC

The complete valve is parametrized and tuned to optimal default performance. Customized tuning is still possible by the user via HCSTool (relevant knowledge is needed)

### ODC units for sparepart purpose

The unit will be delivered with the same parameterization as initial delivered for the actual valve/ section. The identification data must be known, e.g serial no of the ODC unit to replace or product/serial number of the actual section/ complete valveblock. Note that if the feedback sensor is replaced, a calibration of the sensor signal in the SAC unit is required, see manual

### ODC units for retrofit of open loop systems

The unit will have the recommended parameterization for the actual valve type and size to upgrade (open loop system do not include feedback signals)

## Product numbers ODC

ODC product numbers are identical to Servi ERP article numbers and consists of three main groups. Every new modelcode will generate a new arbitrary product number within the main group. A product number can also be for customized parameterization.

| Product no serie | Group Description                                  | Integrated feedback | Feedback signal type   |
|------------------|--|---------------------|------------------------|
| ODC0001-ODC1999  | All valve types in ODC modelcode digit 1 (page 15) | NO <sup>1 2</sup>   | ± 10 V<br>0(4) - 20 mA |
| ODC2000-ODC2999  | All valve types in ODC modelcode digit 1 (page 15) | YES <sup>2</sup>    | ± 10 V                 |
| ODC4000-ODC4999  | All valve types in ODC modelcode digit 1 (page 15) | YES <sup>2</sup>    | 0(4) - 20 mA           |

<sup>1</sup>Combination with feedback from external valve sensor possible)

<sup>2</sup>Combination with feedback from external process sensor possible)

## Selection of Product numbers ODC, Specific parameterized

| Product number | Modelcode page 15    | Valve Type | Mod epag e 20 | FB Type | command Signal Type | File Type        |
|----------------|----------------------|------------|---------------|---------|---------------------|------------------|
| ODC1000        | ODC-1-0-0-2-0-M-1100 | 3          | 1             |         | Ubx0,5 ± Ubx0,25    | CSP              |
| ODC1001        | ODC-1-4-0-1-0-M-1120 | 3          | 3             | HPRS    | ± 10 V              | ISP              |
| ODC1020        | ODC-1-4-1-1-0-M-1120 | 3          | 3             | HPRS    | ± 10 V              | ISP              |
| ODC1300        | ODC-2-0-0-1-0-M-1100 | 5-7        | 1             |         | ± 10 V              | CSP              |
| ODC1301        | ODC-2-3-0-1-0-M-1120 | 5-7        | 3             | WA      | ± 10 V              | ISP              |
| ODC1400        | ODC-2-0-0-1-0-M-1100 | 5-7        | 1             |         | 12 mA ± 8 mA        | CSP              |
| ODC1401        | ODC-2-3-0-1-0-M-1120 | 5-7        | 3             | WA      | 12 mA ± 8 mA        | ISP              |
| ODC1402        | ODC-2-4-0-1-0-M-1120 | 5-7        | 3             | HPRS    | 12 mA ± 8 mA        | ISP              |
| ODC1420        | ODC-2-4-1-1-0-M-1122 | 5-7        | 6             | HPRS    | ± 10 V              | ISP <sup>1</sup> |
| ODC1500        | ODC-2-0-0-2-0-M-1100 | 5-7        | 1             |         | Ubx0,5 ± Ubx0,25    | CSP              |
| ODC1501        | ODC-2-3-0-2-0-M-1120 | 5-7        | 3             |         | Ubx0,5 ± Ubx0,25    | ISP              |
| ODC1650        | ODC-6-0-0-1-0-M-1100 | MB         | 1             |         | ± 10 V              | CSP              |
| ODC1750        | ODC-6-4-0-1-0-M-1120 | MB         | 3             | HPRS    | ± 10 V              | ISP              |
| ODC2000        | ODC-1-1-0-1-0-M-1100 | 3          | 3             | WA      | ± 10 V              | ISP              |
| ODC2001        | ODC-1-1-0-1-0-M-1100 | 3          | 3             | WA      | 12 mA ± 8 mA        | ISP              |
| ODC2100        | ODC-1-1-0-1-1-M-1100 | 3          | 3             | WA      | CANopen; ± 10 V     | ISP              |
| ODC2110        | ODC-6-0-0-1-1-M-1000 | HSV600     | 1             |         | CANopen; ± 10 V     | CSP              |
| ODC2111        | ODC-6-4-1-1-1-M-1022 | HSV600     | 6             | HPRS    | CANopen; ± 10 V     | ISP <sup>1</sup> |
| ODC2600        | ODC-1-1-1-1-0-M-1100 | 3          | 6             | WA      | ± 10 V              | ISP <sup>1</sup> |

<sup>1</sup>Feedback signal for process default ±10 V, 4-20 mA selectable by parameter

Selection of Product numbers ODC, NOT Specific parameterized

| Product number | Modelcode page 15        | Valve Type | Mode page 20 | FB Type | command Signal Type | File Type |
|----------------|--------------------------|------------|--------------|---------|---------------------|-----------|
| ODC0001        | ODC-0-0-0-2-0-M-1100     | All        | 1            |         | Ubx0,5 ± Ubx0,25    | NSP       |
| ODC0002        | ODC-0-3-0-1-0-M-1120     | All        | 3            | WA      | ± 10 V              | NSP       |
| ODC0003        | ODC-0-4-0-1-0-M-1120     | All        | 3            | HPRS    | ± 10 V              | NSP       |
| ODC0100        | ODC-0-3-0-1-1-M-1020     | All        | 3            | WA      | CANopen; ± 10 V     | NSP       |
| ODC0110        | ODC-0-0-0-1-1-M1000      | All        | 1            |         | CANopen; ± 10 V     | NSP       |
| ODC0604        | ODC-5-4-0-2-0-M1120 SDIN | 5-7        | 3            | HPRS    | Ubx0,5 ± Ubx0,25    | NSP       |

## 4.4 ORDERING CODE COMPLETE VALVES

Modelcoding for valves with SAC integration consist of modelcodes of the valve itself with additional OPAT, HPRS and ODC (SAC) product numbers. The SAC product numbers replaces the part of the valve original model coding for the electrohydraulic actuation, included the sensor if a part of the basic valve.

Have proportional valve PSL/PSV series:

**Example 1:**

PSV 4S1/250-3  
 -3 5 H 80/63 A 150 B 230/EAWAODC1301/3  
 -3 2 H 40/25 A 70 B 115/EAHPRS101 ODC1001/3  
 -3 2 H 40/40 A 145 B 105/EAHPRS101 ODC1001/3  
 -E 1-G 24

**Example 2:**

PSV 4S1/250-3  
 -3 5 H 80/63 A 150 B 230/EAHPRS101 OPAT003/3  
 -3 2 H 40/25 A 70 B 115/EAHPRS101 OPAT004/3  
 -3 2 H 40/40 A 145 B 105/EAHPRS101 OPAT004/3  
 -E 1-G 24EX

**Example 3:**

PSVF A2/230/7 SAE-5  
 -A 1 H 160/160/ E9HPRS117 OPAT001 /5 SAE S  
 -ZPL 5 SAE 3  
 -A 2 H 16/25 A 200 B 200/E9A/4  
 -E 1-G 24 TEX455

**Example 4:**

PSVF A2/230/6-5  
 - A 1 H 80/80 /E9AHPRS113 OPAT002/5  
 - ZPL 53  
 -A 1 H 40/25 /E9AHPRS001 OPAT003/3 AN 210 BN210  
 -A 2 H 40/40 A 175 B 105/EA /3  
 -E 1-G 24 TEX-4 55-10 m

Servi HSV600 with addon PSL/PSV:

**Example 5:**

HSV600-M-A1-B1-XXXX  
-IS-M-V-06-OAI/250  
-WS-M-E1-**ODC2111**-9X-F/A210B210  
-WS-M-E1-**ODC2111**-9C-F/A180B230  
-AP-M-SL5  
-SL5-5 5H 160/160 A210 B210 S/EAWA **ODC1301**-  
G24-E1

**Example 6:**

HSV600-M-A1-B1-XXXX  
-IS-M-V-06-OAI/250  
-WS-M-E1-**OPAT003**-9X-F/A210B210  
-WS-M-E1-**OPAT004**-9C-F/A180B230  
-AP-M-SL5  
-SL5-5 5H 160/160 A210 B210 S/E9AHPRS117 **OPAT004**  
G24EX-E1

Servi 6MB Serie:

**Example 7:**

6MB-320-37BER-**ODC1750**-HPRS109-G24

**Example 8:**

6MB-320-37BER-**OPAT003**-HPRS109 G24EX

For sections with SAC, see further examples page xx-xx) :

**Datasheet references:**

Detailed model codes and technical information of the basic valves can be found in respective datasheet:

|                    |                          |
|--------------------|--------------------------|
| PSL/PSV size 3     | <a href="#">D7700-3</a>  |
| PSL/PSV size 5     | <a href="#">D7700-5</a>  |
| PSLF/PSVF size 3/5 | <a href="#">D7700-F</a>  |
| PSLF/PSVF size 7   | <a href="#">D7700-7E</a> |
| HSV600             | <a href="#">D3010</a>    |
| 6MB                | <a href="#">D2612</a>    |

**Documentation:**

Schematic drawings and 3D models of the actual complete valve bank available on request



## 5. CONTROL PROPERTIES

SAC can be used in both open and closed loop, for valve control and/or for process control. Closed loop control requires feedback input signal. The desired mode can be selected in software (for details see section 9), either via local USB connection or via BUS telegram. Following control modes are possible:

### **Open loop (mode 1):**

The unit control the current output proportional to the command (input) signal, no correction from feedback input. Flow properties according Haws datasheets D7700-3/5/F/7F and Servi datasheet D3010. This mode is recommended for standard performance regulation, preferably with human operator corrective control.

### **Closed loop valve control (mode 3):**

The unit control the position of the valve spool and regulates the current needed to keep the spool in desired position with as small deviation (lag) as possible. Any disturbance will be corrected with setting of the PID regulator and the valve regulation performance increase thereby significantly. This mode is recommended for high performance control with machine (eg PLC) or human operator control.

### **Closed loop process control (mode 4):**

The unit control the feedback from the actuator (eg cylinder) in a process and control the current needed to the valve regulating the process as close to the desired target as possible. The process may also be a pressure regulation, where the process feedback signal comes from a pressure transmitter and the current output is controlling a pressure valve. Any disturbance will be corrected with setting of the PID regulator. This mode is recommended for high performance control where the regulation performance of the process is in focus.

### **Closed loop valve and process control (mode 6):**

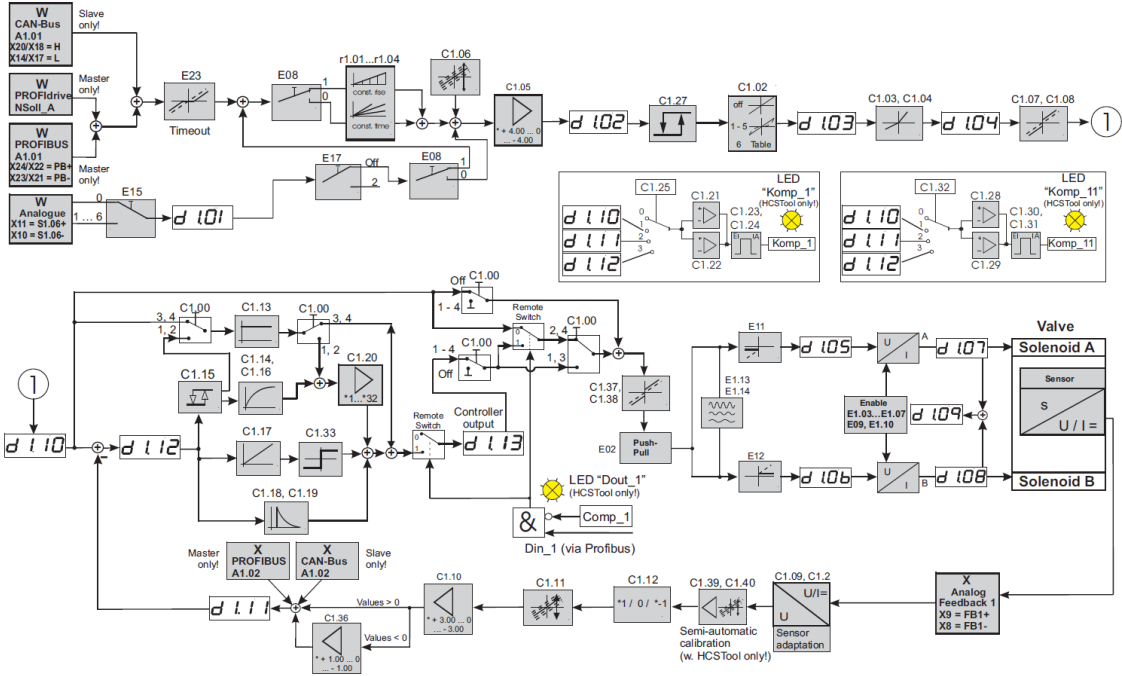
The unit controls the process as for mode 4 and the valve as for mode 3. The gain of the mode 6 process control can be higher than for mode 4 because of the closed loop regulation of the valve (mode 3). Any disturbance for both process and valve will be corrected with setting of the PID regulator, and the process regulation performance increase thereby significantly. This mode is recommended for high performance machine control.

### **Closed loop two processes (mode 8):**

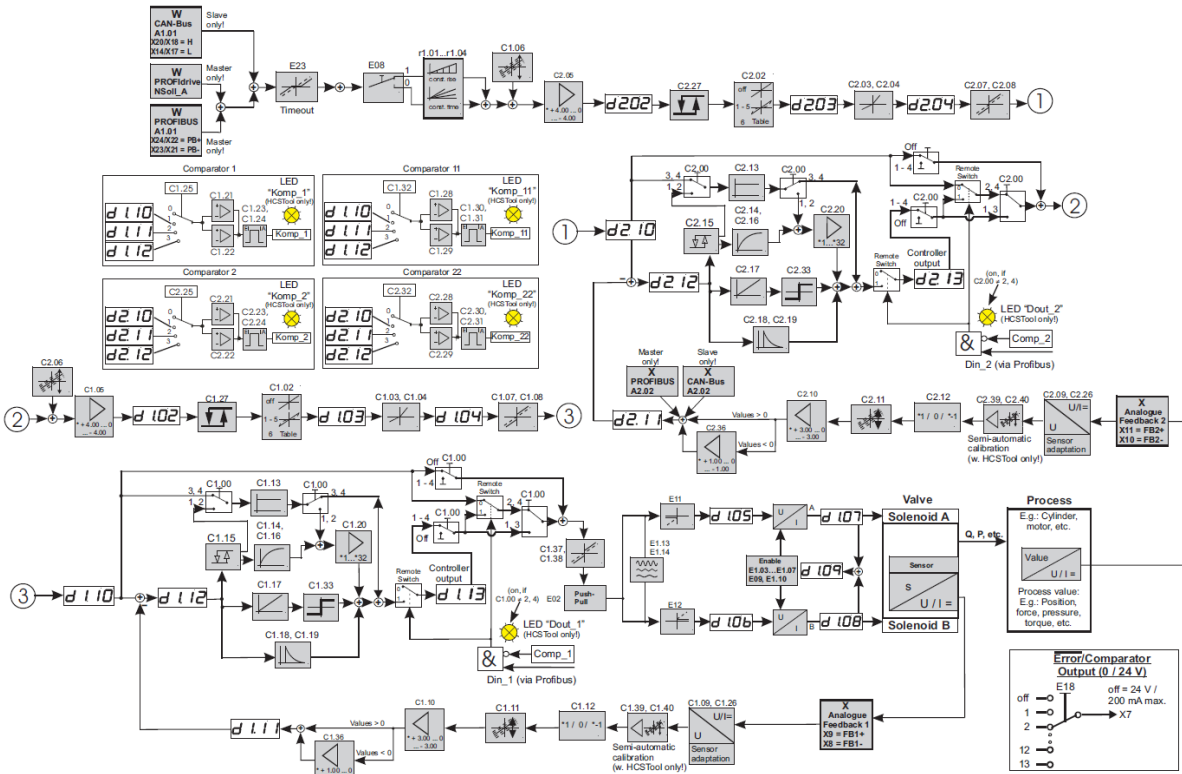
The unit controls two processes individually by separate branches. Each branch have a complete set of parameters for individual adaptation of the feedback signal and optimal tuning of the process regulation. Any disturbance will be corrected by the branch respectively setting of its PID regulator. This mode is intended for single solenoid valves.

6.1 SOFTWARE BLOCKDIAGRAM OPAT

Mode 3:

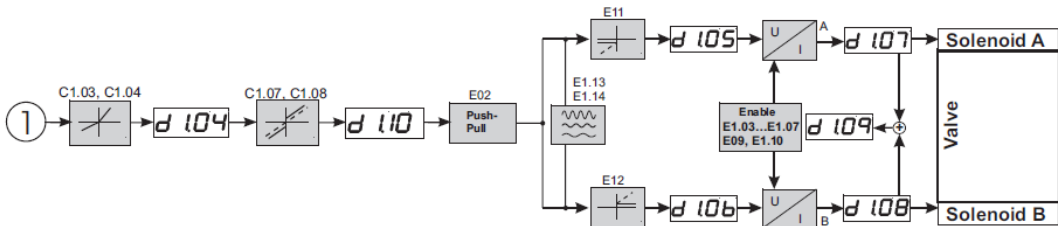
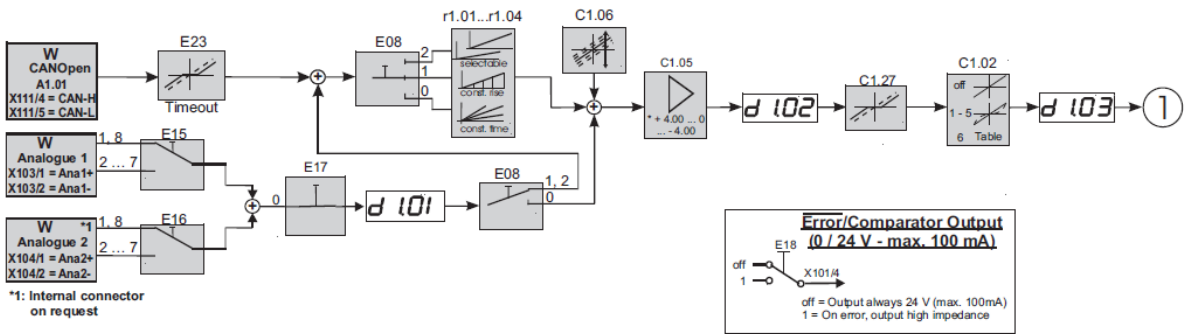


Mode 6:

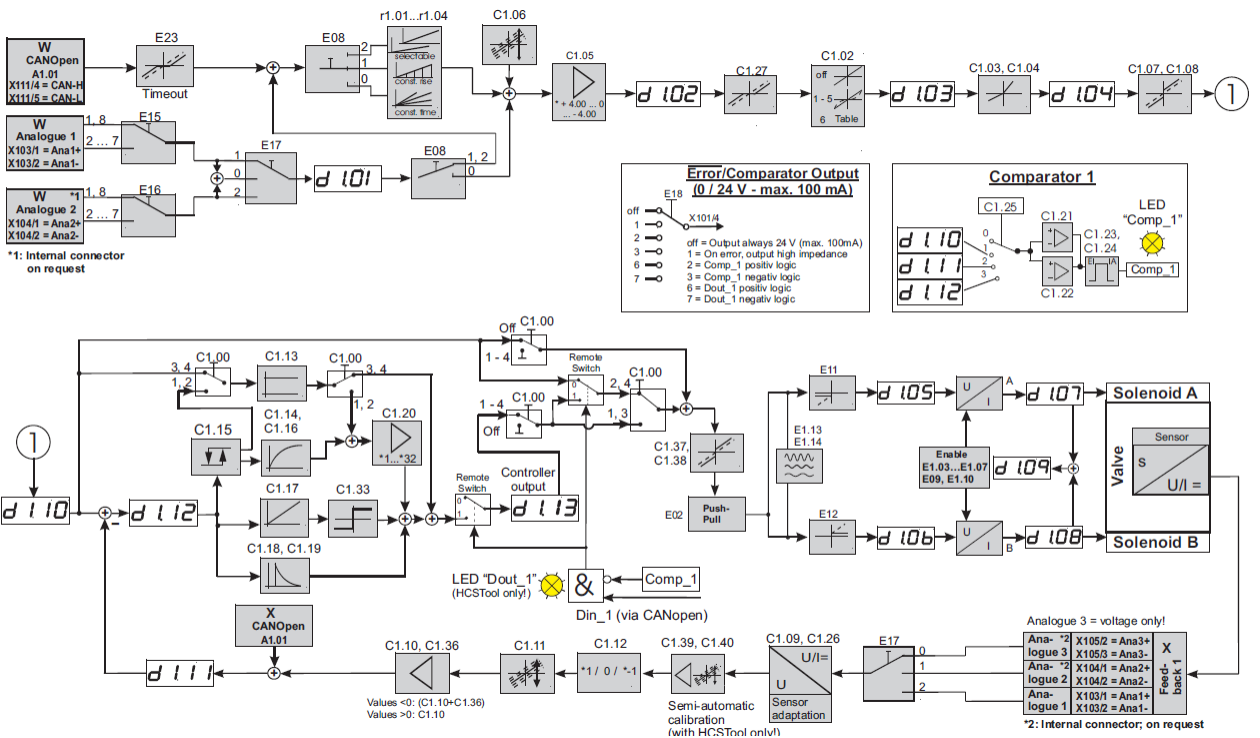


## 6.2 SOFTWARE BLOCKDIAGRAM ODC

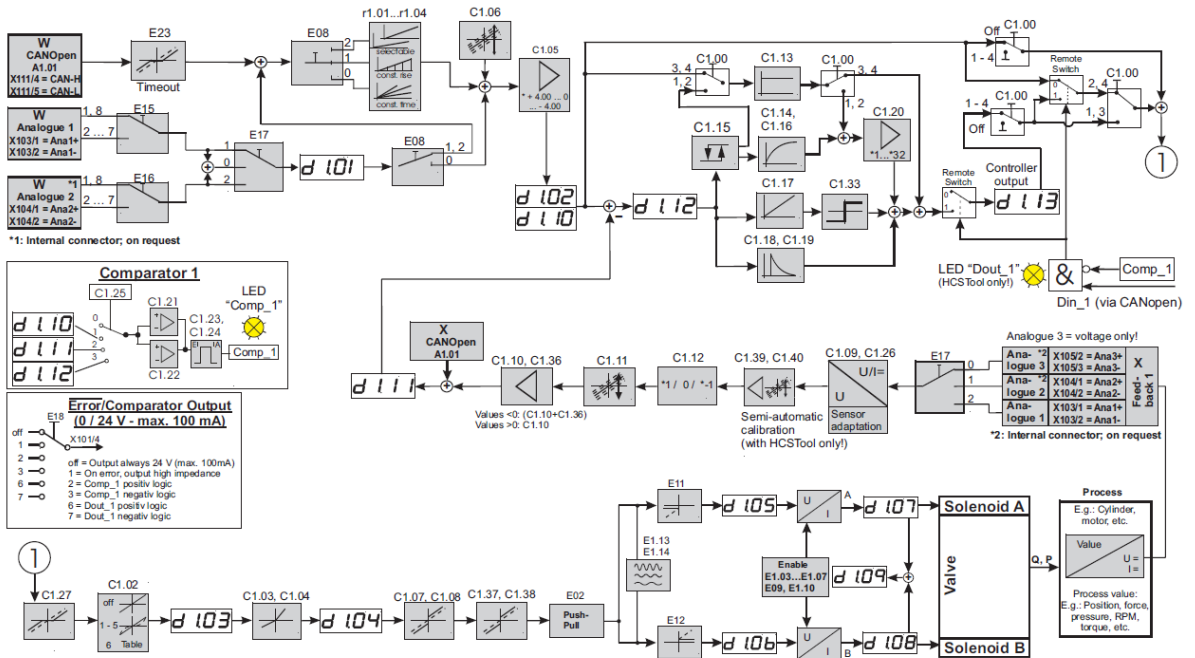
Mode 1:



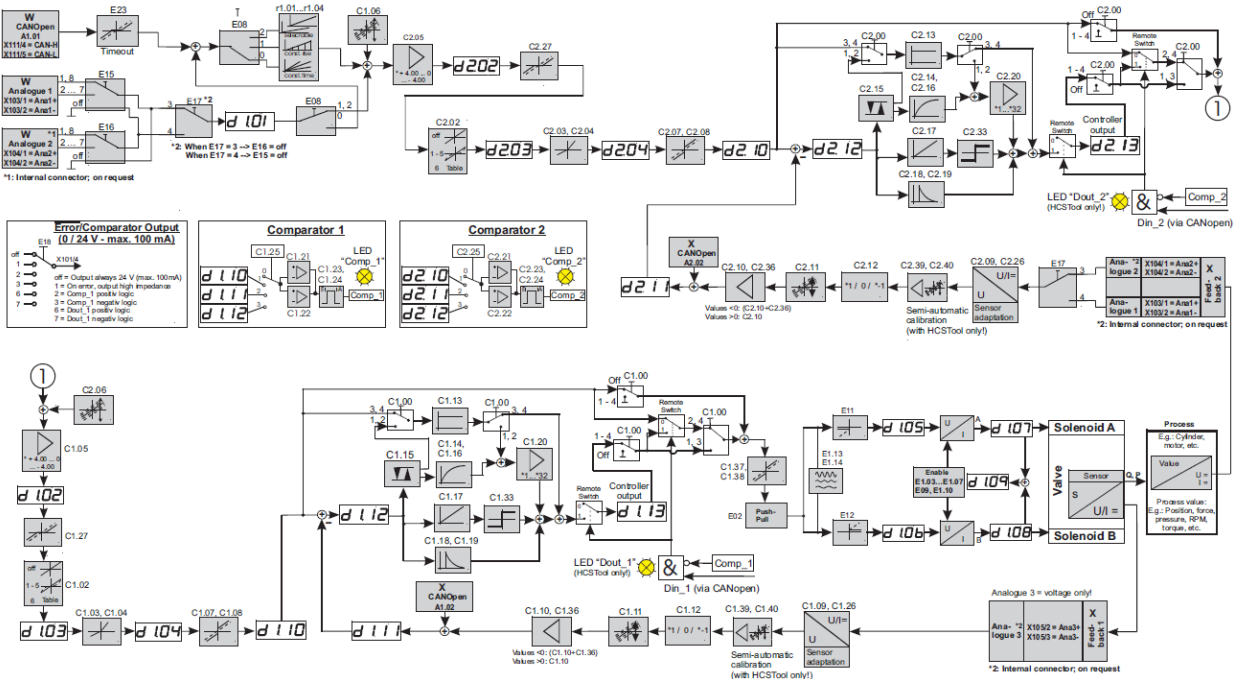
Mode 3:



Mode 4:



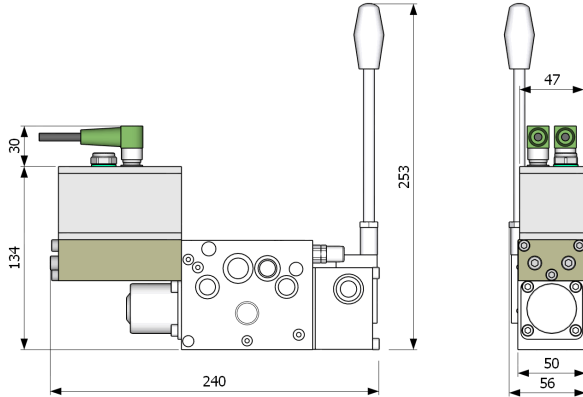
Mode 6:



7. ASSEMBLY VERSIONS (examples)

**Hawe SL3-ODC without spool feedback**

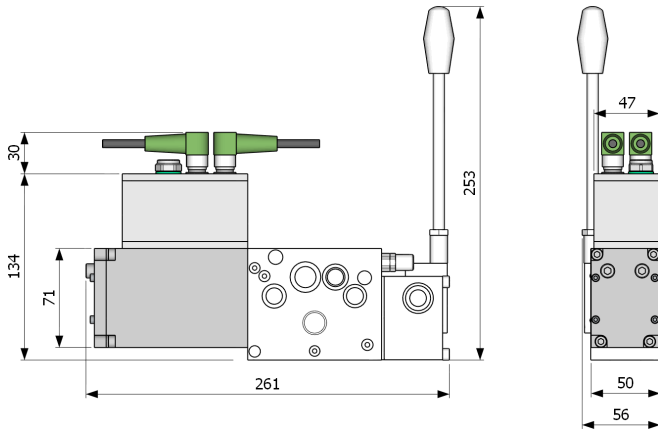
Modelcode example: SL3-32 H 80/80 A200 B200/EA-ODC1000-G24



|                               |     |
|-------------------------------|-----|
| ODC1000: ODC-1-0-0-2-0-M-1100 |     |
| Valve feedback                | No  |
| Process feedback              | No  |
| Analogue command              | Yes |
| Bus                           | No  |
| Connectors                    | M12 |

**Hawe SL3-ODC with integrated spool feedback AUH, CANopen**

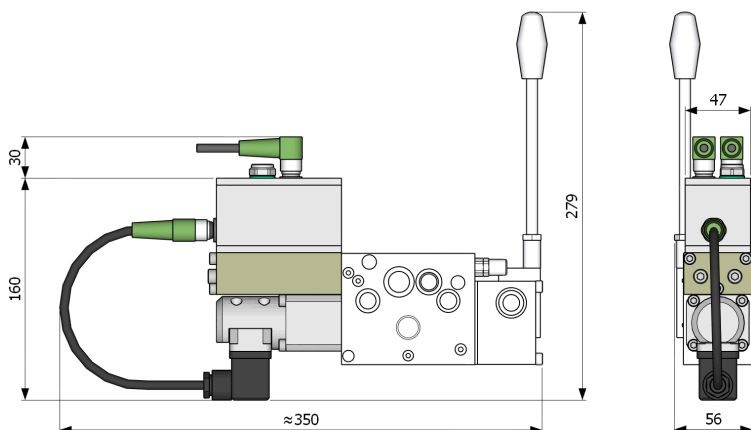
Modelcode example: SL3-32 H 80/80 A200 B200/EA-ODC2100-G24



|                               |     |
|-------------------------------|-----|
| ODC2100: ODC-1-1-0-1-1-M-1100 |     |
| Valve feedback                | Yes |
| Process feedback              | No  |
| Analogue command              | Yes |
| CANopen                       | Yes |
| Connectors                    | M12 |

**Hawe SL3-ODC with spool feedback WA**

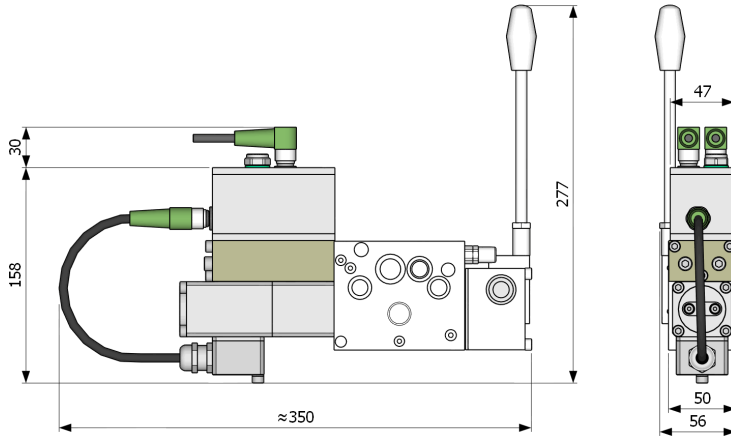
Modelcode example: SL3-32 H 80/80 A200 B200/EAWA-ODC1301-G24



|                                |     |
|--------------------------------|-----|
| ODC1301: ODC-2-3 -0-1-0-M-1120 |     |
| Valve feedback                 | Yes |
| Process feedback               | No  |
| Analogue command               | Yes |
| Bus                            | No  |
| Connectors                     | M12 |

**Hawe SL3-ODC with spool feedback HPRS**

Modelcode example: SL3-32 H 80/80 A200 B200/EA-ODC1001-HPRS101-G24



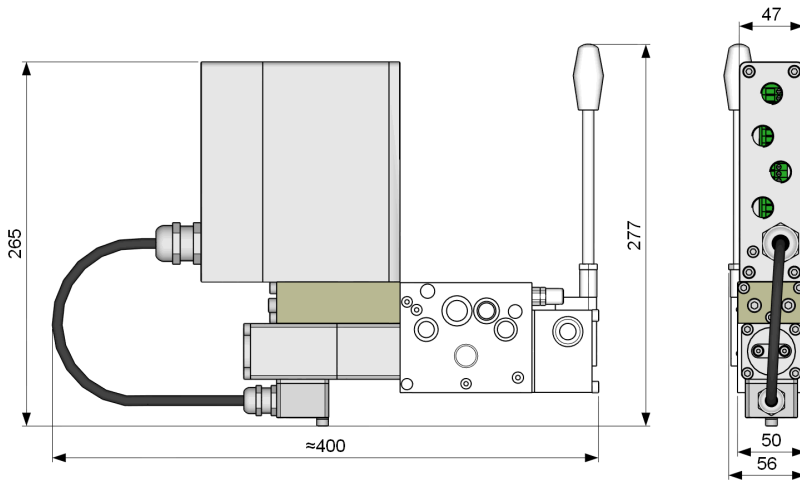
|                               |     |
|-------------------------------|-----|
| ODC1001: ODC-1-4-0-1-0-M-1120 |     |
| Valve feedback                | Yes |
| Process feedback              | No  |
| Analogue command              | Yes |
| Bus                           | No  |
| Connectors                    | M12 |

HPRS101: Ex sensor Manual 1503132  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

**Hawe SL3-OPAT-SDE with spool feedback HPRS**

Modelcode example: SL3-32 H 80/80 A200 B200/EA-OPAT003-HPRS101-G24EX



OPAT003: OPAT-SDEPB, Manual 1388826  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                     |             |
|---------------------|-------------|
| Valve feedback      | Yes         |
| Process feedback 1) | Yes         |
| Analogue command 1) | Yes         |
| PROFIBUS/Profidrive | Yes         |
| Electric Connection | Screw clamp |
| EX approved Zone 1  | ATEX, IECEx |

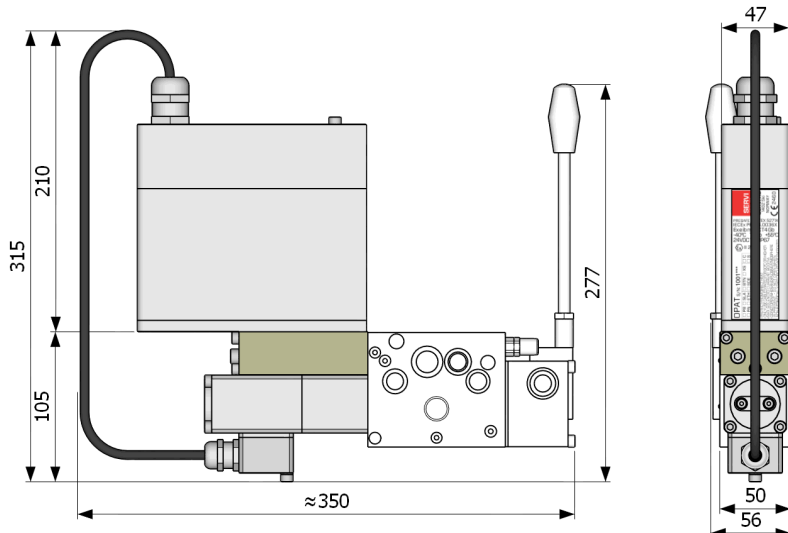
HPRS101: Ex sensor Manual 1503132  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

1) Feedback or command

**Hawe SL3-OPAT-BTN with spool feedback HPRS**

Modelcode example: SL3-32 H 80/80 A200 B200/EA-OPAT002-HPRS106-G24EX



OPAT002: OPAT-BTNSLA, Manual 1388826  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                              |             |
|------------------------------|-------------|
| Valve feedback               | Yes         |
| Process feedback 1)          | Yes         |
| Analogue command 1)          | Yes         |
| CAN (to master, proprietary) | Yes         |
| Electric Connection          | Screw clamp |
| EX approved Zone 1           | ATEX, IECEx |

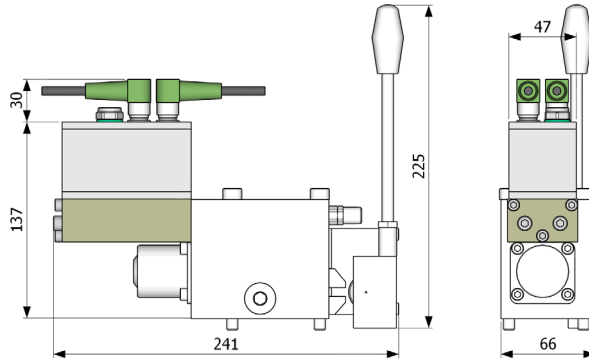
HPRS106: Ex sensor Manual 1503132  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | Yes     |

1) Feedback or command

**Hawe SLF3-ODC without spool feedback, CANopen**

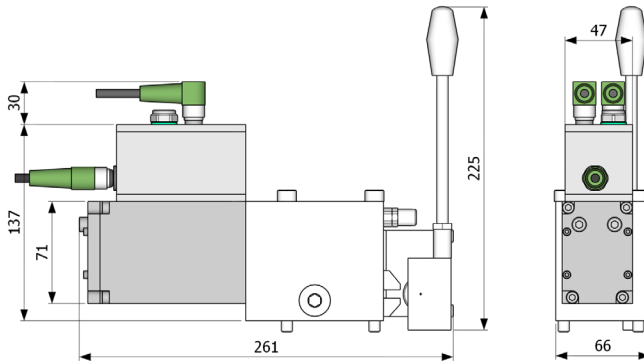
Modelcode example: SLF3-A2 H 80/80 A200 B200/EA-ODC0110-G24



|                               |     |
|-------------------------------|-----|
| ODC0110: ODC-0-0-0-1-1-M-1000 |     |
| Valve feedback                | Yes |
| Process feedback              | No  |
| Analogue command              | Yes |
| CANopen                       | Yes |
| Connectors                    | M12 |

**Hawe SLF3-ODC with integrated spool feedback and Process feedback**

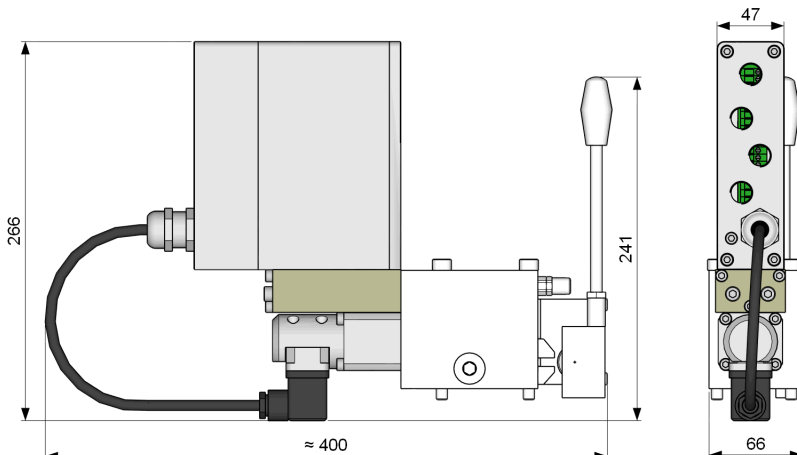
Modelcode example: SL3-A2 H 80/80 A200 B200/EA-ODC2600-G24



|                               |     |
|-------------------------------|-----|
| ODC2600: ODC-1-1-1-1-0-M-1120 |     |
| Valve feedback                | Yes |
| Process feedback              | Yes |
| Analogue command              | Yes |
| CANopen                       | No  |
| Connectors                    | M12 |

**Hawe SLF3-OPAT-SDE with spool feedback WA**

Modelcode example: SL3-A2 H 80/80 A200 B200/EAWAEX-OPAT004-G24EX



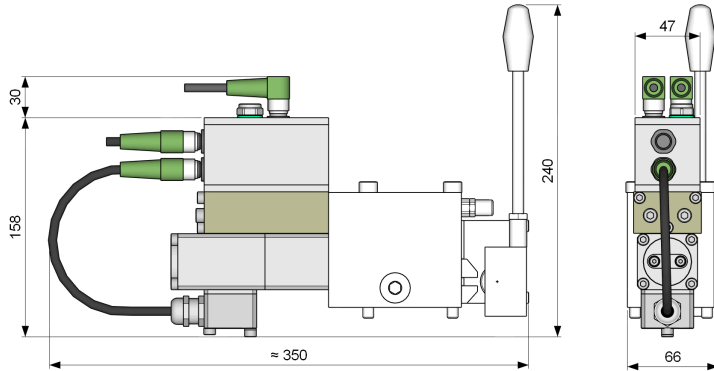
|  |             |
|--|-------------|
| OPAT004: OPAT-SDESLA, Manual 1388826<br>II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67 |             |
| Valve feedback   | Yes         |
| Process feedback 1)  | Yes         |
| Analogue command 1)  | Yes         |
| CAN (to master, proprietary)   | Yes         |
| Electric Connection  | Screw clamp |
| EX approved Zone 1   | ATEX, IECEx |

|   |            |
|---|------------|
| WAEX-3: Ex sensor Manual B10/2008<br>II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67 |            |
| Sensor signal   | 5V ± 2,5 V |
| Shielded cable  | No         |

1) Feedback or command

**Hawe SLF3-ODC without spool feedback HPRS**

Modelcode example: SLF3-A2 H 80/80 A200 B200/EA-ODC1020-HPRS101-G24



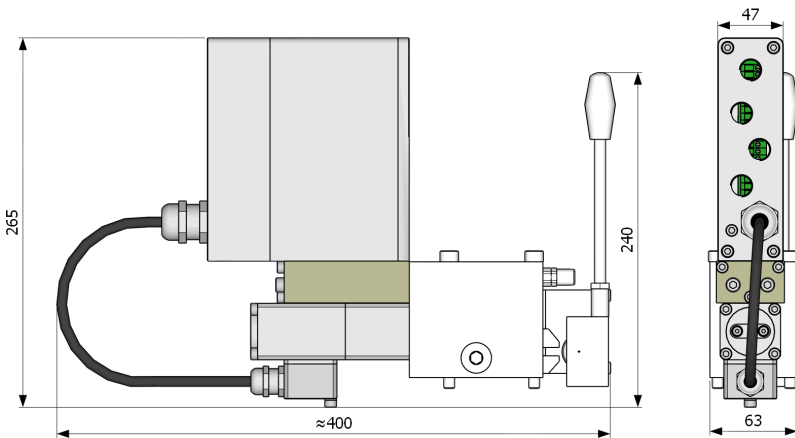
|                               |     |
|-------------------------------|-----|
| ODC1020: ODC-1-4-1-1-0-M-1122 |     |
| Valve feedback                | Yes |
| Process feedback              | No  |
| Analogue command              | Yes |
| Bus                           | No  |
| Connectors                    | M12 |

HPRS101: Ex sensor Manual 1503132  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

**Hawe SLF3-OPAT-SDE with spool feedback HPRS**

Modelcode example: SLF3-A2 H 80/80 A200 B200/EA-OPAT003-HPRS101-G24EX



|   |             |
|---|-------------|
| OPAT003: OPAT-SDEPB, Manual 1388826<br>II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67 |             |
| Valve feedback  | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive   | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1  | ATEX, IECEx |

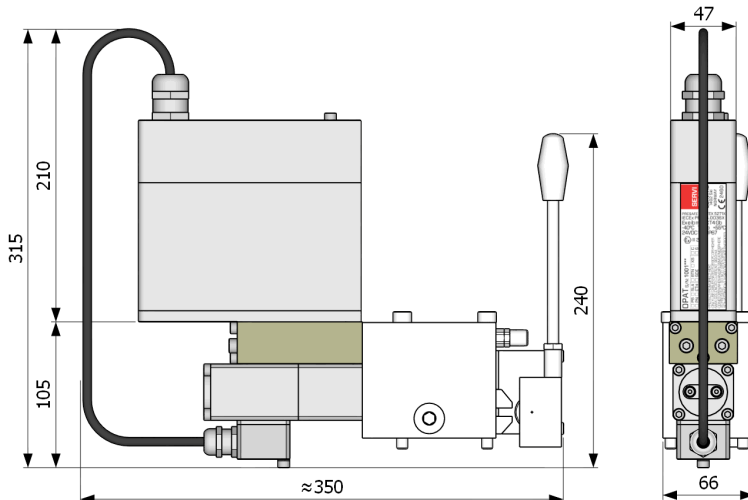
HPRS101: Ex sensor Manual 1503132  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

1) Feedback or command

**Hawe SLf3-OPAT-BTN with spool feedback**

Modelcode example: SL3-A2 H 80/80 A200 B200/EA-OPAT001-HPRS106-G24EX



|   |             |
|---|-------------|
| OPAT001: OPAT-BTNPB, Manual 1388826<br>II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67 |             |
| Valve feedback  | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive   | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1  | ATEX, IECEx |

HPRS106: Ex sensor Manual 1503132  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

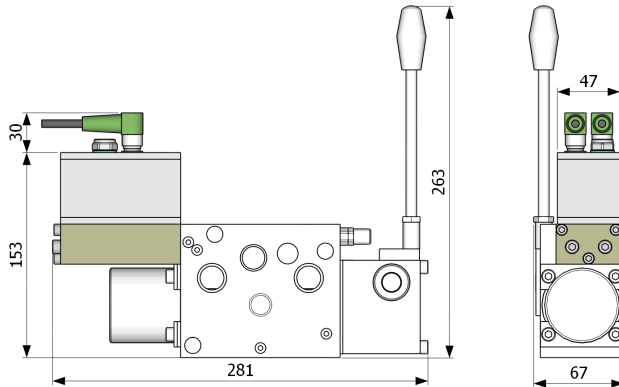
|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | Yes     |

1) Feedback or command



**Hawe SL5-ODC without spool feedback**

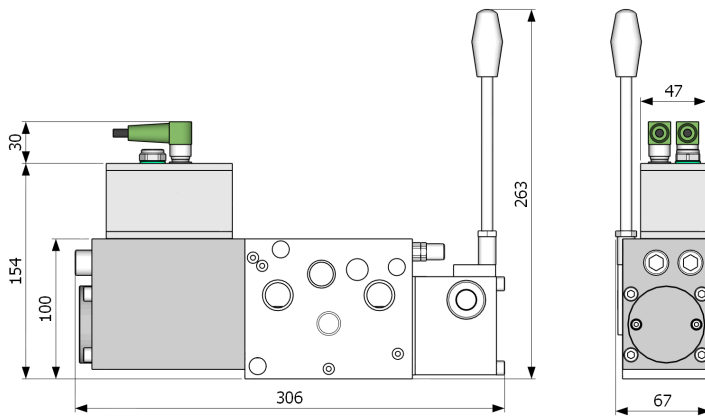
Modelcode example: SL5-52 H 160/160 A200 B200/EA-ODC1300-G24



|                               |     |
|-------------------------------|-----|
| ODC1300: ODC-2-0-0-1-0-M-1100 |     |
| Valve feedback                | No  |
| Process feedback              | No  |
| Analogue command              | Yes |
| Bus                           | No  |
| Connectors                    | M12 |

**Hawe SL5-ODC with integrated spool feedback**

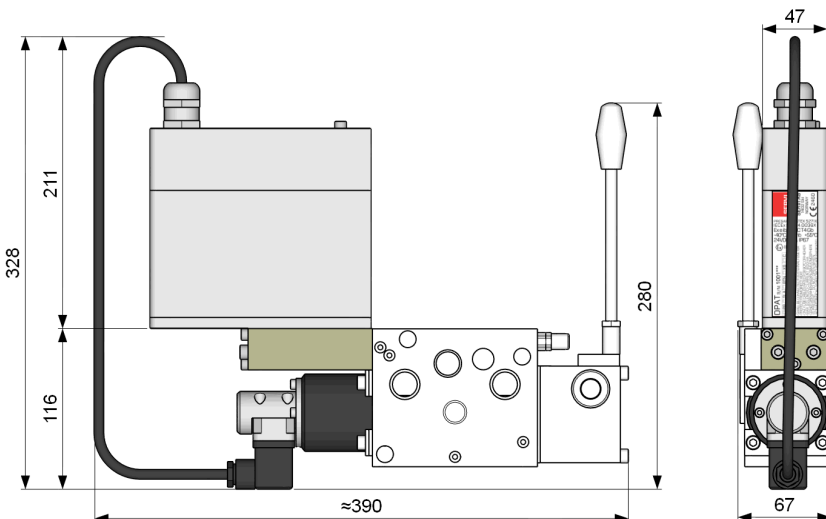
Modelcode example: SL5-52 H 160/160 A200 B200/EA-ODC2701-G24



|                               |     |
|-------------------------------|-----|
| ODC2701: ODC-2-1-0-2-0-M-1100 |     |
| Valve feedback                | Yes |
| Process feedback              | No  |
| Analogue command              | Yes |
| Bus                           | No  |
| Connectors                    | M12 |

**Hawe SL5-OPAT-BTN with spool feedback WA**

Modelcode example: SL5-52 H 160/160 A200 B200/EAWAEX-OPAT001-G24EX

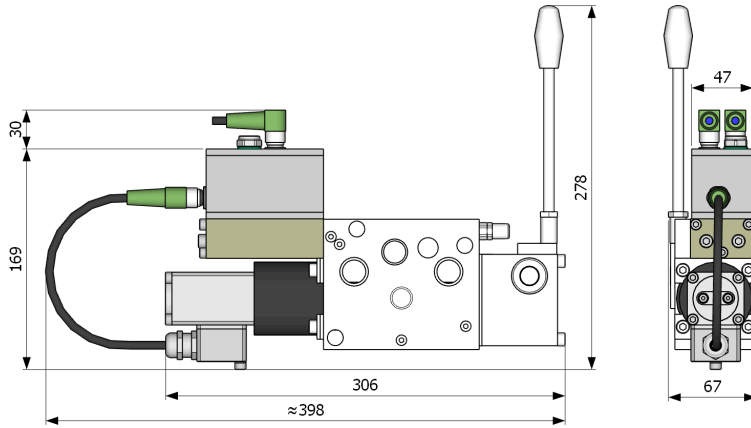


|   |             |
|---|-------------|
| OPAT001: OPAT-BTNPB, Manual 1388826<br>II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67 |             |
| Valve feedback  | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive   | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1  | ATEX, IECEx |
| WAEX-5: Ex sensor Manual B10/2008<br>II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67         |             |
| Sensor signal   | 5V ± 2,5 V  |
| Shielded cable  | No          |

1) Feedback or command

**Hawe SL5-ODC with spool feedback HPRS**

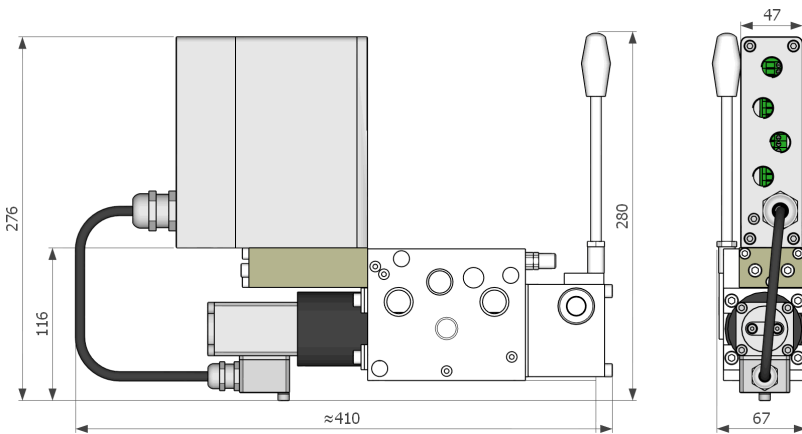
Modelcode example: SL5-52 H 160/160 A200 B200/EA-**ODC1402-HPRS117-G24**



|                               |     |
|-------------------------------|-----|
| ODC1402: ODC-2-4-0-1-0-M-1120 |     |
| Valve feedback                | Yes |
| Process feedback              | No  |
| Analogue command              | Yes |
| Bus                           | No  |
| Connectors                    | M12 |

**Hawe SL5-OPAT-SDE with spool feedback HPRS**

Modelcode example: SL5-52 H 160/160 A200 B200/EA-**OPAT004-HPRS117-G24EX**



OPAT004: OPAT-SDESLA, Manual 1388826  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                              |             |
|------------------------------|-------------|
| Valve feedback               | Yes         |
| Process feedback 1)          | Yes         |
| Analogue command 1)          | Yes         |
| CAN (to master, proprietary) | Yes         |
| Electric Connection          | Screw clamp |
| EX approved Zone 1           | ATEX, IECEx |

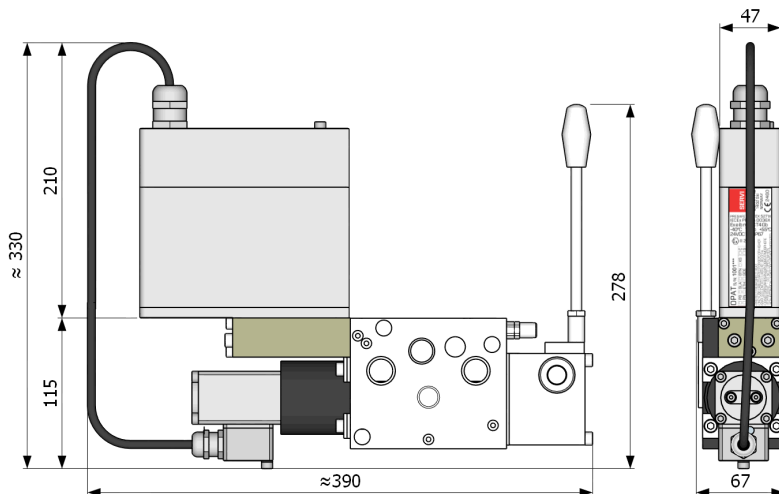
HPRS117: Ex sensor Manual 1503132  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

1) Feedback or command

**Hawe SL5-OPAT-BTN with spool feedback HPRS**

Modelcode example: SL5-52 H 160/160 A200 B200/EA-**OPAT001-HPRS121-G24EX**



OPAT001: OPAT-BTNPB, Manual 1388826  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

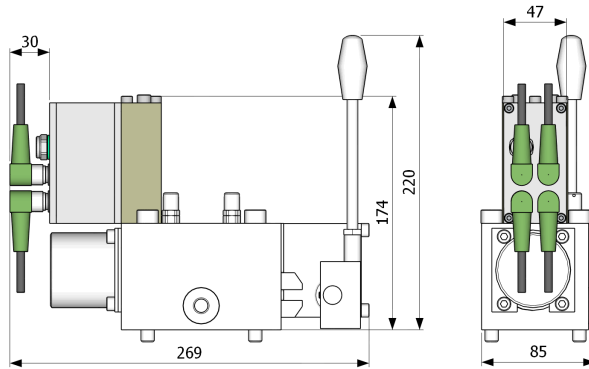
HPRS121: Ex sensor Manual 1503132  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | Yes     |

1) Feedback or command

**Hawe SLF5-ODC without spool feedback**

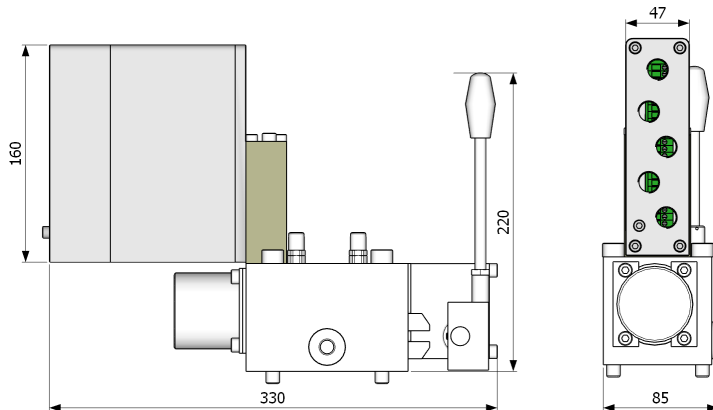
Modelcode example: SLF5-A2 H 160/160 A200 B200/EA-ODC0110-G24



|                               |     |
|-------------------------------|-----|
| ODC0110: ODC-1-0-0-1-1-M-1000 |     |
| Valve feedback                | No  |
| Process feedback              | No  |
| Analogue command              | Yes |
| CANopen                       | Yes |
| Connectors                    | M12 |

**Hawe SLF5-OPAT-BTN without spool feedback**

Modelcode example: SLF5-A2 H 160/160 A200 B200/EA-OPAT001-G24EX

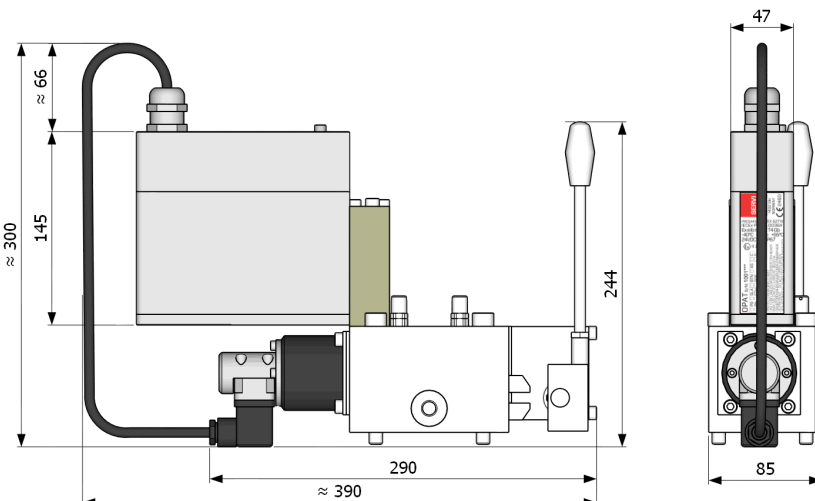


|   |             |
|---|-------------|
| OPAT001: OPAT-BTNPB, Manual 1388826<br>II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67 |             |
| Valve feedback  | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive   | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1  | ATEX, IECEx |

1) Feedback or command

**Hawe SLF5-OPAT-SDE with spool feedback WA**

Modelcode example: SLF5-A2 H 160/160 A200 B200/EAWAEX-OPAT001-G24EX



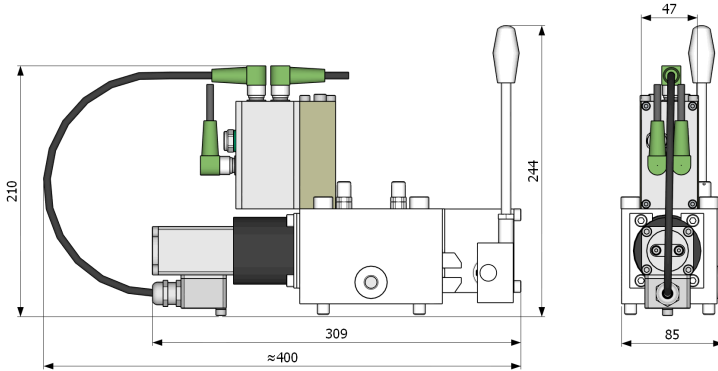
|   |             |
|---|-------------|
| OPAT001: OPAT-BTNPB, Manual 1388826<br>II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67 |             |
| Valve feedback  | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive   | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1  | ATEX, IECEx |

|  |            |
|--|------------|
| II 2 WAEX-5: Ex sensor Manual 1503132<br>G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67 |            |
| Sensor signal  | 5V ± 2,5 V |
| Shielded cable   | No         |

1) Feedback or command

**Hawe SLF5-ODC with spool feedback HPRS, CANopen**

Modelcode example: SLF5-A2 H 160/160 A200 B200/EA-ODC1420-HPRS117-G24



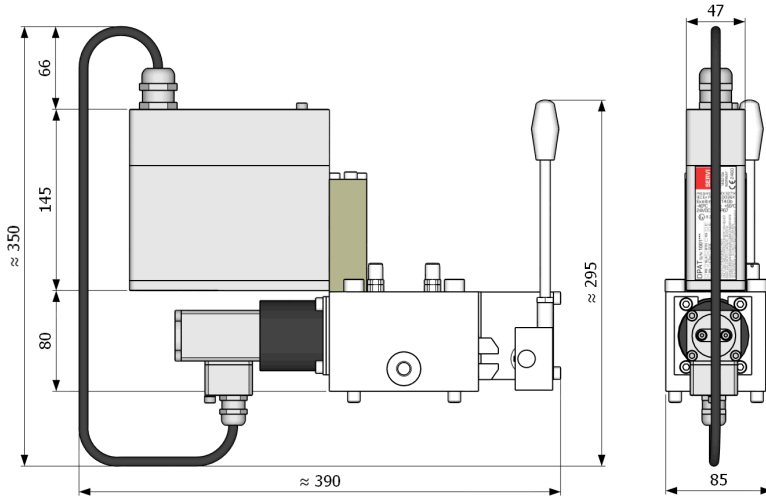
|                               |     |
|-------------------------------|-----|
| ODC1420: ODC-4-4-1-1-0-M-1122 |     |
| Valve feedback                | Yes |
| Process feedback              | Yes |
| Analogue command              | Yes |
| Bus                           | No  |
| Connectors                    | M12 |

**HPRS130: Ex sensor Manual 1503132**  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | Yes     |

**Hawe SLF5-OPAT-SDE with spool feedback HPRS**

Modelcode example: SLF5-A2 H 160/160 A200 B200/EA-OPAT003-HPRS130-G24EX



**OPAT003: OPAT-SDEPB, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

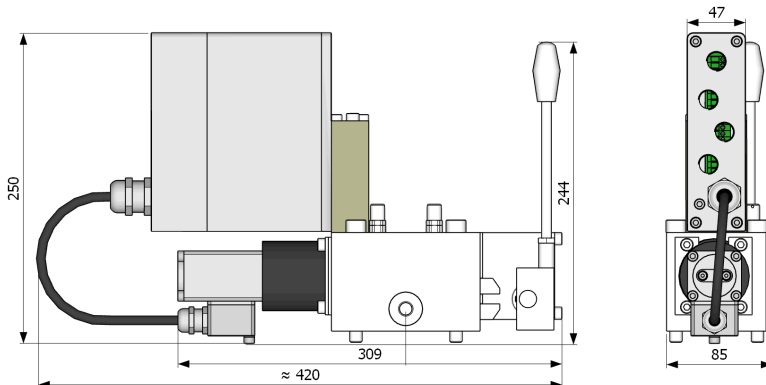
**HPRS130: Ex sensor Manual 1503132**  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | Yes     |

1) Feedback or command

**Hawe SLF5-OPAT-BTN with spool feedback HPRS**

Modelcode example: SLF5-A2 H 160/160 A200 B200/EA-OPAT001-HPRS117-G24EX



**OPAT001: OPAT-BTNPB, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

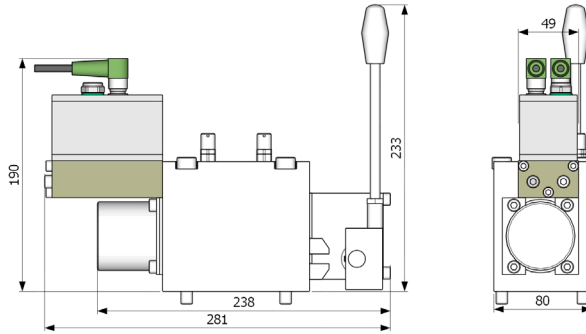
**HPRS117: Ex sensor Manual 1503132**  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

1) Feedback or command

**Hawe SLF5AC-ODC without spool feedback**

Modelcode example: SLF5-AC2 H 160/160 A200 B200/EA-ODC1300-G24

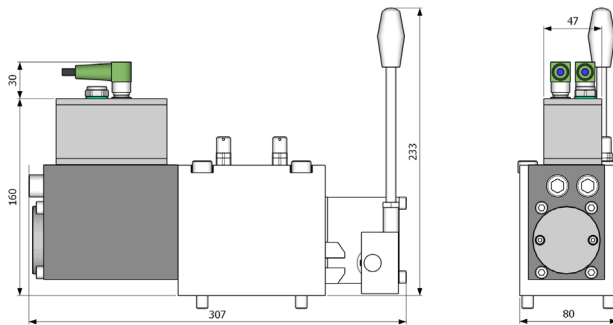


ODC1302: ODC-3-0-0-1-0-M-1100

|                  |     |
|------------------|-----|
| Valve feedback   | No  |
| Process feedback | No  |
| Analogue command | Yes |
| Bus              | No  |
| Connectors       | M12 |

**Hawe SLF5AC-ODC with integrated spool feedback**

Modelcode example: SLF5-AC2 H 160/160 A200 B200/EA-ODC2702-G24

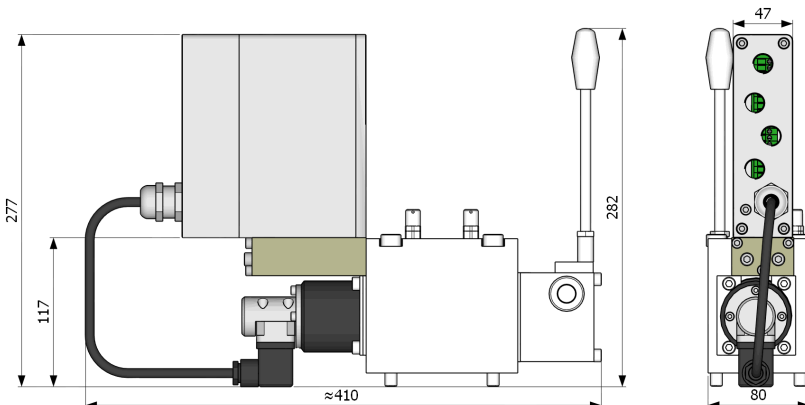


ODC2702: ODC-2-2-0-2-0-M-1100

|                  |     |
|------------------|-----|
| Valve feedback   | Yes |
| Process feedback | No  |
| Analogue command | Yes |
| Bus              | No  |
| Connectors       | M12 |

**Hawe SLF5AC-OPAT-SDE with spool feedback WA**

Modelcode example: SLF5-AC2 H 160/160 A200 B200/EAWAEX-OPAT003-G24EX



OPAT003: OPAT-SDEPB, Manual 1388826

II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

WAEX-5: Ex sensor Manual 1503132

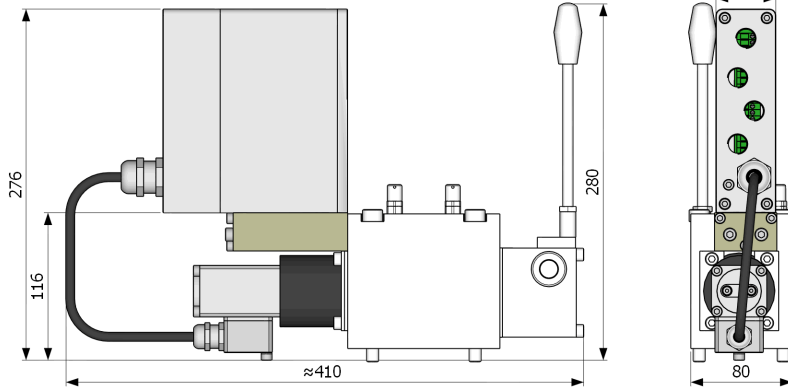
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |            |
|----------------|------------|
| Sensor signal  | 5V ± 2,5 V |
| Shielded cable | No         |

1) Feedback or command

**Hawe SLF5AC-OPAT-SDE with spool feedback HPRS**

Modelcode example: SLF5-AC2 H 160/160 A200 B200/EA-OPAT004-HPRS121-G24EX



OPAT004: OPAT-SDESLA, Manual 1388826  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                              |             |
|------------------------------|-------------|
| Valve feedback               | Yes         |
| Process feedback 1)          | Yes         |
| Analogue command 1)          | Yes         |
| CAN (to master, proprietary) | Yes         |
| Electric Connection          | Screw clamp |
| EX approved Zone 1           | ATEX, IECEx |

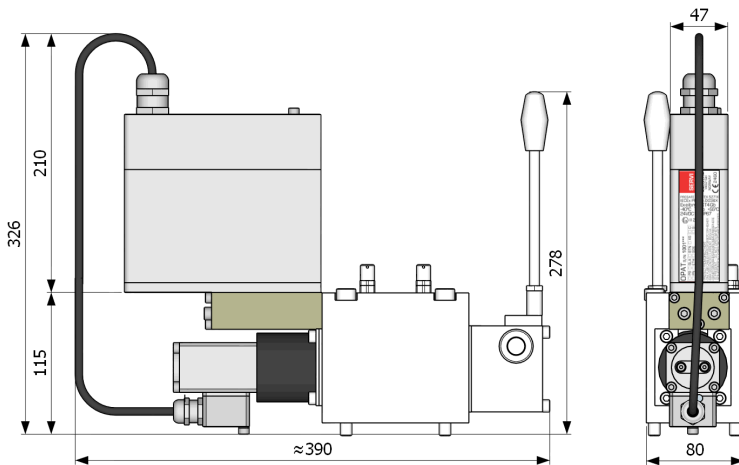
HPRS117: Ex sensor Manual 1503132  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

1) Feedback or command

**Hawe SLF5AC-OPAT-BTN with spool feedback HPRS**

Modelcode example: SLF5-AC2 H 160/160 A200 B200/EA-OPAT002-HPRS118-G24EX



OPAT002: OPAT-BTNLSLA, Manual 1388826  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                              |             |
|------------------------------|-------------|
| Valve feedback               | Yes         |
| Process feedback 1)          | Yes         |
| Analogue command 1)          | Yes         |
| CAN (to master, proprietary) | Yes         |
| Electric Connection          | Screw clamp |
| EX approved Zone 1           | ATEX, IECEx |

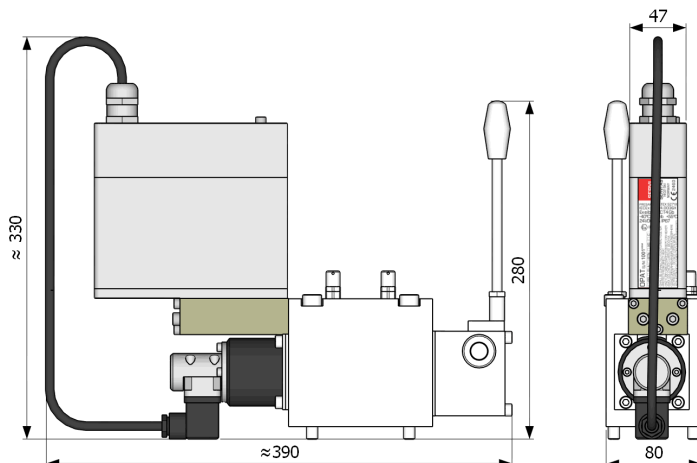
HPRS118: Ex sensor Manual 1503132  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

1) Feedback or command

**Hawe SLF5AC-OPAT-BTN with spool feedback WA**

Modelcode example: SLF5-AC2 H 160/160 A200 B200/EAWAEX-OPAT001-G24EX



OPAT001: OPAT-BTNPB, Manual 1388826  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

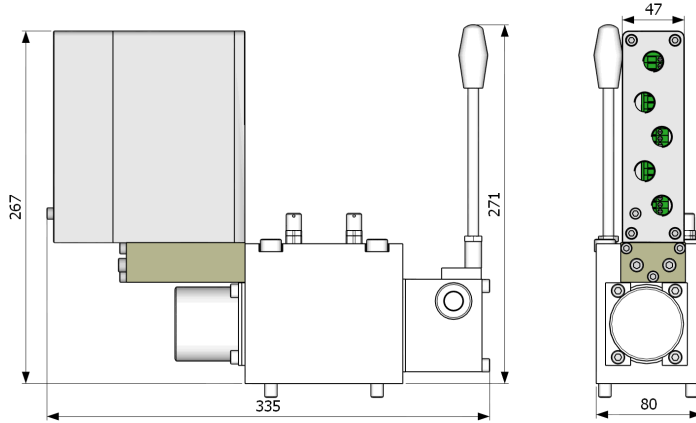
WAEX-5: Ex sensor Manual 1503132  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |            |
|----------------|------------|
| Sensor signal  | 5V ± 2,5 V |
| Shielded cable | No         |

1) Feedback or command

**Hawe SLF5AC-OPAT-SDE without spool feedback**

Modelcode example: SLF5-AC2 H 160/160 A200 B200/EA-**OPAT003**-G24EX



**OPAT003: OPAT-SDEPB, Manual 1388826**

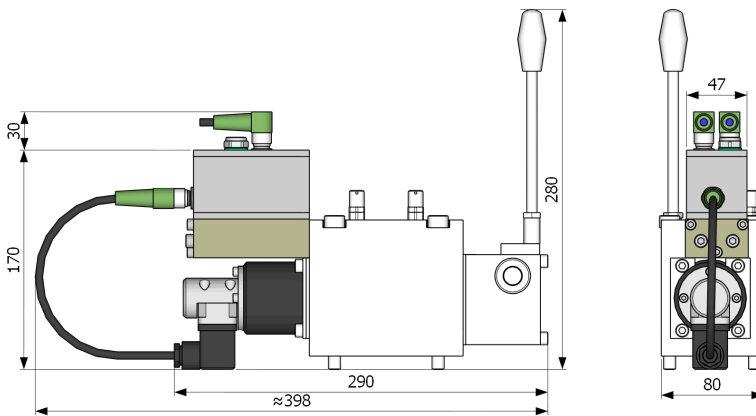
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

1) Feedback or command

**Hawe SLF5AC-ODC with spool feedback WA**

Modelcode example: SLF5-AC2 H 160/160 A200 B200/EAWA-**ODC1501**-G24

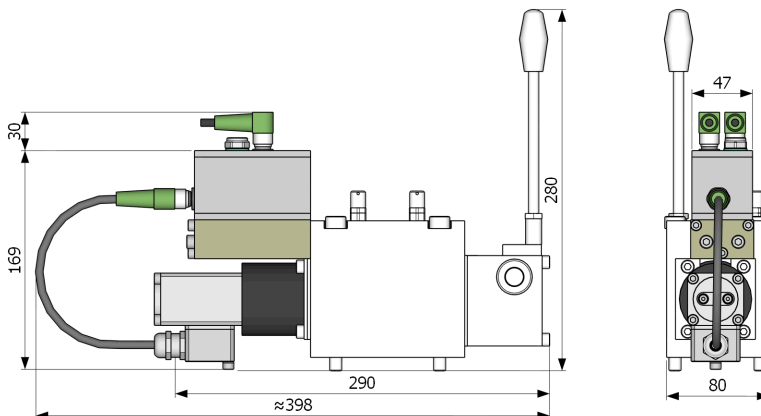


**ODC1501: ODC-3-3-0-2-0-M-1120**

|                  |     |
|------------------|-----|
| Valve feedback   | Yes |
| Process feedback | No  |
| Analogue command | Yes |
| Bus              | No  |
| Connectors       | M12 |

**Hawe SLF5AC-ODC with spool feedback HPRS**

Modelcode example: SLF5-AC2 H 160/160 A200 B200/EA-**ODC1301**-HPRS117-G24



**ODC1301: ODC-3-4-0-1-0-M-1120**

|                  |     |
|------------------|-----|
| Valve feedback   | Yes |
| Process feedback | No  |
| Analogue command | Yes |
| Bus              | No  |
| Connectors       | M12 |

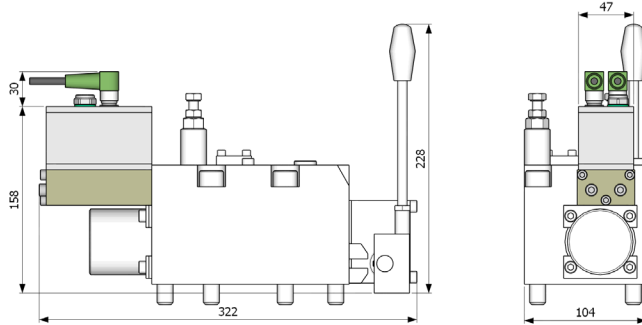
**HPRS117: Ex sensor Manual 1503132**

II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

**Hawe SLF7-ODC without spool feedback**

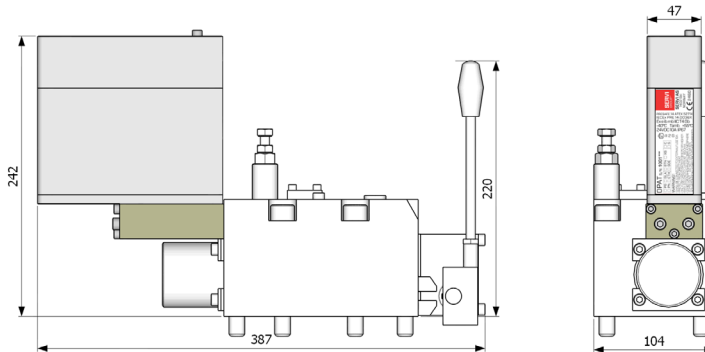
Modelcode example: SLF7-A2 H 400/400 A200 B200/EA-**ODC1300**-G24



|                               |     |
|-------------------------------|-----|
| ODC1300: ODC-2-0-0-1-0-M-1100 |     |
| Valve feedback                | Yes |
| Process feedback              | No  |
| Analogue command              | Yes |
| Bus                           | No  |
| Connectors                    | M12 |

**Hawe SLF7-OPAT-BTN without spool feedback**

Modelcode example: SLF7-A2 H 400/400 A200 B200/EA-**OPAT001**-G24EX

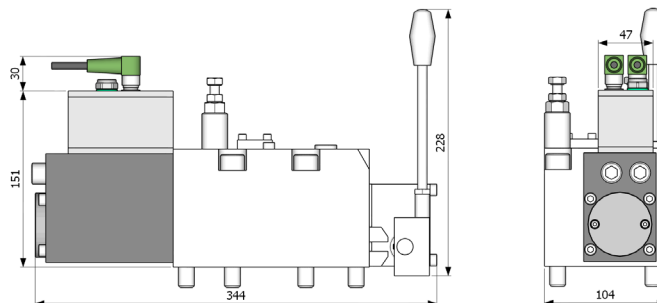


|   |             |
|---|-------------|
| OPAT001: OPAT-BTNPB, Manual 1388826<br>II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67 |             |
| Valve feedback  | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive   | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1  | ATEX, IECEx |

1) Feedback or command

**Hawe SLF7-ODC with integrated spool feedback**

Modelcode example: SLF7-A2 H 400/400 A200 B200/EA-**ODC2701**-G24

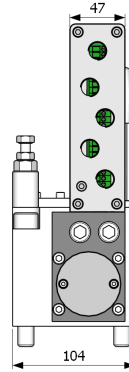
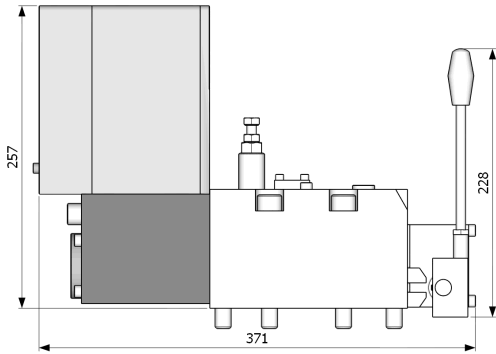


|                               |     |
|-------------------------------|-----|
| ODC2701: ODC-2-2-0-2-0-M-1100 |     |
| Valve feedback                | Yes |
| Process feedback              | No  |
| Analogue command              | Yes |
| Bus                           | No  |
| Connectors                    | M12 |



**Hawe SLF7-OPAT-SDE with integrated spool feedback**

Modelcode example: SLF7-A2 H 400/400 A200 B200/EA-OPAT003-G24EX



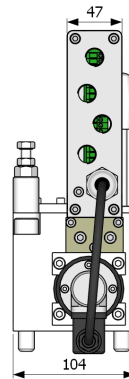
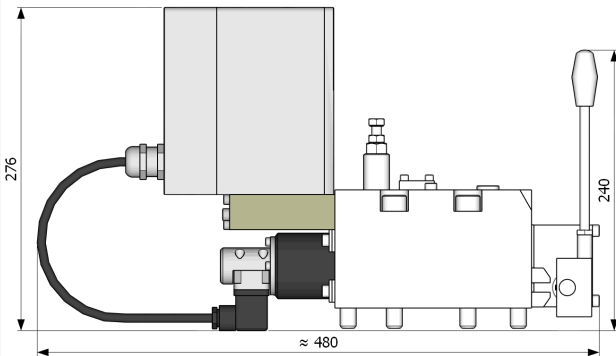
**OPAT003: OPAT-SDEPB, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

1) Feedback or command

**Hawe SLF7-OPAT-SDE with spool feedback WA**

Modelcode example: SLF7-A2 H 400/400 A200 B200/EAWAEX-OPAT003-G24EX



**OPAT003: OPAT-SDEPB, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

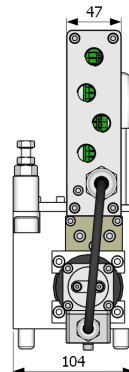
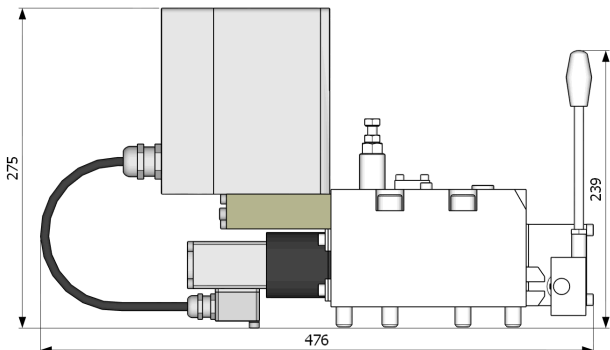
**WAEX-5: Ex sensor Manual 1503132**  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |            |
|----------------|------------|
| Sensor signal  | 5V ± 2,5 V |
| Shielded cable | No         |

1) Feedback or command

**Hawe SLF7-OPAT-SDE with spool feedback HPRS**

Modelcode example: SLF7-A2 H 400/400 A200 B200/EA-OPAT003-HPRS117-G24EX



**OPAT003: OPAT-SDEPB, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

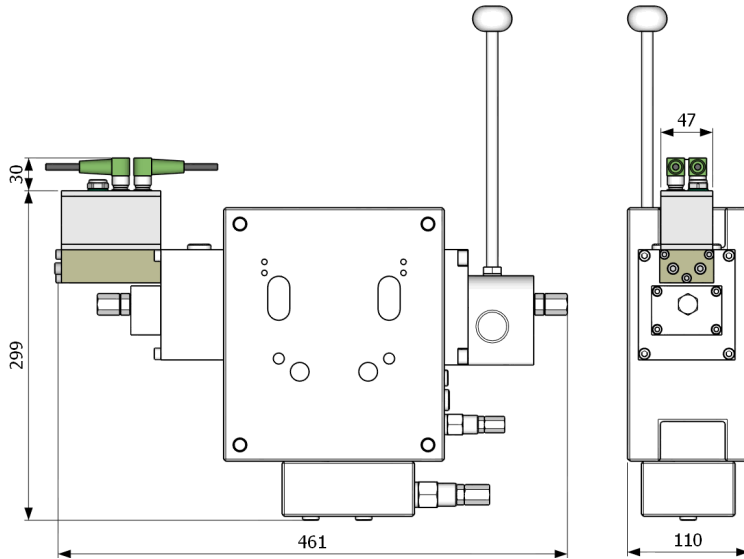
**HPRS117: Ex sensor Manual 1503132**  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

1) Feedback or command

**HSV600-ODC without spool feedback**

Modelcode example: WS-M E1 ODC2110-G24 9C - - /A210B210

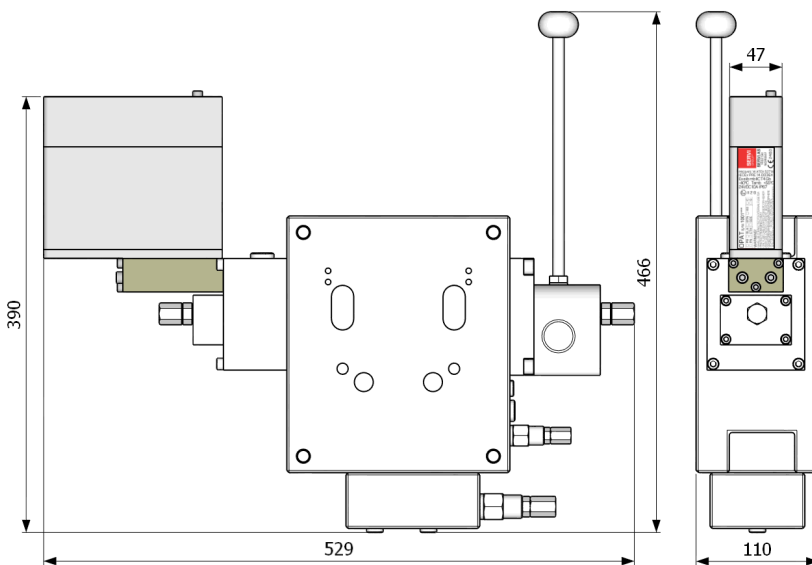


ODC2110: ODC-7-0-0-1-1-M-1100

|                  |     |
|------------------|-----|
| Valve feedback   | No  |
| Process feedback | No  |
| Analogue command | Yes |
| Bus, Canopen     | Yes |
| Connectors       | M12 |

**HSV600-OPAT BTN without spool feedback**

Modelcode example: WS-M E1 OPAT001-G24EX9C - - /A210B210



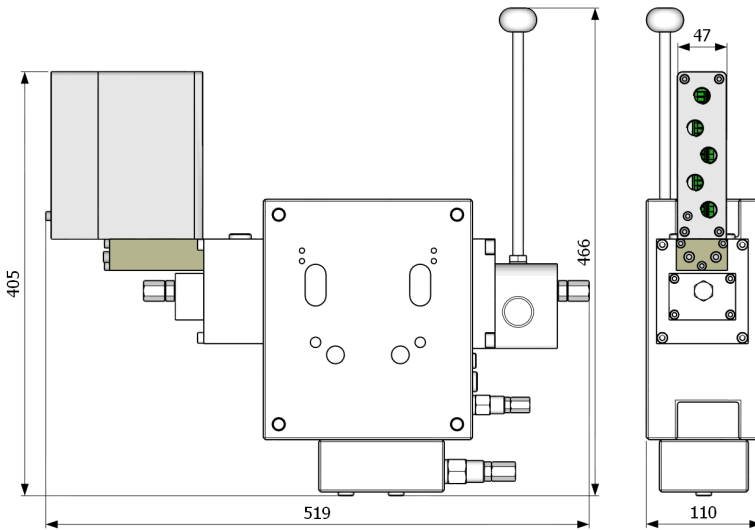
OPAT003: OPAT-SDEPB, Manual 1388826  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

1) Feedback or command

**HSV600-OPAT-SDE without spool feedback**

Modelcode example: WS-M E1 **OPAT003-G24EX9C** - - /A210B210



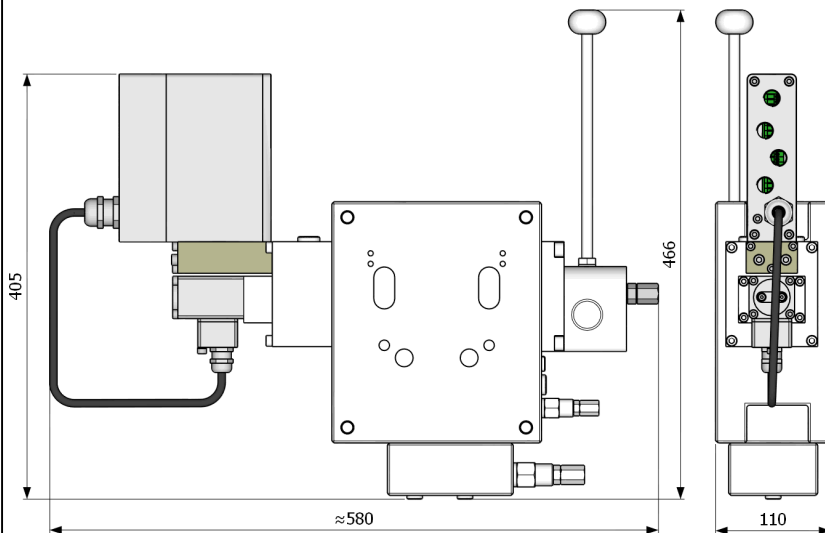
**OPAT003: OPAT-SDEPB, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

1) Feedback or command

**HSV600-OPAT SDE with spool feedback HPRS**

Modelcode example: WS-M E1 **OPAT003G24EX9C HPRS102** - /A210B210



**OPAT003: OPAT-SDEPB, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                       |             |
|-----------------------|-------------|
| Valve feedback        | Yes         |
| Process feedback 1)   | Yes         |
| Analogue command 1)   | Yes         |
| PROFIBUS / Profidrive | Yes         |
| Electric Connection   | Screw clamp |
| EX approved Zone 1    | ATEX, IECEx |

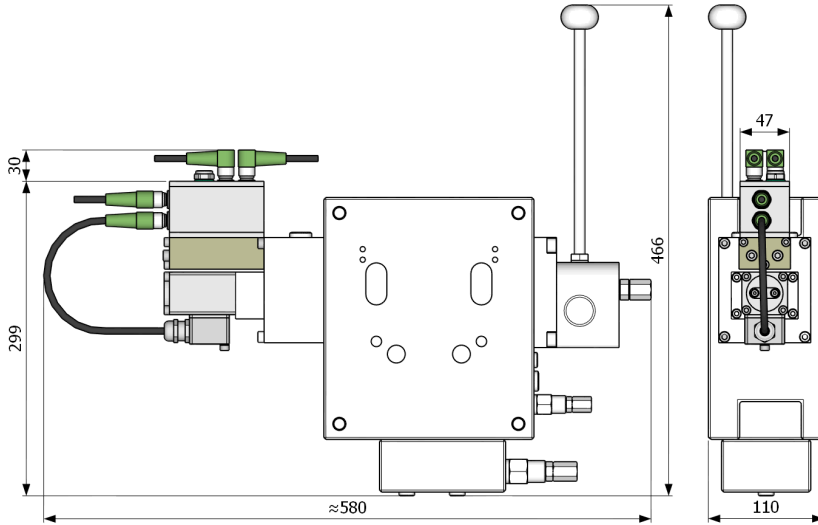
**HPRS117: Ex sensor Manual 1503132**  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

1) Feedback or command

**HSV600-ODC with spool feedback HPRS**

Modelcode example: WS-M E1 **ODC2111-G24 9C HPRS102** - /A210B210

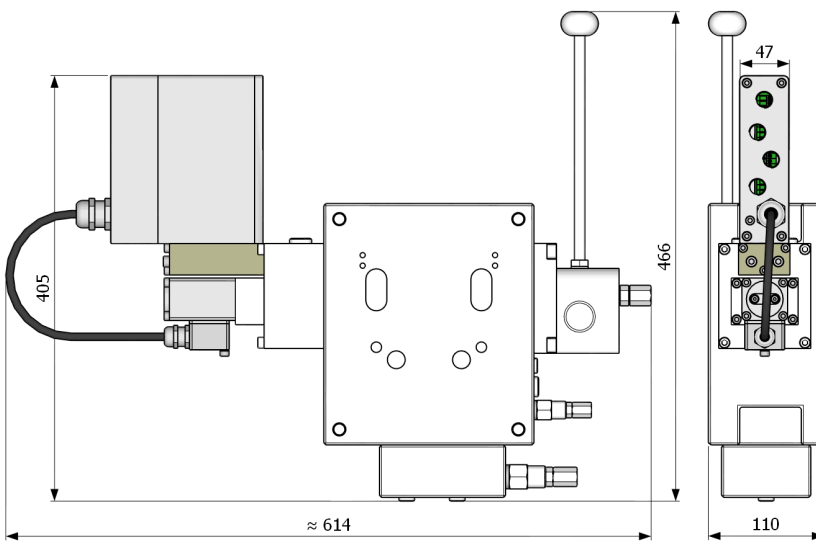


**ODC2111: ODC-7-4-1-1-1-M-1022**

|                  |     |
|------------------|-----|
| Valve feedback   | Yes |
| Process feedback | Yes |
| Analogue command | Yes |
| Bus, Canopen     | Yes |
| Connectors       | M12 |

**HSV600-OPAT-SDE with spool feedback HPRS**

Modelcode example WS-M E1 **OPAT003-G24EX 9C HPRS106** - /A210B210



**OPAT003: OPAT-SDEPB, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                            |             |
|----------------------------|-------------|
| Valve feedback             | Yes         |
| Process feedback <b>1)</b> | Yes         |
| Analogue command <b>1)</b> | Yes         |
| PROFIBUS / Profidrive      | Yes         |
| Electric Connection        | Screw clamp |
| EX approved Zone 1         | ATEX, IECEx |

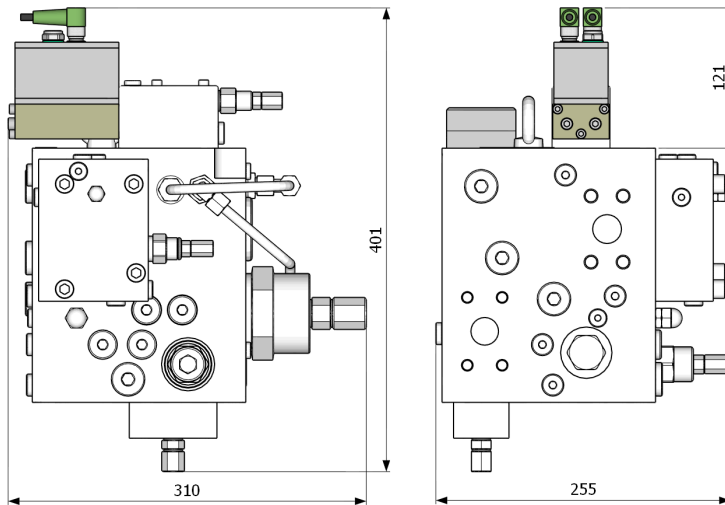
**HPRS106: Ex sensor Manual 1503132**  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | Yes     |

1) Feedback or command

**6MB-ODC without spool feedback**

Modelcode example: 6MB-450-ODC1650-G24

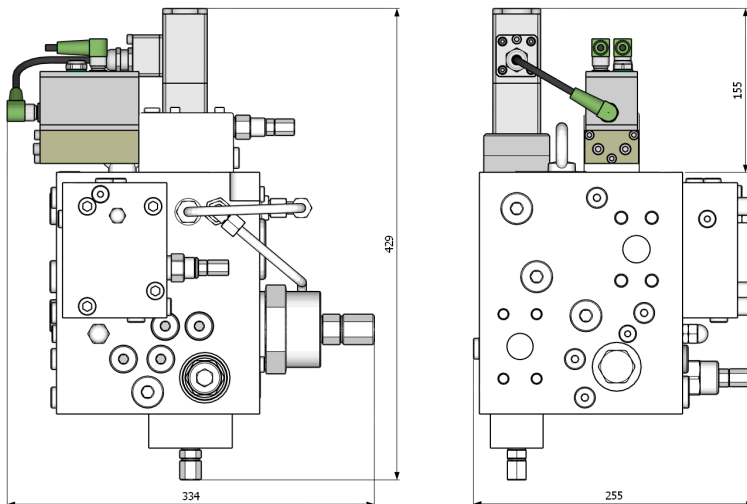


**ODC1650: ODC-8-0-0-1-0-M-1100**

|                  |     |
|------------------|-----|
| Valve feedback   | No  |
| Process feedback | No  |
| Analogue command | Yes |
| CANopen          | No  |
| Connectors       | M12 |

**6MB-ODC with spool feedback HPRS**

Modelcode example: 6MB-450-ODC1750-HPRS109-G24



**ODC1750: ODC-8-4-0-1-0-M-1120**

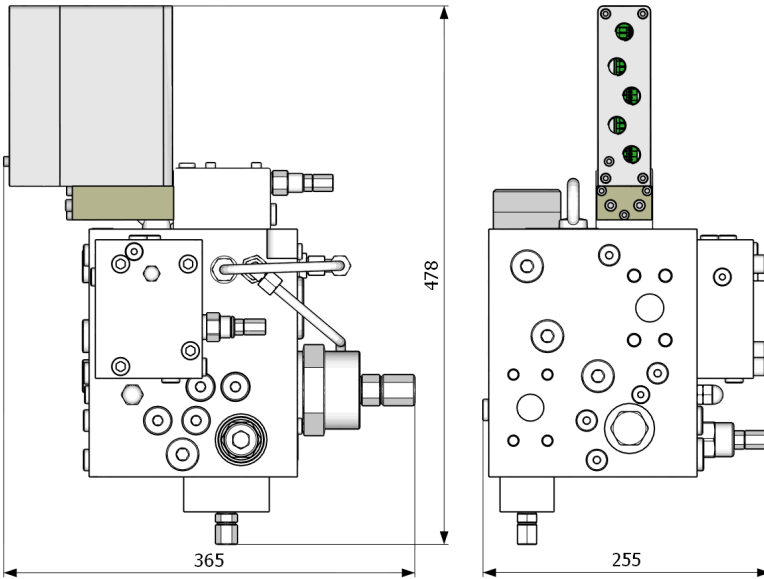
|                  |     |
|------------------|-----|
| Valve feedback   | No  |
| Process feedback | No  |
| Analogue command | Yes |
| CANopen          | No  |
| Connectors       | M12 |

**II 2 G HPRS109** : Ex sensor Manual 1503132  
Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

**6MB-OPAT-SDE without spool feedback**

Modelcode example: 6MB-450-OPAT004 G24EX



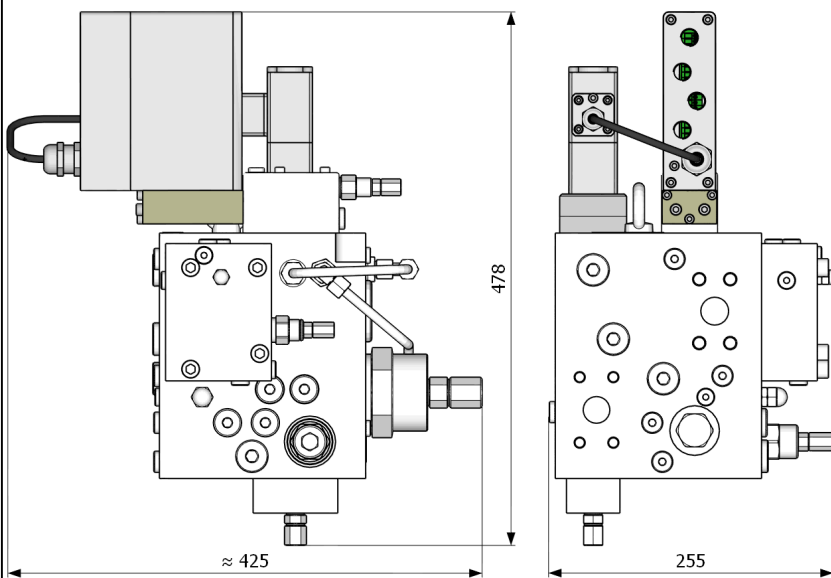
**OPAT004: OPAT-SDESLA, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                     |             |
|---------------------|-------------|
| Valve feedback      | Yes         |
| Process feedback 1) | Yes         |
| Analogue command 1) | Yes         |
| PROFIBUS/Profidrive | Yes         |
| Electric Connection | Screw clamp |
| EX approved Zone 1  | ATEX, IECEx |

1) Feedback or command

**6MB-OPAT-SDE with spool feedback HPRS**

Modelcode example: 6MB-450-OPAT003-HPRS109 G24EX



**OPAT001: OPAT-BTNPB, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                     |             |
|---------------------|-------------|
| Valve feedback      | Yes         |
| Process feedback 1) | Yes         |
| Analogue command 1) | Yes         |
| PROFIBUS/Profidrive | Yes         |
| Electric Connection | Screw clamp |
| EX approved Zone 1  | ATEX, IECEx |

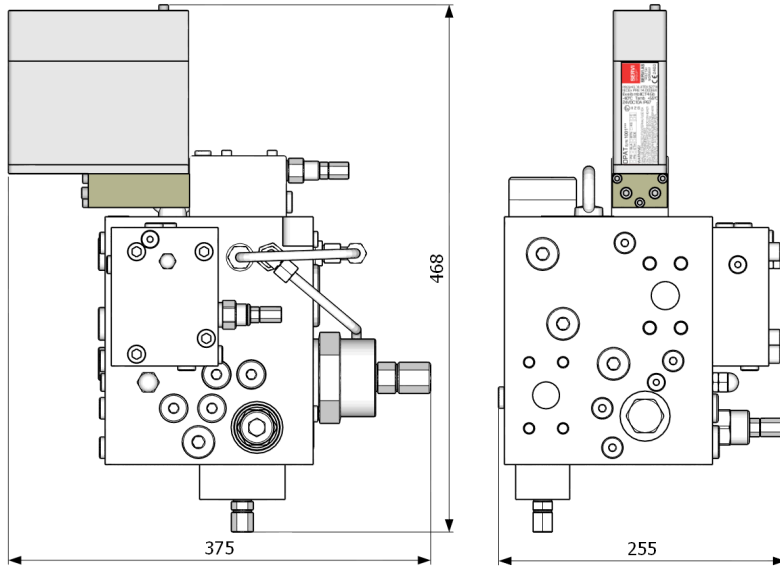
**HPRS109 : Ex sensor Manual 1503132**  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | No      |

1) Feedback or command

**6MB-OPAT-BTN without spool feedback**

Modelcode example: 6MB-450-OPAT001 G24EX



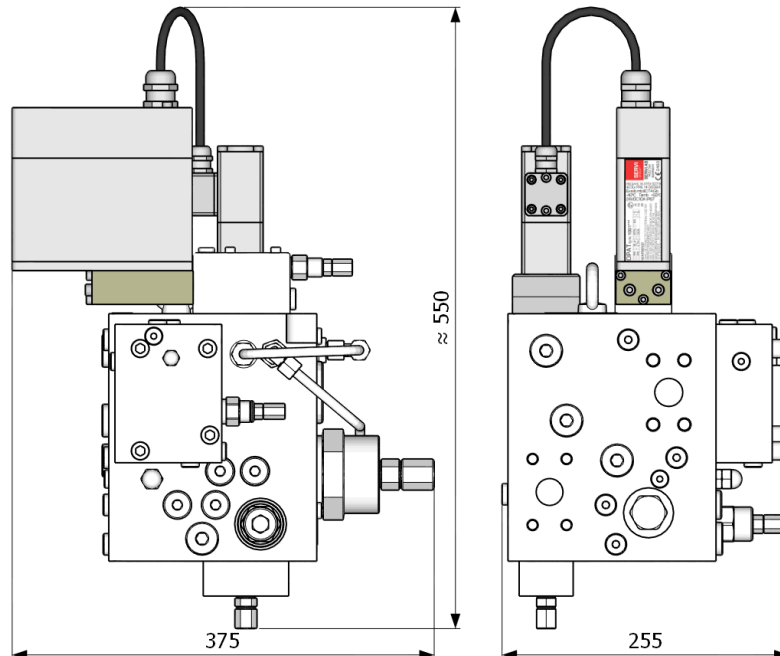
**OPAT001: OPAT-BTNPB, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                     |             |
|---------------------|-------------|
| Valve feedback      | Yes         |
| Process feedback 1) | Yes         |
| Analogue command 1) | Yes         |
| PROFIBUS/Profidrive | Yes         |
| Electric Connection | Screw clamp |
| EX approved Zone 1  | ATEX, IECEx |

1) Feedback or command

**6MB-OPAT-BTN with spool feedback HPRS**

Modelcode example: 6MB-450-OPAT001-HPRS105 G24EX



**OPAT001: OPAT-BTNPB, Manual 1388826**  
II 2 G Ex eb ib mb IIC T4 Gb, Tamb: -40°C to +55°C, IP67

|                     |             |
|---------------------|-------------|
| Valve feedback      | Yes         |
| Process feedback 1) | Yes         |
| Analogue command 1) | Yes         |
| PROFIBUS/Profidrive | Yes         |
| Electric Connection | Screw clamp |
| EX approved Zone 1  | ATEX, IECEx |

**HPRS105 : Ex sensor Manual 1503132**  
II 2 G Ex db IIB T6 Gb, Tamb: -40°C to +70°C, IP67

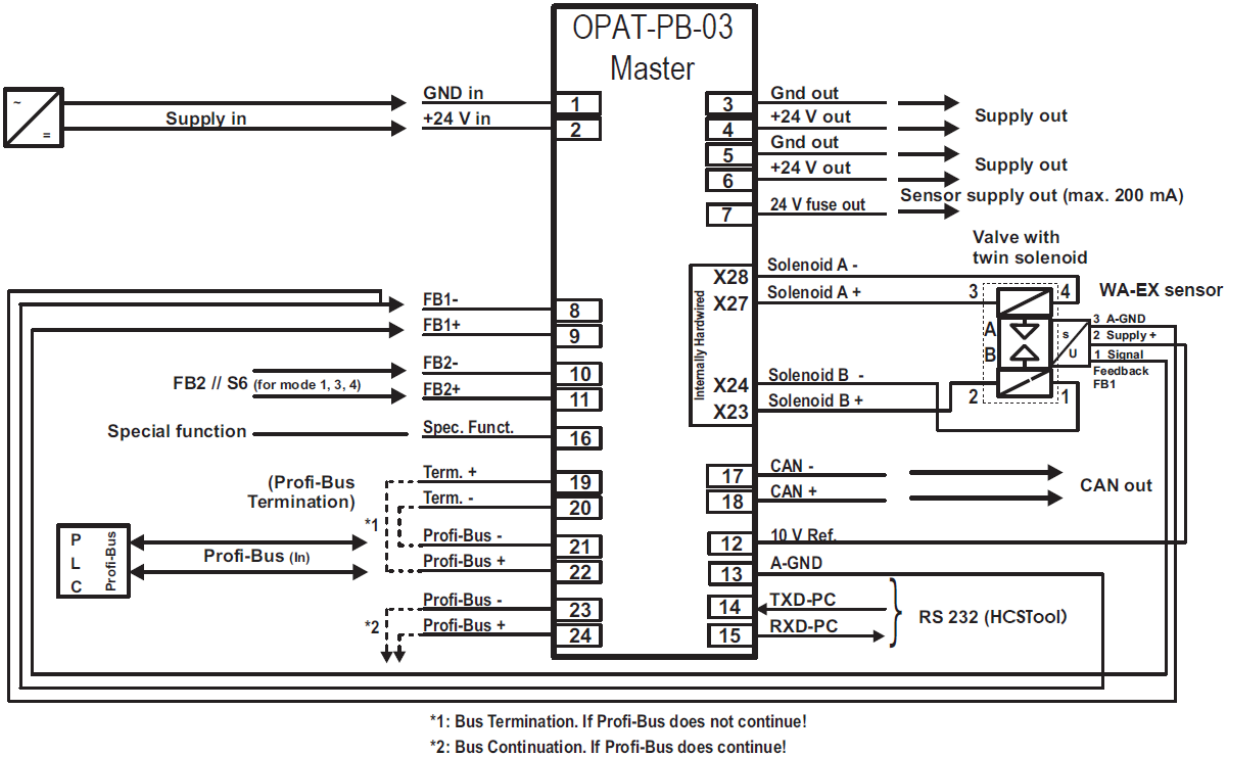
|                |         |
|----------------|---------|
| Sensor signal  | 4-20 mA |
| Shielded cable | Yes     |

1) Feedback or command

## 8.1 WIRING DIAGRAM, OPAT

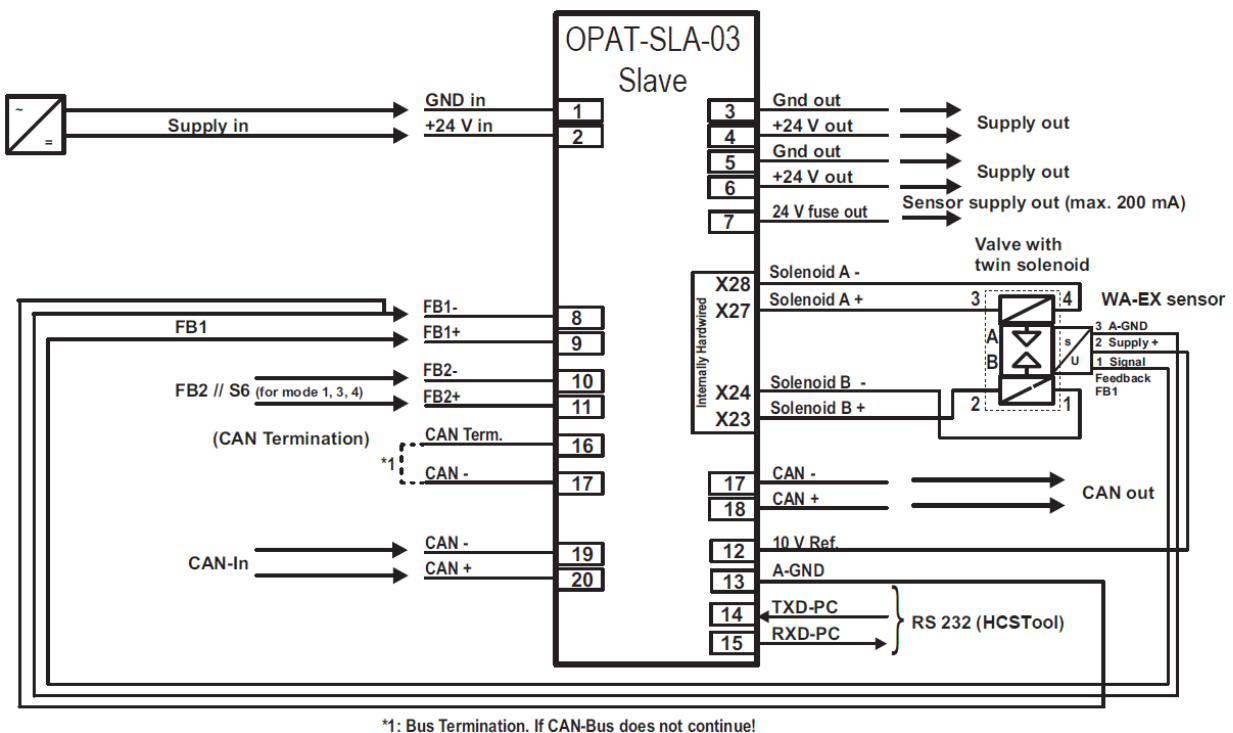
OPAT - \*\*\* PB (Master with PROFIBUS, Profidrive)

Wiring diagram for Voltage feedback signal (i.e WA-EX sensor)



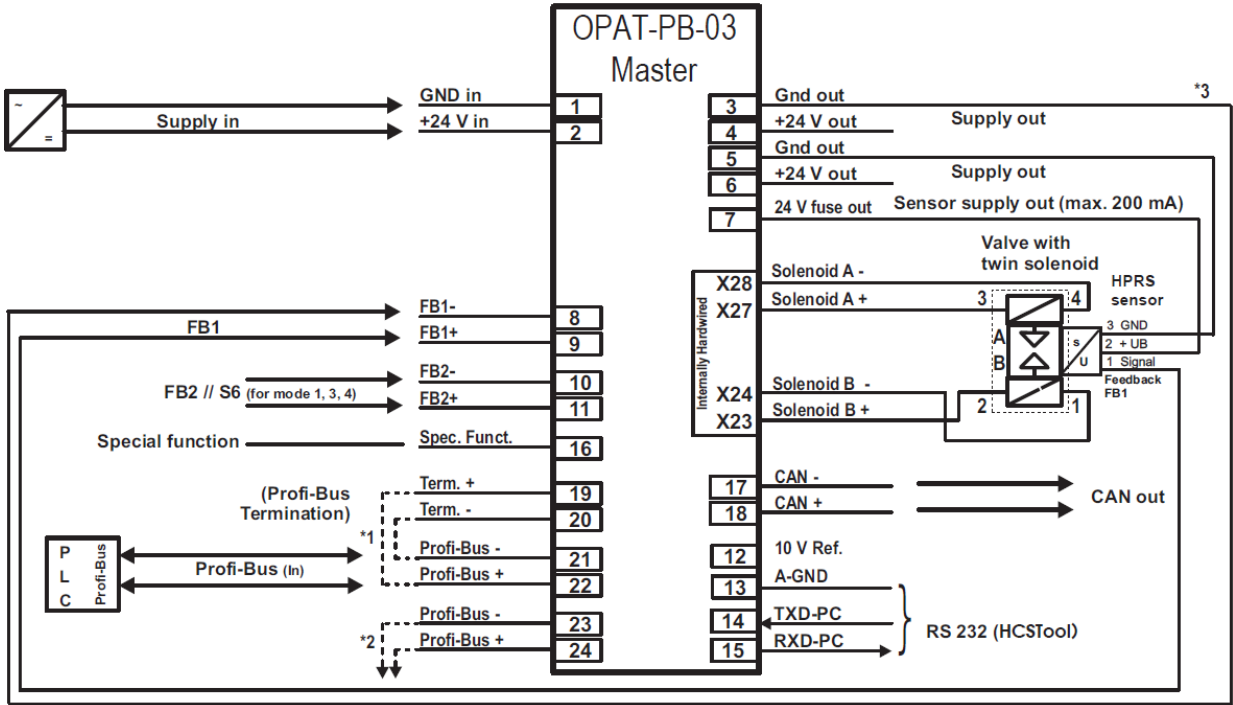
OPAT - \*\*\* SLA (Slave with CANbus)

Wiring diagram for Voltage feedback signal (i.e WA-EX sensor)



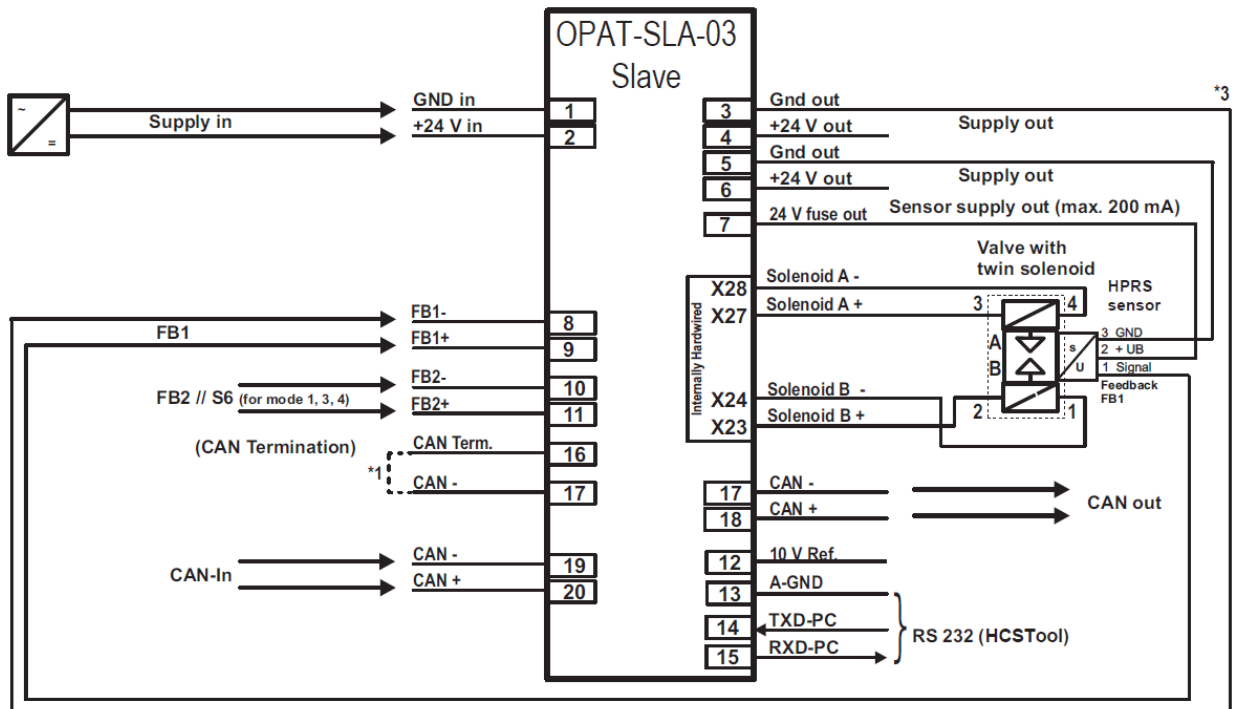


OPAT - \*\*\* PB (Master with PROFIBUS, Profidrive)  
 Wiring diagram for Current feedback signal (i.e HPRS sensor)



\*1: Bus Termination. If Profi-Bus does not continue!  
 \*2: Bus Continuation. If Profi-Bus does continue!  
 \*3: GND can alternatively be connected in parallel to pin 1 or 5

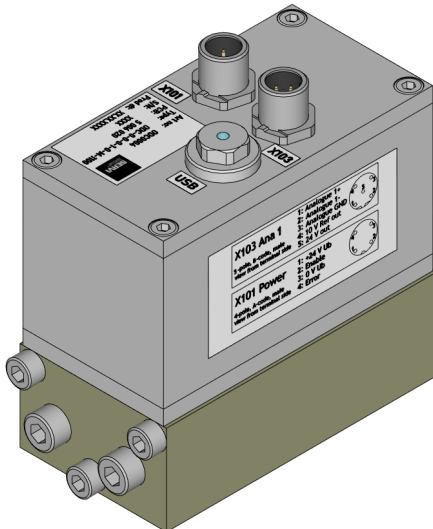
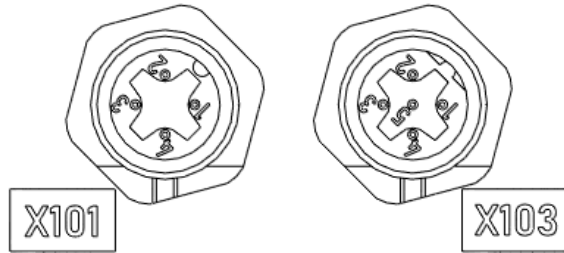
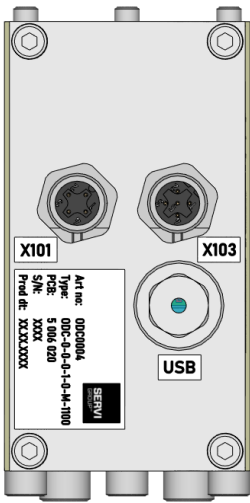
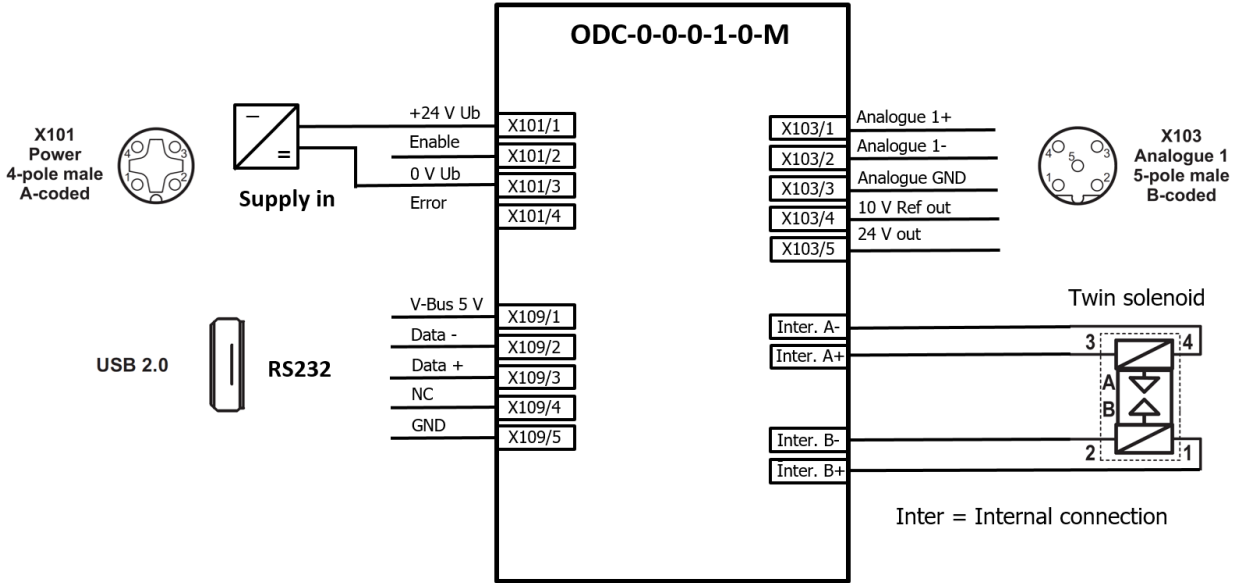
OPAT - \*\*\* SLA (Slave with CANbus)  
 Wiring diagram for Current feedback signal (i.e HPRS sensor)

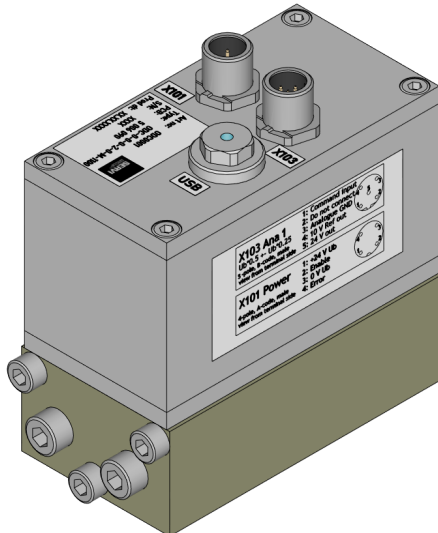
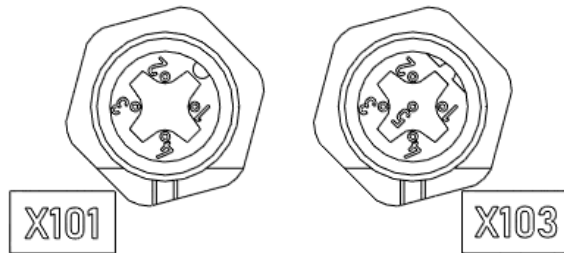
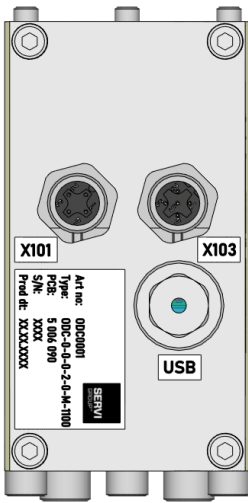
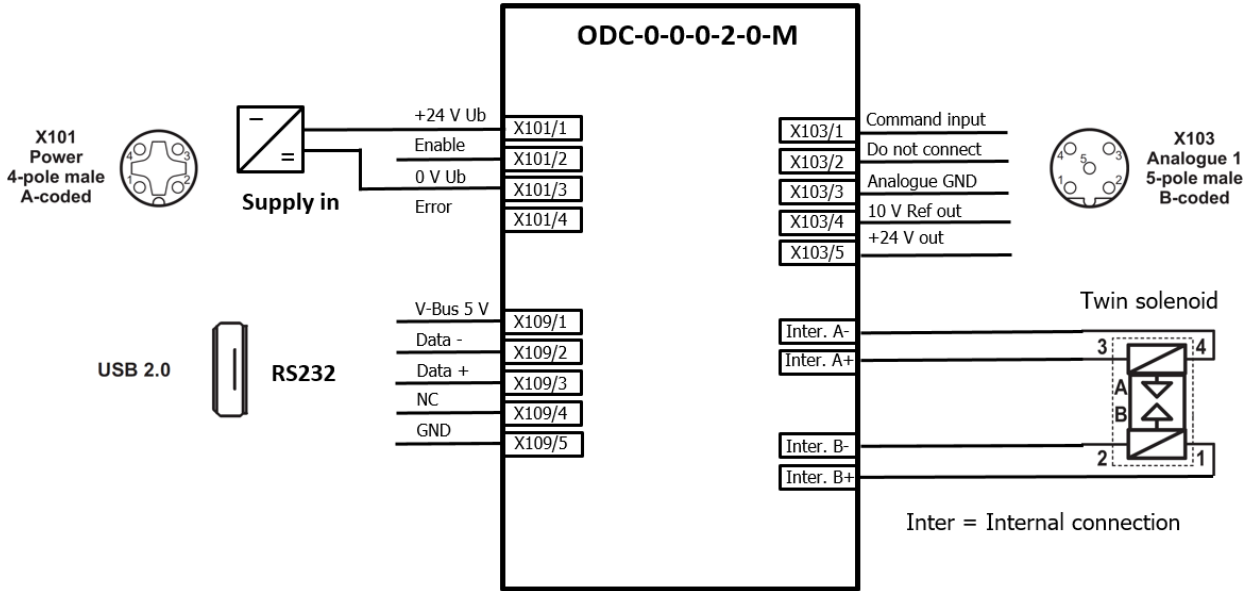


\*1: Bus Termination. If CAN-Bus does not continue!  
 \*3: GND can alternatively be connected in parallel to pin 1 or 5

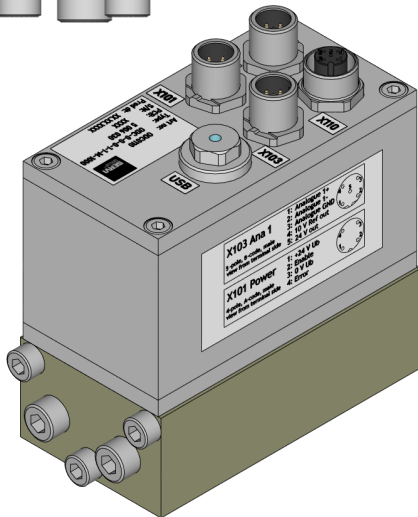
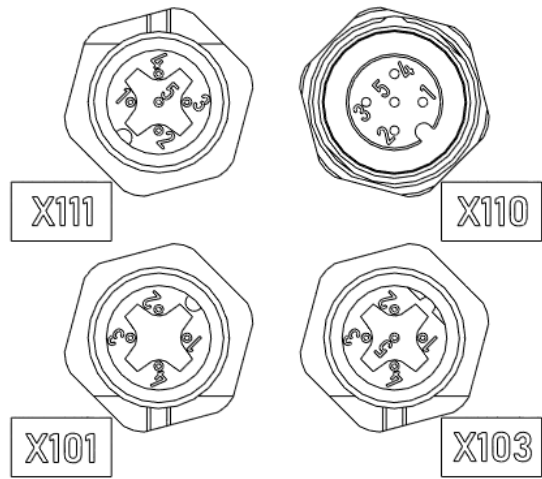
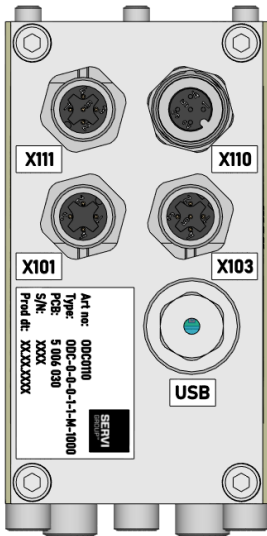
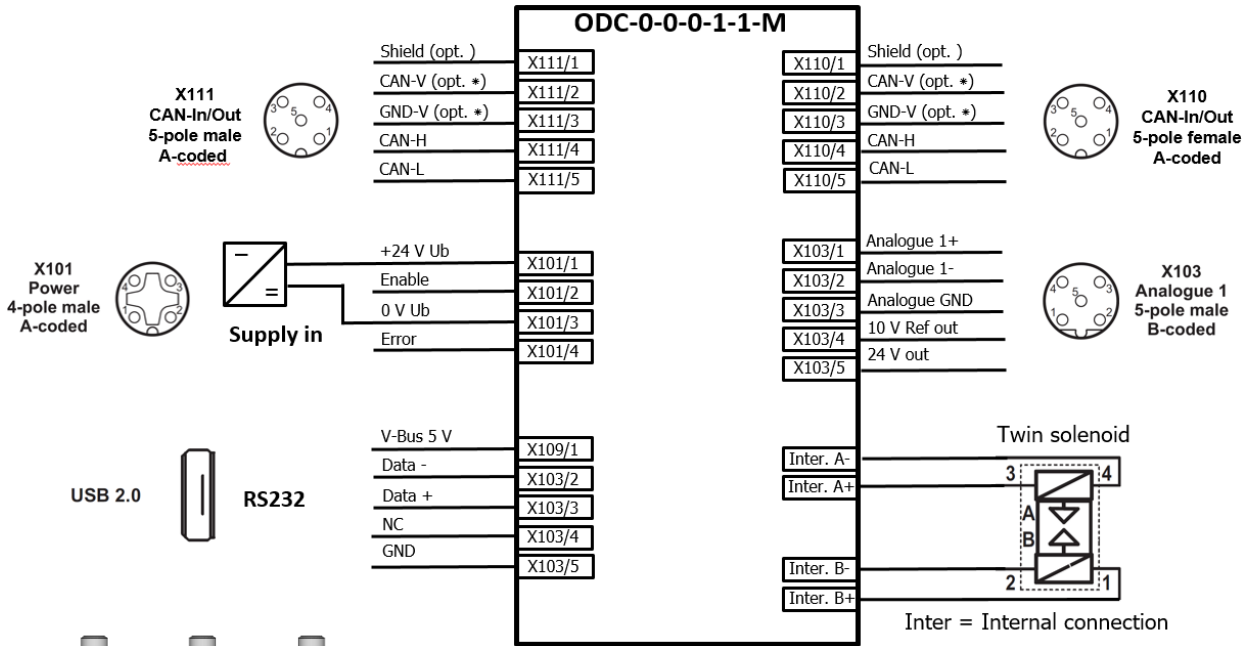
## 8.2 WIRING DIAGRAM, ODC

ODC, twinsolenoid, analogue command, w/o feedback

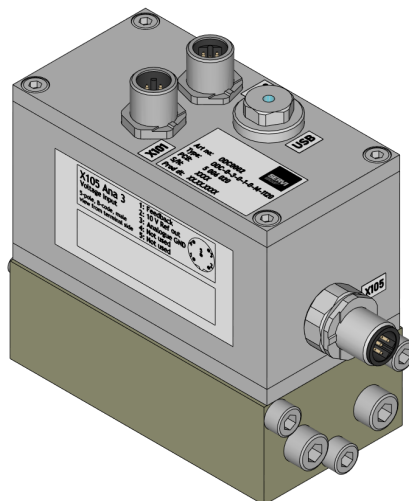
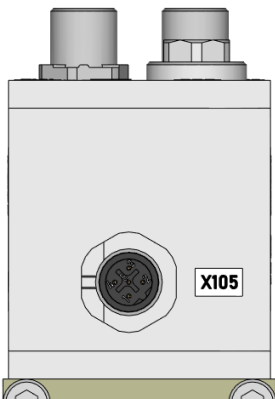
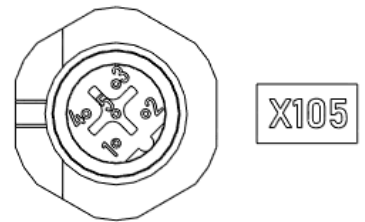
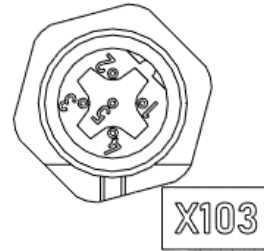
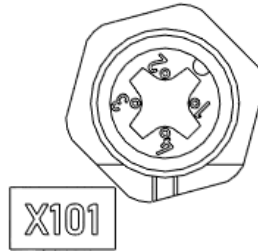
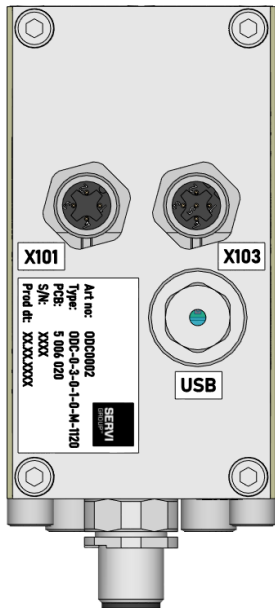
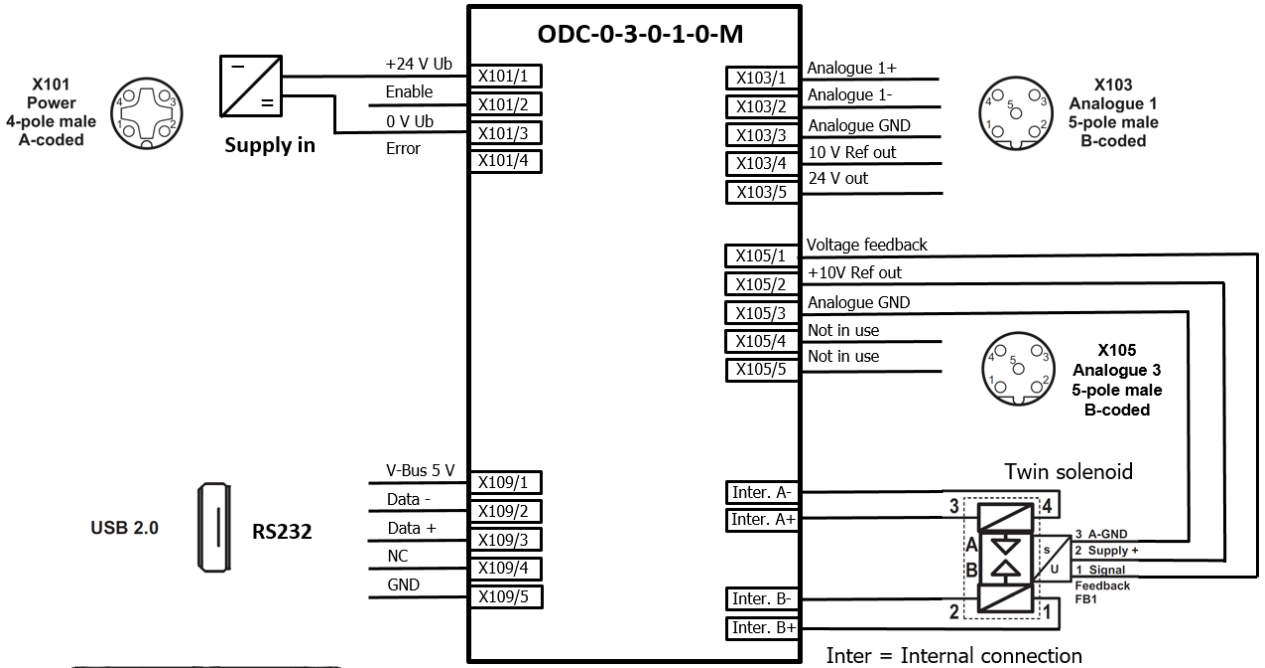




ODC, twinsolenoid, CANopen and analogue command, w/o feedback

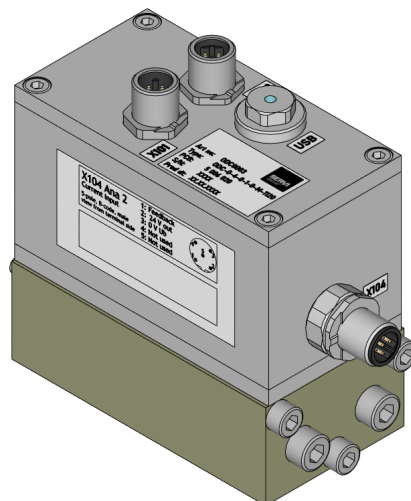
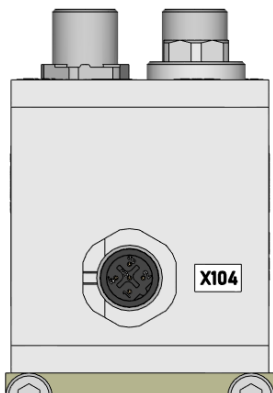
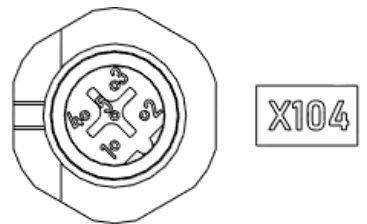
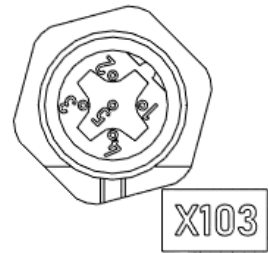
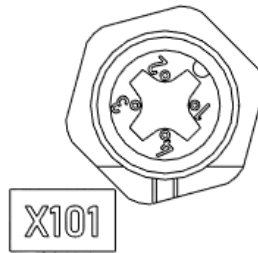
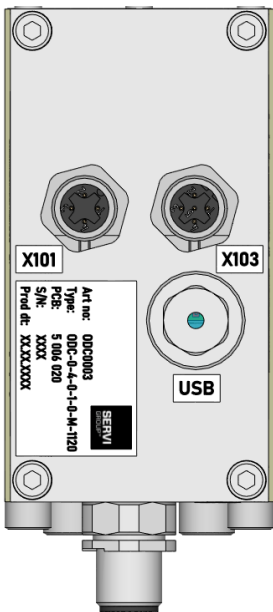
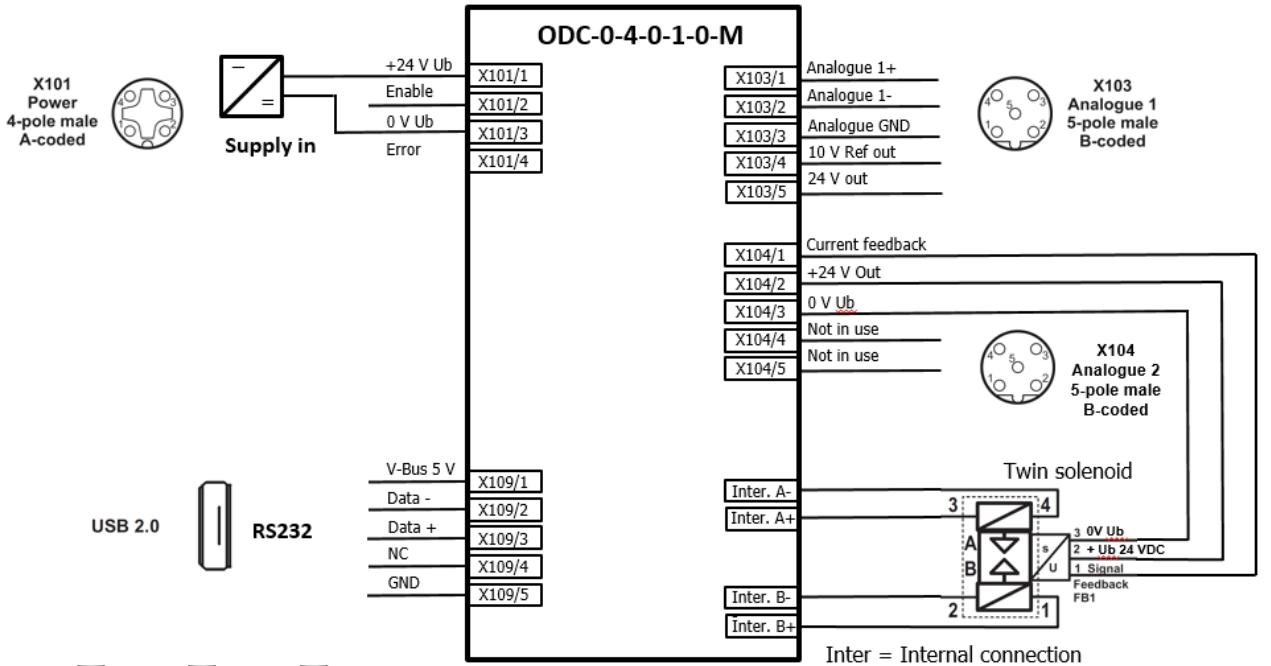


ODC, twinsolenoid, analogue command, with WA (voltage) valve feedback



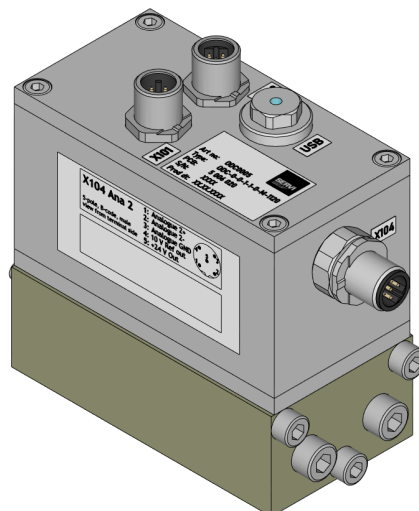
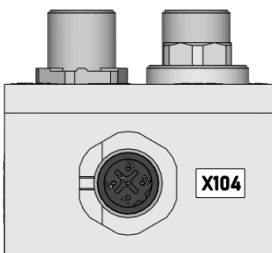
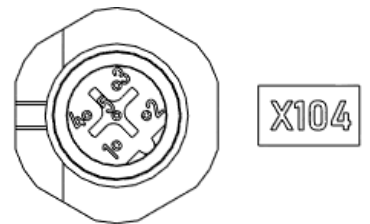
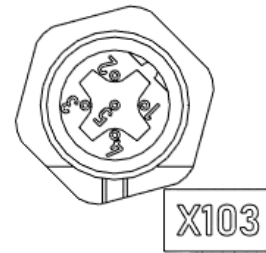
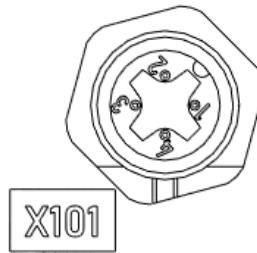
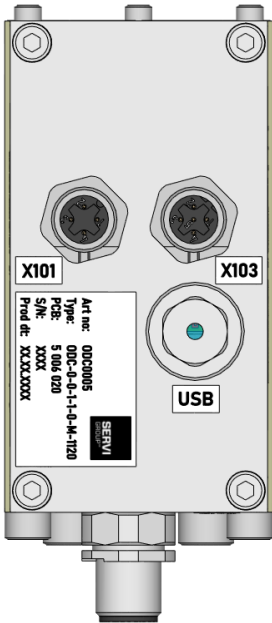
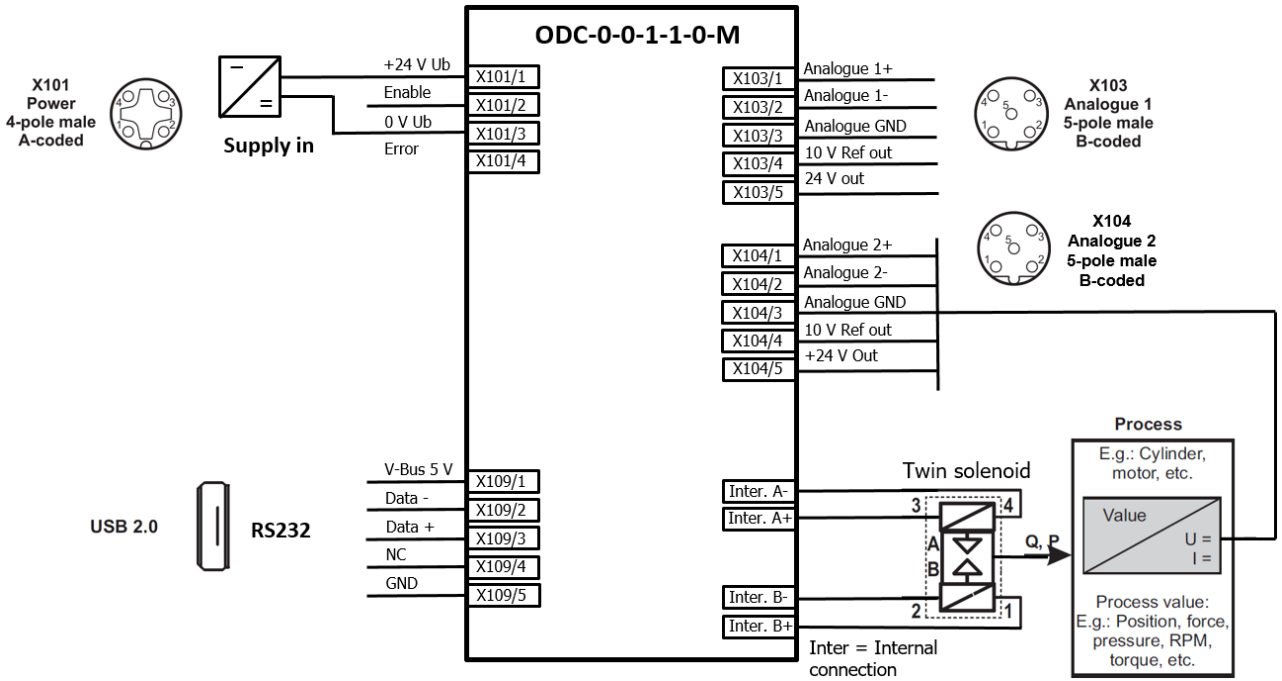
For combination with **CANopen** and/or **Process feedback**, see relevant pages for wiring diagram

ODC, twinsolenoid, analogue command, with HPRS (current) valve feedback



For combination with **CANopen** and/or **Process feedback**, see relevant pages for wiring diagram

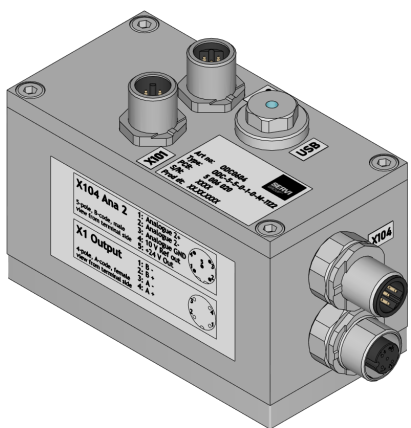
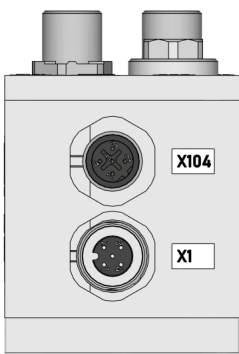
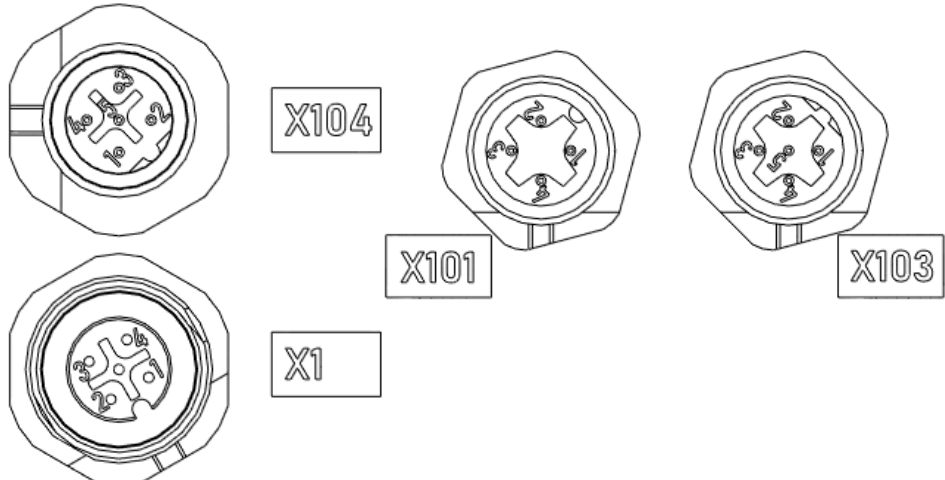
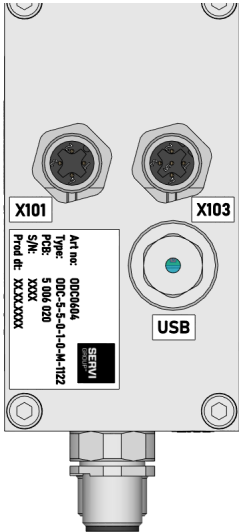
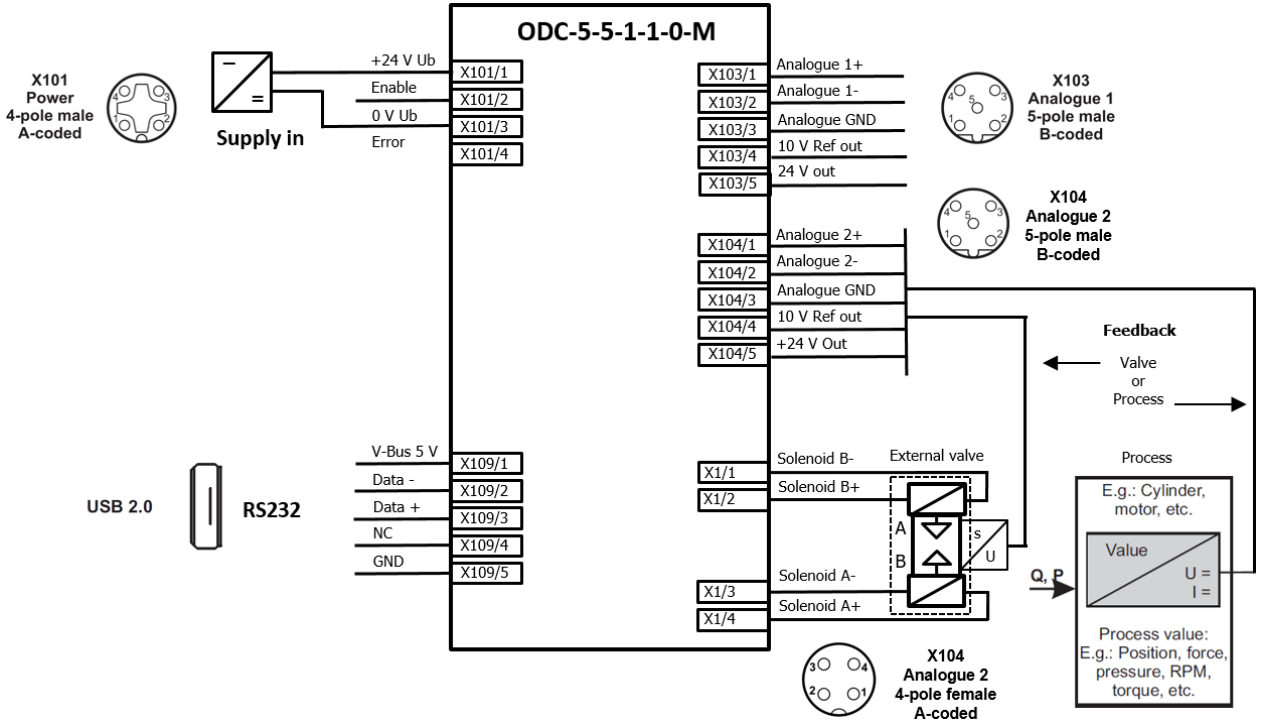
ODC, twinsolenoid, analogue command, with process feedback (voltage or current)



For combination with **CANopen** and/or **Valve feedback**, see relevant pages for wiring diagram



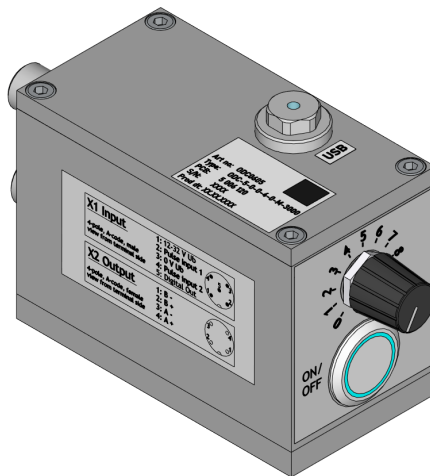
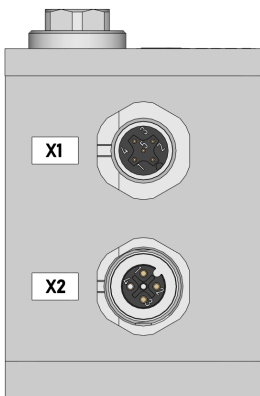
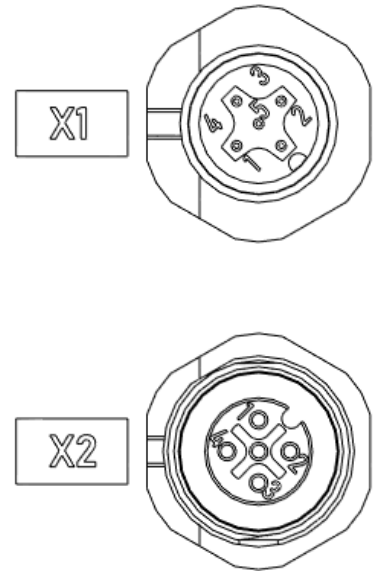
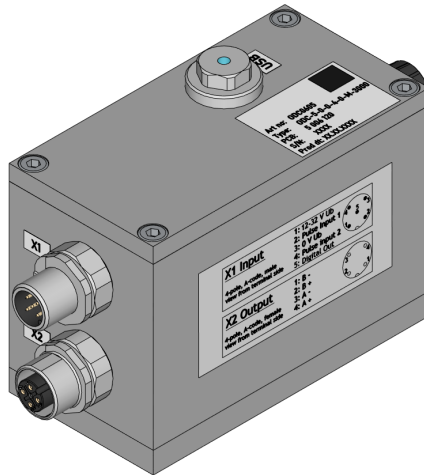
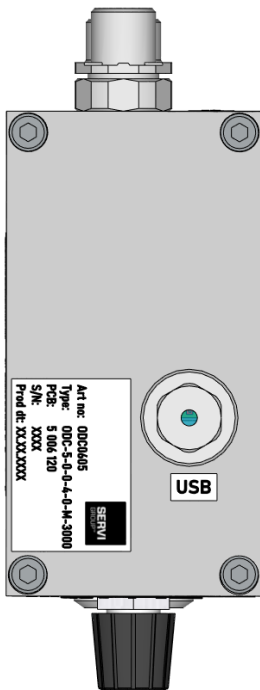
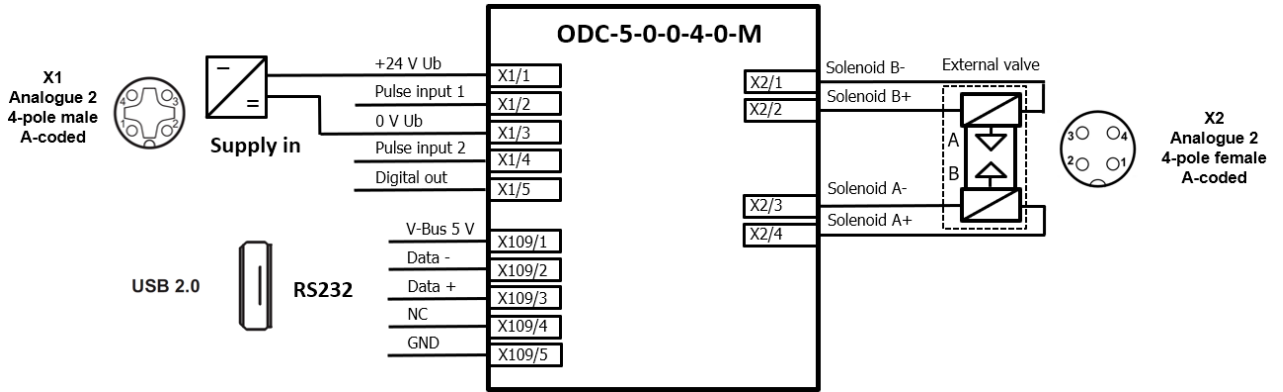
ODC-XS, analogue command, with valve or process feedback (example)



For combination with **CANopen** and/or **Valve/Process feedback**, see relevant pages for wiring diagram



ODC-XS, ISO11768 adapted command w/o feedback (special solution example)



## 9. PARAMETER SETTING

SAC, when as a part of a complete valve, is from factory adjusted for optimal performance and ready to use. No further parameterization is required.

Special tuning and/or altering of the standard setup (ie type of command signal type) can be made with dedicated software - HCS tool. Connection from PC/Laptop to the units by standard USB cable, with micro / standard USB interface for ODC and a dedicated serial USB cable with adaptor for OPAT. Following product numbers are available.

| SAC UNIT | PRODUCT NO. | DESCRIPTION   |
|----------|-------------|---|
| ODC      | 779787      | ODC programming cable USB A - Micro B Left Angle, 1,8 m                           |
|          | 779788      | ODC programming cable USB A - Micro B straight 3,0 m                              |
| OPAT     | 779784      | OPAT programming cable RS232 RJ45 female - open end straight 3,0 m <sup>1)</sup>  |
|          | 779785      | OPAT programming cable RS232 RJ45 female - open end straight 10,0 m <sup>1)</sup> |
|          | 674682      | USB-RS232-RJ45-2.5 m (for DMA)  |
|          | 679107      | USB-RS232-RJ45-10m (DMA)  |

<sup>1)</sup> Must be combined with product number 674682 or 679107



Changing the parameters of the unit during operation shall only occur if the operator carrying out the modification has the necessary training, to ensure correct functioning of the unit. The operator shall also ensure that the change in parameters does not cause unwanted movement of the machine on which the unit is installed, resulting in personal injuries or damage to property. See separate manuals for bus communication and parameter adjustment. Note especially that all changes in parameters will have immediate effect, also during operation.



The power must be “ON” to get contact with the unit. Power “ON” can be detected visually by green LED (blinking or fixed) at the unit. HCSTool must be installed to your device (download from [https://www.h-c-s-gmbh.de/en/download/Software HCSTool](https://www.h-c-s-gmbh.de/en/download/Software%20HCSTool)) and a dedicated cable must be connected between the unit and the PC/Laptop. Before altering any parameters it is highly recommended to **save the default parameter file (.dat) into your device by using the HCSTool.**

## Available parameters for OPAT and ODC

The parameters are used for adapting the OPAT and ODC function to the specific valve and / or machine the units are used for. Also all the internal values can be displayed according the block diagrams.

### Parameter classification:

- Display: These parameters are used to display all parameter and internal digital values (for programming, commissioning and diagnosis).
- Ramps: Set ramp times up/down in the interval 0-39 seconds
- Controller: Influencing the command signal from input to output, i.e gain, offset, PID regulator etc
- Extended: Selection of functions that adapt and improves the function and usage of the units.

### List of all available parameters:

| display |      |     | ramps   |      |     | Controller 1   |      |     | Controller 2   |      |     | Extended General |      |     | Extended |      |     |
|---------|------|-----|---------|------|-----|----------------|------|-----|----------------|------|-----|------------------|------|-----|----------|------|-----|
| "dx.xx" | OPAT | ODC | "r1.xx" | OPAT | ODC | "C1.xx" / "L1" | OPAT | ODC | "C2.xx" / "L2" | OPAT | ODC | "E xx"           | OPAT | ODC | "E1.xx"  | OPAT | ODC |
| d1.01   | x    | x   | r1.01   | X    | x   | C1.00          | x    | x   | C2.00          | x    | x   | E 00             | x    | x   | E1.03    | x    |     |
| d1.02   | x    | x   | r1.02   | x    | x   | C1.01          | x    | x   | C2.01          | x    | x   | E 02             | x    | x   | E2.03    | x    |     |
| d1.03   | x    | x   | r1.03   | x    | x   | C1.02          | x    | x   | C2.02          | x    | x   | E 03             | x    | x   | E1.04    | x    |     |
| d1.04   | x    | x   | r1.04   | x    | x   | C1.03          | x    | x   | C2.03          | x    | x   | E 04             | x    | x   | E2.04    | x    |     |
| d1.05   | x    | x   |         |      |     | C1.04          | x    | x   | C2.04          | x    | x   | E 05             | x    | x   | E1.05    | x    |     |
| d1.06   | x    | x   |         |      |     | C1.05          | x    | x   | C2.05          | x    | x   | E 06             | x    | x   | E2.05    | x    |     |
| d1.07   | x    | x   |         |      |     | C1.06          | x    | x   | C2.06          | x    | x   | E 07             | x    | x   | E1.06    | x    |     |
| d1.08   | x    | x   |         |      |     | C1.07          | x    | x   | C2.07          | x    | x   | E 08             | x    | x   | E2.06    | x    |     |
| d1.09   | x    | x   |         |      |     | C1.08          | x    | x   | C2.08          | x    | x   | E 09             | x    | x   | E1.07    | x    |     |
| d1.10   | x    | x   |         |      |     | C1.09          | x    | x   | C2.09          | x    | x   | E 10             | x    | x   | E2.07    | x    |     |
| d1.11   | x    | x   |         |      |     | C1.10          | x    | x   | C2.10          | x    | x   | E 11             | x    | x   | E1.10    | x    |     |
| d1.12   | x    | x   |         |      |     | C1.11          | x    | x   | C2.11          | x    | x   | E 12             | x    | x   | E2.10    | x    |     |
| d1.13   | x    | x   |         |      |     | C1.12          | x    | x   | C2.12          | x    | x   | E 13             | x    | x   | E1.13    | x    |     |
| d1.14   |      |     |         |      |     | C1.13          | x    | x   | C2.13          | x    | x   | E 14             | x    | x   | E2.13    | x    |     |
| d2.02   | x    | x   |         |      |     | C1.14          | x    | x   | C2.14          | x    | x   | E 15             |      | x   | E1.14    | x    |     |
| d2.03   | x    | x   |         |      |     | C1.15          | x    | x   | C2.15          | x    | x   | E 16             |      | x   | E2.14    | x    |     |
| d2.04   | x    | x   |         |      |     | C1.16          | x    | x   | C2.16          | x    | x   | E 17             |      | x   |          |      |     |
| d2.10   | x    | x   |         |      |     | C1.17          | x    | x   | C2.17          | x    | x   | E 18             | x    | x   |          |      |     |
| d2.11   | x    | x   |         |      |     | C1.18          | x    | x   | C2.18          | x    | x   | E 23             | x    |     |          |      |     |
| d2.12   | x    | x   |         |      |     | C1.19          | x    | x   | C2.19          | x    | x   | E 24             | x    |     |          |      |     |
| d2.13   | x    | x   |         |      |     | C1.20          | x    | x   | C2.20          | x    | x   | E 25             | x    | x   |          |      |     |
| d2.14   |      | x   |         |      |     | C1.21          | x    | x   | C2.21          | x    | x   | E 26             | x    | x   |          |      |     |
|         |      |     |         |      |     | C1.22          | x    | x   | C2.22          | x    | x   | E 27             | x    |     |          |      |     |
|         |      |     |         |      |     | C1.23          | x    | x   | C2.23          | x    | x   | E CLR            | x    |     |          |      |     |
|         |      |     |         |      |     | C1.24          | x    | x   | C2.24          | x    | x   | E 28             | x    | x   |          |      |     |
|         |      |     |         |      |     | C1.25          | x    | x   | C2.25          | x    | x   | E 29             |      | x   |          |      |     |
|         |      |     |         |      |     | C1.26          | x    | x   | C2.26          | x    | x   |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.27          | x    | x   | C2.27          | x    | x   |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.28          | x    |     | C2.28          | x    |     |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.29          | x    |     | C2.29          | x    |     |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.30          | x    |     | C2.30          | x    |     |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.31          | x    |     | C2.31          | x    |     |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.32          | x    |     | C2.32          | x    |     |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.33          | x    | x   | C2.33          | x    | x   |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.36          | x    | x   | C2.36          | x    | x   |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.37          | x    | x   | L2             |      | x   |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.38          | x    | x   |                |      |     |                  |      |     |          |      |     |
|         |      |     |         |      |     | L1             | x    | x   |                |      |     |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.39          | x    | x   |                |      |     |                  |      |     |          |      |     |
|         |      |     |         |      |     | C1.40          | x    | x   |                |      |     |                  |      |     |          |      |     |

## Parameter list for OPAT and ODC

### Display-Parameters:

| #     | FUNCTION                        | UNIT | STEPP | MIN    | MAX   |
|-------|---------------------------------|------|-------|--------|-------|
| d1.01 | Analogue set value (S1.06)      | V    | 0,001 | -9,999 | 9,999 |
| d1.02 | Sum of all post ramp set values | V    | 0,001 | -9,999 | 9,999 |
| d1.03 | Set values after linearization  | V    | 0,001 | -9,999 | 9,999 |
| d1.04 | Value after gain adjustment.    | V    | 0,001 | -9,999 | 9,999 |
| d1.05 | Signal A                        | V    | 0,001 | -9,999 | 9,999 |
| d1.06 | Signal B                        | V    | 0,001 | -9,999 | 9,999 |
| d1.07 | Current A                       | A    | 0,001 | 0,000  | 5,000 |
| d1.08 | Current B                       | A    | 0,001 | 0,000  | 5,000 |
| d1.09 | Total current                   | A    | 0,001 | 0,000  | 5,000 |
| d1.10 | Desired value (w)               | V    | 0,001 | -9,999 | 9,999 |
| d1.11 | Actual value, feedback value(x) | V    | 0,001 | -9,999 | 9,999 |
| d1.12 | Lag error (e)                   | V    | 0,001 | -9,999 | 9,999 |
| d1.13 | Controller output (y)           | V    | 0,001 | -9,999 | 9,999 |

### Ramp parameters for set values:

| #     | FUNCTION         | UNIT | STEPP | MIN  | MAX   |
|-------|------------------|------|-------|------|-------|
| r1.01 | Ramp from 0 to - | S    | 0,01  | 0,00 | 39,50 |
| r1.02 | Ramp from - to 0 | S    | 0,01  | 0,00 | 39,50 |
| r1.03 | Ramp from 0 to + | S    | 0,01  | 0,00 | 39,50 |
| r1.04 | Ramp from + to 0 | S    | 0,01  | 0,00 | 39,50 |

### Controller parameters:

| #        | FUNCTION                  | UNIT | STEPP | MIN    | MAX   | CODE  |
|----------|---------------------------|------|-------|--------|-------|---|
| C1/C2.00 | Controller selection      | ---  | 1     | 0      | 4     | 0 = off<br>1 = P-PT1-I-DT1<br>2 = Remote<br>3 = dff<br>4 = Remote + dff                         |
| C1/C2.01 | Safety function           | ---  | ---   | 0      | 1     | off = off; on = on  |
| C1/C2.02 | Linearization             | ---  | 1     | 0      | 6     | off = Linearization off<br>1 ... 5 = predefined curve 1-5<br>6 = Customized curve<br>(in L1/L2) |
| C1/C2.03 | Gain A                    | V/V  | 0,01  | 0.00   | 2.00  | ---   |
| C1/C2.04 | Gain B                    | V/V  | 0,01  | 0.00   | 2.00  | ---   |
| C1/C2.05 | Set value sign and factor | ---  | 0,01  | -4.00  | 4.00  | ---   |
| C1/C2.06 | Set value offset          | V    | 0,001 | -9,999 | 9,999 | ---   |
|          |                           |      |       |        |       |   |
| C1/C2.07 | Dead band compensation A  | V    | 0,001 | 0,000  | 9,999 | 9.999 V = max. current<br>depending on solenoid<br>selection                                    |
| C1/C2.08 | Dead band compensation B  | V    | 0,001 | 0,000  | 9,999 |   |

## Parameter list for OPAT and ODC

Controller parameters:

| #        | FUNCTION  | UNIT | STEP  | MIN         | MAX   | CODE   |
|----------|---|------|-------|-------------|-------|--|
| C1.09    | Sensor type *1<br><br>*1, Attention:<br>No negative controller output possible when 10, 11 or 12 is selected! | ---  | 1     | 1           | 26    | 0 = off<br>1 = 0 ... 20 mA<br>2 = 4 ... 20 mA<br>3 = 12 mA ± 8 mA<br>4 = 0 ... 10 V<br>5 = 0 ... ± 10 V<br>6 = 6 V ± 2,5 V<br>7 = 7,5 V ± 2,5 V<br>8 = 6 V ± 4 V<br>10 = 0 ... 20 mA (positive controller output only)<br>11 = 4 ... 20 mA (positive controller output only)<br>12 = 0 ... 10 V (positive controller output only)<br>14 = 5V+-3,0V<br>21 = Bipolar voltage, semiautomatic calibration<br>22 = Unipolar voltage, semiautomatic calibration<br>23 = Unipolar voltage, semiauto. calibration (positive controller output only)<br>24 = Bipolar (internal) current, semiauto. calibration<br>25 = Unipolar current, semiauto. calibration<br>26 = Unipolar current semiauto. calibration (positive controller output only) |
| C2.09    | Sensor type *1<br><br>*1, Attention:<br>No negative controller output possible when 10, 11 or 12 is selected! | ---  | 1     | 1           | 12    | 0 = off<br>1 = 0 ... 20 mA<br>2 = 4 ... 20 mA<br>3 = 12 mA ± 8 mA<br>4 = 0 ... 10 V<br>5 = 0 ... ± 10 V<br>6 = 6 V ± 2,5 V<br>7 = 7,5 V ± 2,5 V<br>8 = 6 V ± 4 V<br>10 = 0 ... 20 mA (positive controller output only)<br>11 = 4 ... 20 mA (positive controller output only)<br>12 = 0 ... 10 V (positive controller output only)  |
| C1/C2.10 | Actual value gain   | V/V  | 0,01  | 0,01        | 4,00  | ---  |
| C1/C2.11 | Actual value offset   | V    | 0,001 | - 9,99<br>9 | 9,999 | ---  |
| C1/C2.12 | Actual value sign   | ---  | ---   | -1          | +1    | -1 = negative off = off<br>+1 = positive   |
| C1/C2.13 | P-Portion KP1   | V/V  | 0,01  | 0,00        | 4,00  | ---  |
| C1/C2.14 | T-Portion for PT1 (to C1.16)  | S    | 0,01  | 0,00        | 4,00  | ---  |
| C1/C2.15 | Threshold (C1.13, C1.16)  | V    | 0,001 | 0,00<br>0   | 9,999 | ---  |

Parameter list for OPAT and ODC

Controller parameters:

| #        | FUNCTION                             | UNIT | STEP  | MIN    | MAX   | CODE   |
|----------|--------------------------------------|------|-------|--------|-------|--|
| C1/C2.16 | P-Portion KP2                        | V/V  | 0,01  | 0,00   | 4,00  | ---  |
| C1/C2.17 | I-Portion                            | V/s  | 0,001 | 0,000  | 4,000 | ---  |
| C1/C2.18 | D-Portion                            | Vs   | 0,01  | 0,00   | 4,00  | ---  |
| C1/C2.19 | T-Portion for DT1                    | s    | 0,01  | 0,00   | 4,00  | ---  |
| C1/C2.20 | Gain ( C1.13 and C1.16)              | V/V  | 1     | 1      | 32    | 1 = faktor 1<br>2 = faktor 2<br>4 = faktor 4<br>8 = faktor 8<br>16 = faktor 16<br>32 = faktor 32   |
| C1/C2.21 | Comparator upper level               | V    | 0,001 | -9,999 | 9,999 | ---  |
| C1/C2.22 | Comparator lower level               | V    | 0,001 | -9,999 | 9,999 | ---  |
| C1/C2.23 | Comparator delay into window         | S    | 0,001 | 0,000  | 9,999 | ---  |
| C1/C2.24 | Comparator delay out of window       | s    | 0,001 | 0,000  | 9,999 | ---  |
| C1/C2.25 | Comparator selection                 | ---  | 1     | 0      | 9     | off = Comparator off<br>1 = Compare with d1.10 (Set value)<br>2 = Compare with d1.11 (Actual value)<br>3 = Compare with d1.12 (Lag error)<br>4 = Compare with d1.10, no signal for remote loop control<br>5 = Compare with d1.11, no signal for remote loop control<br>6 = Compare with d1.12, no signal for remote loop control<br>7 = Compare with d1.10, always run in "open loop" when signal DKOMP_1 not active<br>8 = Compare with d1.11, always run in "open loop" when signal DKOMP_1 not active<br>9 = Compare with d1.12, always run in "open loop" when signal DKOMP_1 not active |
| C1/C2.26 | Cable fracture detection feedback    | ---  | ---   | off    | 2     | off = Cable fracture detection off<br>1 = Cable fracture detection on<br>2 = Cable fracture detection on, only in closed loop  |
| C1/C2.27 | command signal hysteresis            | V    | 0,001 | 0,000  | 9,999 | ---  |
| C1/C2.28 | KOMP_11 Comparator upper level       | V    | 0,001 | -9,999 | 9,999 | ---  |
| C1/C2.29 | KOMP_11 Comparator lower level       | V    | 0,001 | -9,999 | 9,999 | ---  |
| C1/C2.30 | KOMP_11 Comparator delay into window | s    | 0,001 | 0,000  | 9,999 | ---  |

Parameter list for OPAT and ODC

Controller parameters:

| #        | FUNCTION   | UNIT | STEP  | MIN    | MAX   | CODE  |
|----------|--|------|-------|--------|-------|---|
| C1/C2.31 | KOMP_11 Comparator delay out of window                               | s    | 0,001 | 0,000  | 9,999 | ---   |
| C1/C2.32 | Comparator selection   | ---  | 1     | 0      | 3     | off = Comparator off<br>1 = Compare with d1.10 (Set value)<br>2 = Compare with d1.11 (Actual value)<br>3 = Compare with d1.12 (Lag error) |
| C1/C2.33 | I-Portion output value limitation                                    | V    | 0,001 | 0,000  | 9,999 |   |
| C1/C2.36 | Sensor signal correction factor for values < 0 (related to C1/C2.10) | V/V  | 1     | -1     | 1     |   |
| C1.37    | Spool overlap compensation solenoid A                                | V    | 0,001 | 0,000  | 9,999 | ---   |
| C1.38    | Spool overlap compensation solenoid B                                | V    | 0,001 | 0,000  | 9,999 | ---   |
| L1/L2    | Table of linearization for C1/2.02 = 6                               | ---  | 0,001 | -9,999 | 9,999 | ---   |
| C1.39    | Semi-automatic calibration of the FB1 sensor                         | ---  | ---   | 0      | 5     |   |
| C1.40    | Stored data of sensor type of the semi-automatic calibration         | ---  | ---   | 0      | 26    |   |

Extended-Parameters, basic and optional adjustments:

| #             | FUNCTION                | UNIT | STEP | MIN   | MAX   | CODE   |
|---------------|-------------------------|------|------|-------|-------|--|
| E 00          | Operation mode          | ---  | ---  | 1     | 8     | 1 = Open loop, 1 valve<br>3 = Closed loop, 1 valve<br>4 = Closed loop, 1 process<br>6 = Closed loop, 1 valve 1 process<br>8 = Closed loop, 2 processes   |
| E 02          | Push-Pull function      | ---  | ---  | off   | 4     | off = Push-Pull function off<br>1 = Push-Pull function active<br>2 = Common connection point with detection<br>4 = Push-Pull function off with detection |
| E 03/E1(2).03 | Solenoid selection OPAT | ---  | ---  | 0,350 | 0,800 | 3 = 0.350 A<br>4 = 0.400 A<br>5 = 0.500 A<br>6 = 0.630 A<br>7 = 0.800 A  |

Parameter list for OPAT and ODC

Extended-Parameters, basic and optional adjustments:

| #             | FUNCTION  | UNIT | STEP  | MIN   | MAX   | CODE  |
|---------------|---|------|-------|-------|-------|---|
| E 03          | Solenoid selection ODC  | ---  | ---   | 0,150 | 0,800 | 3 = 0.150 A<br>4 = 0.240 A<br>5 = 0.500 A<br>6 = 0.630 A<br>7 = 0.800 A   |
| E 03          | Solenoid selection ODC-XS   | ---  | ---   | 0,630 | 2,500 | 1 = 0.630 A<br>2 = 0.800 A<br>3 = 1.000 A<br>4 = 1.250 A<br>5 = 1.800 A<br>6 = 2.000 A<br>7 = 2.500 A   |
| E 04/E1(2).04 | P-Portion current controller, Energization  | ---  | 0,001 | 0,000 | 9,999 | ---   |
| E 05/E1(2).05 | I-Portion current controller, Energization  | ---  | 0,001 | 0,000 | 9,999 | ---   |
| E 06/E1(2).06 | P-Portion current controller, de- energization  | ---  | 0,001 | 0,000 | 9,999 | ---   |
| E 07/E1(2).07 | I-Portion current controller, de- energization  | ---  | 0,001 | 0,000 | 9,999 | ---   |
| E 08          | Ramp selection  | ---  | 1     | 0     | 1     | 0 = digital set values (time constant)<br>1 = all set values (constant rise)  |
| E 09          | Time delay enable signal  | S    | 0,001 | 0,000 | 9,999 | ---   |
| E 10/E1(2).10 | Maximum output current adjustment   | ---  | 0,01  | 0,50  | 1,10  | Variable adjustment of max. current   |
| E 11          | Initial current solenoid A  | V    | 0,001 | 0,000 | 9,999 | OPAT; max 3,000   |
| E 12          | Initial current solenoid B  | V    | 0,001 | 0,000 | 9,999 | OPAT; max 3,000   |
| E 13/E1(2).13 | Dither Amplitude  | V    | 1     | 0     | 3000  | 3.000 V = 30 % of max. rated current  |
| E 14/E1(2).14 | Dither Frequency  | Hz   | 1     | 1     | 300   | ---   |
| E 15          | Selection set point input OPAT<br><br>S1.06 Remark:<br>Selection 1, 3, 4: only solenoid B will be activated<br>Selection 2, 5, 6: both solenoid A and B will be activated | ---  | 1     | 0     | 7     | 0 = Voltage 0 V-+10 V<br>1 = 0 ... 20 mA w/o cable fracture detection<br>2 = 10 mA ± 10 mA w/o cable fracture detection<br>3 = 4 ... 20 mA w/o cable fracture detection<br>4 = 4 .... 20 mA with cable fracture detection<br>5 = 12 mA ± 8 mA w/o cable fracture detection<br>6 = 12 mA ± 8 mA with cable fracture detection<br>7 = Voltage 5 V ± 5 V |



Parameter list for OPAT and ODC

Extended-Parameters, basic and optional adjustments:

| #    | FUNCTION  | UNIT | STEP | MIN | MAX | CODE   |
|------|---|------|------|-----|-----|--|
| E 15 | Selection set point input ODC<br><br>X103 Remark:<br>Selection 2, 4, 5: only solenoid B will be activated<br>Selection 3, 6, 7: both solenoid A and B will be activated | ---  | 1    |     | 8   | off = Not active<br>1 = Voltage 0 V ± 10 V<br>2 = 0 ... 20 mA w/o cable fracture detection<br>3 = 10 mA ± 10 mA w/o cable fracture detection<br>4 = 4 ... 20 mA w/o cable fracture detection<br>5 = 4 ... 20 mA with cable fracture detection<br>6 = 12 mA ± 8 mA w/o cable fracture detection<br>7 = 12 mA ± 8 mA with cable fracture detection<br>8 = Voltage 5 V ± 5 V                            |
| E 15 | Selection set point input, ODC-0-0-0-2-0 (Ub*0,5±Ub*0,25)   | ---  | 1    | off | 1   | off = Not active<br>1 = Input definition Ub/2... ± 0,25*Ub   |
| E 16 | Selection set point input ODC<br><br>X104 Remark:<br>Selection 2, 4, 5: only solenoid B will be activated<br>Selection 3, 6, 7: both solenoid A and B will be activated | ---  | 1    | off | 8   | off = Not active<br>1 = Voltage 0 V ± 10 V<br>2 = 0 ... 20 mA w/o cable fracture detection<br>3 = 10 mA ± 10 mA w/o cable fracture detection<br>4 = 4 ... 20 mA w/o cable fracture detection<br>5 = 4 ... 20 mA with cable fracture detection<br>6 = 12 mA ± 8 mA w/o cable fracture detection<br>7 = 12 mA ± 8 mA with cable fracture detection<br>8 = Voltage 5 V ± 5 V (or 4 V ± 4 V for 8 V Ref) |
| E 17 | Set value activation mode, Remark: OPAT, mode 3, 4  |      |      | off | 2   | off = PROFIBUS and analogue set values<br>2 = Only PROFIBUS set values   |
| E 17 | Assignment of setpoint and feedback inputs FB1,FB2, Remark: ODC, mode 1   | ---  | 1    | 0   | 0   | 0 = Setpoint (analogue 1 + analogue 2)   |
| E 17 | Assignment of setpoint and feedback inputs FB1,FB2, Remark: ODC, mode 3, 4  | ---  | 1    | 0   | 2   | 0 = Setpoint (analogue 1 + analogue 2), FB 1 (Analogue 3)<br>1 = Setpoint (analogue 1), FB 1 (Analogue 2)<br>2 = Setpoint (analogue 2), FB 1 (Analogue 1)  |
| E 17 | Assignment of setpoint and feedback inputs FB1,FB2, Remark: ODC, mode 6 without and with CANopen  | ---  | 1    | 3   | 4   | 3 = Setpoint (CANopen + analogue 1), FB 1 (Analogue 3), FB 2 (Analogue 2)<br>4 = Setpoint (CANopen + analogue 2), FB 1 (Analogue 3), FB 2 (Analogue 1)   |

## Parameter list for OPAT and ODC

Extended-Parameters, basic and optional adjustments:

| #    | FUNCTION   | UNIT  | STEP  | MIN   | MAX   | CODE   |
|------|--|-------|-------|-------|-------|--|
| E 18 | Error / Comparator output selection<br><br>Remark: Selection depending active mode               | ---   | 1     | off   | 13    | off = X7 = 24V (max. 200mA)<br>1 = when Error, X7 high impedance<br>2 = Comp_1 positive logic<br>3 = Comp_1 negative logic<br>4 = Comp_2 positive logic<br>5 = Comp_2 negative logic<br>6 = Dout_1 positive logic<br>7 = Dout_1 negative logic<br>8 = Dout_2 positive logic<br>9 = Dout_2 negative logic<br>10 = Comp_1 (and) Comp_2 positive logic<br>11 = Comp_1 (and) Comp_2 negative logic<br>12 = Comp_1 (or) Comp_2 positive logic<br>13 = Comp_1 (or) Comp_2 negative logic |
| E 22 | CAN slave address (cannot be set by parameter)   | ---   | 1     | 1     | 9     | Read only  |
| E 22 | Definition of the set value source for the automatic operation, ODC-XS AGRO                      | ---   | 1     | 2     | 3     | 2 = Automatic, setpoint is given by ground speed<br>3 = Automatic, setpoint is specified by calculated speed   |
| E 23 | PROFIBUS timeout, at 0s the function is deactivated  | s     | 0,001 | 0,000 | 9,999 | ---  |
| E 23 | Last stored setpoint source for operation, ODC-XS AGRO   | ---   | 1     | 1     | 3     | 1 = Manual, setpoint is set via potentiometer<br>2 = Automatic, setpoint is given by ground speed<br>3 = Automatic, setpoint is specified by calculated speed  |
| E 24 | PROFIBUS address, with 126, reset to automatic address setting                                   | ---   | 1     | 0     | 126   | ---  |
| E 24 | CANopen Node-ID, if Node-ID=0 CAN is deactivated   | ---   | 1     | off   | 5     | if Node-ID = -1 the device is unconfigured   |
| E 24 | Definition of the impulse specification per meter, ODC-XS AGRO                                   | Imp/m | 1     | 80    | 200   | ---  |
| E 25 | Function of spec. Input;<br>Remark:<br>OPAT Master all available<br>OPAT Slave, off, 1 available |       |       |       |       | off = No function (OPHAT disabled)<br>1 = No function (OPHAT enabled)<br>2 = 24V, OPAT enabled (no Address function)<br>3 = 24V, OPAT disabled (no Address function)<br>4 = 24V, set PROFIBUS address to 126 (OPAT disabled)<br>5 = 24V, set PROFIBUS address to 126 (OPAT enabled)  |

## Parameter list for OPAT and ODC

Extended-Parameters, basic and optional adjustments:

| #     | FUNCTION  | UNIT | STEP | MIN  | MAX   | CODE   |
|-------|---|------|------|------|-------|--|
| E 25  | CANopen baudrate, ODC   | ---  | 1    | 1    | 7     | 1 = 20KBit/s<br>2 = 50KBit/s<br>3 = 125KBit/s<br>4 = 250KBit/s<br>5 = 500KBit/s<br>6 = 800KBit/s<br>7 = 1MBit/s  |
| E 25  | Maximum amplification factor of the potentiometer during automatic operation, ODC-XS AGRO | ---  | 1    | 1    | 3     | 1= Factor 4.0<br>2= Factor 2.0<br>3= Factor 1.0  |
| E 26  | CAN baudrate, OPAT<br><br>Remark: Proprietary CANbus between Master and Slave             | ---  | 1    | off  | 8     | off = no CAN<br>1 = 10Kbaud<br>2 = 20Kbaud<br>3 = 50Kbaud<br>4 = 125Kbaud<br>5 = 250Kbaud<br>6 = 500Kbaud<br>7 = 800Kbaud<br>8 = 1Mbaud  |
| E 26  | Signal monitoring of setpoint, analogue 1, ODC  | ---  | 1    | off  | 1     | Off = Not active<br>1 = Active   |
| E 26  | Reducing of the LED light intensity of the green top LED, ODC-XS AGRO                     | %    | 1    | 0    | 100   | ---  |
| E CLR | Reset Error   | ---  | 1    | off  | 1     | off = nothing<br>1 = clears a pending error  |
| E 27  | Connected CAN-Slaves  | ---  | 1    | 1    | 7     | Read only  |
| E 27  | Time until the top LED (green) goes into dimmed mode after enable, ODC-XS AGRO            | s    | 0,01 | 0,00 | 30,00 | ---  |
| E 28  | Handling of CAN communication error of the master when connection to slave fails          | ---  | 1    | 0    | 2     | 0 = No connection to slave causes error-7 and master disable<br>1 = No connection to slave causes error-7, but the master follow the enable signal<br>2 = No connection error is completely suppressed |
| E 28  | Reducing of the LED light intensity of the blue push button LED, ODC-XS AGRO              | %    | 1    | 0    | 100   | ---  |
| E 29  | Time the button LED (blue) flashes when the mode is changed, ODC-XS AGRO                  | s    | 0,01 | 0,00 | 30,00 | ---  |

## 10. CONTROLLER SETTINGS

### Standard controller setting (C1.00, C2.00)

The controller and its general functions are activated using parameter C1/C2.00. There are four different types of controller configurations:

- |      |   |  |
|------|---|--|
| I:   | P-PT1-I-DT1 – controller                        | Standard controller with various options   |
| II:  | remote loop control                             | The Controller is activated or deactivated by reaching a threshold value and/or by the status of a digital input. Structure of controller is the same as in I.   |
| III: | direct feed forward controller (dff controller) | This is a controller where a portion of the set point (depending on C1.13) is switched directly on the output stage. The remaining portion is a standard P-PT1-I-DT1 controller; further referred to as a dff controller (direct feed forward) |
| IV:  | combination of I and II:                        | this is a combined dff controller and P-PT1-I-DT1 controller (that can be activated as described in II)<br>The safety function is activated by the parameter C1.01 and will be described in the following section.                             |

The manual for SAC controllers must be read carefully before any activation of close loop controllers.

For double acting direction valve having integrated spool position feedback, mode 3/5 (E 00 = 3/5) is default. Such valve is direct or pilot operated (e.g PSL/PSV, HSV600 and MB series) and the main spool is normally spring centred, thus the zero position of the spool is mechanically controlled. At any emergency stop situation removing the energy to the system, hydraulically and/or electrically the machine will stop.



**Reset from emergency stop:** To avoid instabilities or unexpected movement the set value(s) must be set to zero before system is restarted.

For systems having a feedback from the axis, directly or indirectly attached to the actuator, mode 4 (E 00 = 4) is default. In such process regulations the feedback signal can be from e.g speed, position, pressure or other relevant sensors.



**Avoid instabilities of the control loop during the adjustment.  
Instabilities may cause damage to personal and/or to the machine.**

During commissioning and after an emergency-stop undesired drive movements may occur. The drives are normally run at a specific speed implemented by the internal ramp functions. If the emergency-stop chain is activated, either the supply voltage or the enable signal is switched off. If only the enable signal is switched off, you must observe the safety instructions. After restarting (the supply voltage or enable on) the set point starts from zero due to the ramp

During commissioning, particular attention must be paid to the correct design and realisation of the wiring. This must be checked before applying the supply voltage.

To avoid collisions, the safety devices and limit switches must be activated. All safety regulations are to be observed.

Monitoring the fault signal output or via BUS is recommended.

Malfunctions can occur with the following:

- Changes to the settings made by the supplier.
- Neglecting of operating parameters (e.g. supply voltage, application of inadmissible signals on inputs or outputs,
- ambient conditions, wiring, unsafe loads such as motors, contactors, relays, ohm loads, etc.)
- Faults in series-connected controls components and set points or actual values
- Faults in the subsequent hydraulic components
- Removing of solenoids connections.

## **TIP**

**The internal set point used after the emergency stop defines the machine end position, preferably the 'home position'. The drive velocity is regulated by the ramp.**

## 11. STARTUP AND COMMISSIONING

### General information and recommendations

In order to avoid personal injury or damage to equipment and property, the installation and start-up must only be made by relevant trained personnel and in accordance to the requirements in this manual incl the links to other manuals. For use in Ex zones the specific manuals for Ex approved equipment must carefully be read.

The unit must be mounted in such a way that it is protected against external heat sources which can make the surrounding temperature exceed the permissible temperature. In particular, heat sources emitting radial heat (e.g. direct sunlight) must be taken into consideration. Do not install the unit so that it carries more weight than its own. Cables must be fastened using suitable fasteners.

In case of long distance between the SAC products and the main controller setting out set-values (analogue or BUS) or between sensors and SAC controllers (analogue signals), the sensitivity to possible disturbance (EMC) increases. Analogue voltage signals are in general sensitive to potential differences (e.g in junction boxes) and interference from electromagnetic fields. Shielded cables, adapted baud rate (BUS) and correct termination can protect voltage signal, but for cable length above 10 meters current signal type 0(4)-20 mA is generally recommended.

The SAC units are normally delivered installed and tuned to the specified valves/blocks in this manual and are ready to use without need for any further parameterization tuning.

Furthermore, SAC can also be retrofitted to the same products having already installed the twin solenoid, or be used as a stand alone units.

See [manual](#) for retrofit installation and adjustment

For usage with bus a controller with the correct BUS compatibility must be used. Manuals for the respective BUS networks of SAC you can find here:

[OPAT PROFIBUS manual](#)

[QDC CANopen manual](#)

BUS configuration files:

[GSD for PROFIBUS](#)

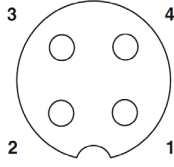
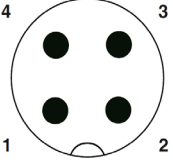
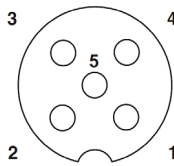
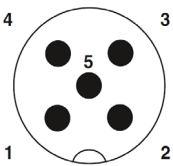
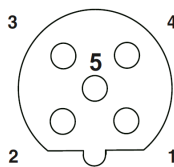
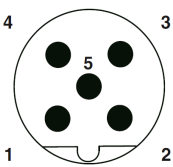
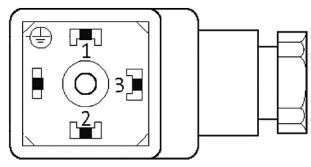

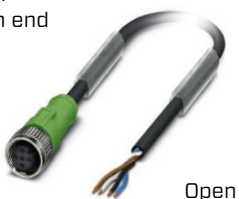



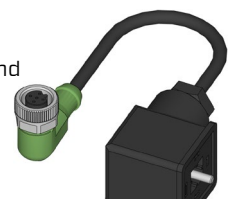
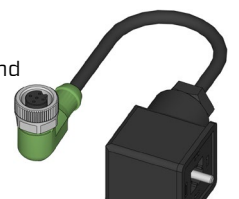

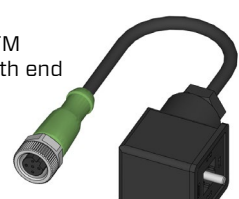
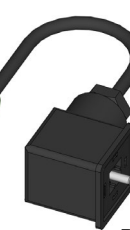






[ESD for CANopen](#)

## Connector components for ODC:

| Article number | Conn. ID   | Conn. descr.     | End "A"          | End "B"           | Length (m) | M12 coding | Poles/wires | Valve type                           |
|----------------|------------|------------------|------------------|-------------------|------------|------------|-------------|--------------------------------------|
| 780050         | X101       | Power            | M12, FM angled   | open end          | 3          | A          | 4           | All                                  |
| 780051         | X101       | Power            | M12, FM angled   | open end          | 10         | A          | 4           | All                                  |
| 761993         | X101       | Power            | M12, FM straight | open end          | 10         | A          | 4           | All                                  |
| 780052         | X101       | Power, patch     | M12, FM straight | M12, M straight   | 0,3        | A          | 4           | All                                  |
| 780053         | X101       | Power, patch     | M12, FM angled   | M12, M straight   | 0,3        | A          | 4           | All                                  |
| 780054         | X101       | Power, patch     | M12, FM straight | M12, M straight   | 0,6        | A          | 4           | All                                  |
| 780055         | X101       | Power, patch     | M12, FM angled   | M12, M straight   | 0,6        | A          | 4           | All                                  |
| 780056         | X110       | CAN              | M12, M straight  | open end          | 10         | A          | 2+2+1       | CANopen version                      |
| 780057         | X111       | CAN              | M12, FM straight | open end          | 10         | A          | 2+2+1       | CANopen version                      |
| 780058         | X110, X111 | CAN patch        | M12, FM straight | M12, M straight   | 0,3        | A          | 5           | CANopen version                      |
| 780063         | X110, X111 | CAN patch        | M12, FM straight | M12, M straight   | 0,15       | A          | 5           | CANopen version                      |
| 780059         | X103, X104 | Analogue         | M12, FM angled   | open end          | 3          | B          | 5           | All                                  |
| 780060         | X103, X104 | Analogue         | M12, FM angled   | open end          | 10         | B          | 5           | All                                  |
| 761994         | X103, X104 | Analogue         | M12, FM straight | open end          | 10         | B          | 5           | All                                  |
| 780046         | X105       | Feedback WA      | M12, FM straight | DIN 43650, type A | 0,2        | B          | 3           | SL3/5, SLF3/5AC, SLF7, HSV600        |
| 780071         | X105       | Feedback WA      | M12, FM angled   | DIN 43650, type A | 0,3        | B          | 3           | SLF5                                 |
| 780062         | X1, X2     | Current out      | M12, M straight  | open end          | 10         | B          | 4           | All                                  |
| 780072         | X2         | Power, Pulse com | M12, FM straight | ISO 11786, FM     | 3          | A          | 4           | One coil valve                       |
| 762717         | X101       | Patch, power     | M12 socket       | open end          | 10         | A          | 5           | Power for up to 4 units              |
| 780064         | X101       | Patch, power     | M12 socket       | open end          | 10         | A          | 5           | Power for up to 6 units              |
| 780065         | X101       | Patch, power     | M12 socket       | open end          | 10         | A          | 5           | Power for up to 8 units              |
| 780066         | X110       | CAN termination  | M12, M straight  | ----              | ----       | A          | 2           | All CANopen valves                   |
| 768009         | X111       | CAN termination  | M12, FM straight | ----              | ----       | A          | 2           | All CANopen valves                   |
| 762721         | ----       | Plug, metal      | M12, M           | ----              | ----       | ----       | 2           |                                      |
| 780067         | ----       | Plug             | M12, M           | ----              | ----       | ----       | 2           | Protection plug for female connector |
| 762719         | ----       | CAP, metal       | M12, FM          | ----              | ----       | ----       | ----        | Protection cap for male connector    |
| 780068         | ----       | CAP              | M12, FM          | ----              | ----       | ----       | ----        | Protection cap for male connector    |
| 780069         | X1, X104   | Digital out      | M12, FM          | M12, FM, M        | ----       | A          | 5           | Y-splitter female-male / female      |
| 780070         | X2         | Digital out      | M12, M           | M12, M, FM        | ----       | A          | 5           | Y-splitter female-male / female      |

FM = Female connector  
M = Male connector

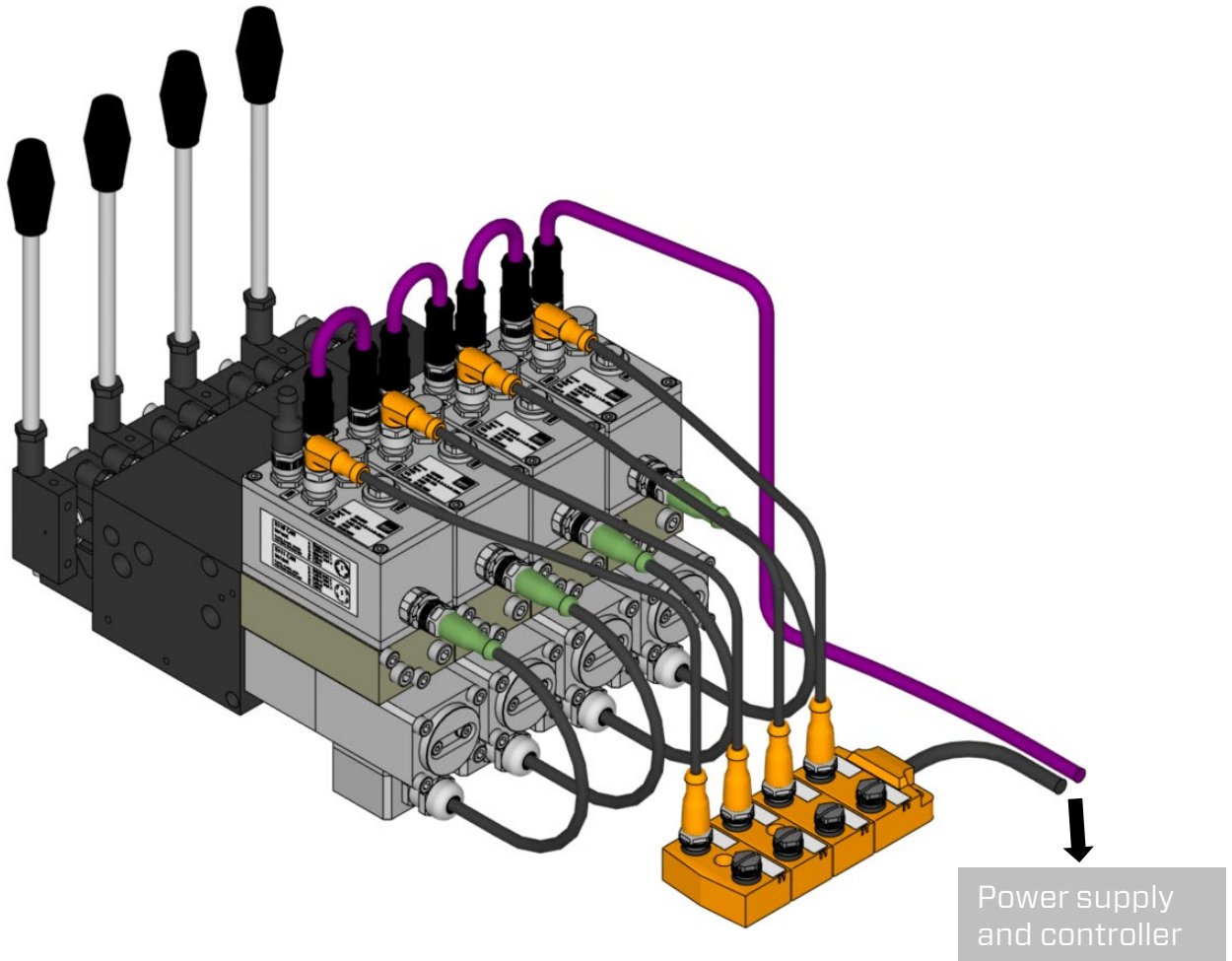
Connector components for ODC, details:

| <p><b>4-pole A-code</b></p> <p>Male</p>  <p>Female</p>    | <p><b>Wiring colours</b></p> <table border="1"> <thead> <tr> <th>Pin</th> <th>4-pos., A-coded</th> <th>Color</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>BN</td> <td>Red</td> </tr> <tr> <td>2</td> <td>WH</td> <td>White</td> </tr> <tr> <td>3</td> <td>BU</td> <td>Blue</td> </tr> <tr> <td>4</td> <td>BK</td> <td>Black</td> </tr> </tbody> </table>   | Pin   | 4-pos., A-coded | Color | 1               | BN    | Red | 2  | WH  | White | 3   | BU | Blue | 4     | BK | Black |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
|---|---|-------|-----------------|-------|-----------------|-------|-----|----|-----|-------|-----|----|------|-------|----|-------|---|----|------|----|------|---|----|-------|----|-------|---|----|------|----|------|
| Pin   | 4-pos., A-coded   | Color |                 |       |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| 1   | BN  | Red   |                 |       |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| 2   | WH  | White |                 |       |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| 3   | BU  | Blue  |                 |       |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| 4   | BK  | Black |                 |       |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| <p><b>5-pole A-code</b></p> <p>Male</p>  <p>Female</p>    | <table border="1"> <thead> <tr> <th>Pin</th> <th>5-pos., A-coded</th> <th>Color</th> <th>5-pos., B-coded</th> <th>Color</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>BN</td> <td>Red</td> <td>BN</td> <td>Red</td> </tr> <tr> <td>2</td> <td>WH</td> <td>White</td> <td>WH</td> <td>White</td> </tr> <tr> <td>3</td> <td>BU</td> <td>Blue</td> <td>BU</td> <td>Blue</td> </tr> <tr> <td>4</td> <td>BK</td> <td>Black</td> <td>BK</td> <td>Black</td> </tr> <tr> <td>5</td> <td>GY</td> <td>Grey</td> <td>GY</td> <td>Grey</td> </tr> </tbody> </table> | Pin   | 5-pos., A-coded | Color | 5-pos., B-coded | Color | 1   | BN | Red | BN    | Red | 2  | WH   | White | WH | White | 3 | BU | Blue | BU | Blue | 4 | BK | Black | BK | Black | 5 | GY | Grey | GY | Grey |
| Pin   | 5-pos., A-coded   | Color | 5-pos., B-coded | Color |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| 1   | BN  | Red   | BN              | Red   |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| 2   | WH  | White | WH              | White |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| 3   | BU  | Blue  | BU              | Blue  |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| 4   | BK  | Black | BK              | Black |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| 5   | GY  | Grey  | GY              | Grey  |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| <p><b>5-pole B-code</b></p> <p>Male</p>  <p>Female</p>    | <p><b>DIN 43650 type A</b></p>    |       |                 |       |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| <p><b>Power (A-code) and Analogue / Feedback (B-code) versions</b></p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;"> <p>M12, M Elbow end</p>  <p>Open end</p> </div> <div style="width: 33%;"> <p>M12, FM Straight end</p>  <p>Open end</p> </div> <div style="width: 33%;"> <p>M12 M, Straight end</p>  <p>M12, FM Elbow end</p>  </div> <div style="width: 33%;"> <p>M12, M Straight end</p>  <p>M12, FM Straight end</p>  </div> <div style="width: 33%;"> <p>M12, FM Elbow end</p>  <p>DIN 43650 Type A</p>  </div> <div style="width: 33%;"> <p>M12, FM Straight end</p>  <p>DIN 43650 Type A</p>  </div> </div> |   |       |                 |       |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |
| <p><b>CANopen versions, A-code</b></p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;"> <p>M12, M Straight end</p>  <p>Open end, shielded</p>  </div> <div style="width: 33%;"> <p>M12, FM Straight end</p>  <p>Open end, shielded</p>  </div> <div style="width: 33%;"> <p>M12, M Straight end, unshielded</p>  <p>M12, FM Straight end, unshielded</p>  </div> </div>   |   |       |                 |       |                 |       |     |    |     |       |     |    |      |       |    |       |   |    |      |    |      |   |    |       |    |       |   |    |      |    |      |



Connector components for ODC, connection example

PSL(V)-3 with ODC CANopen

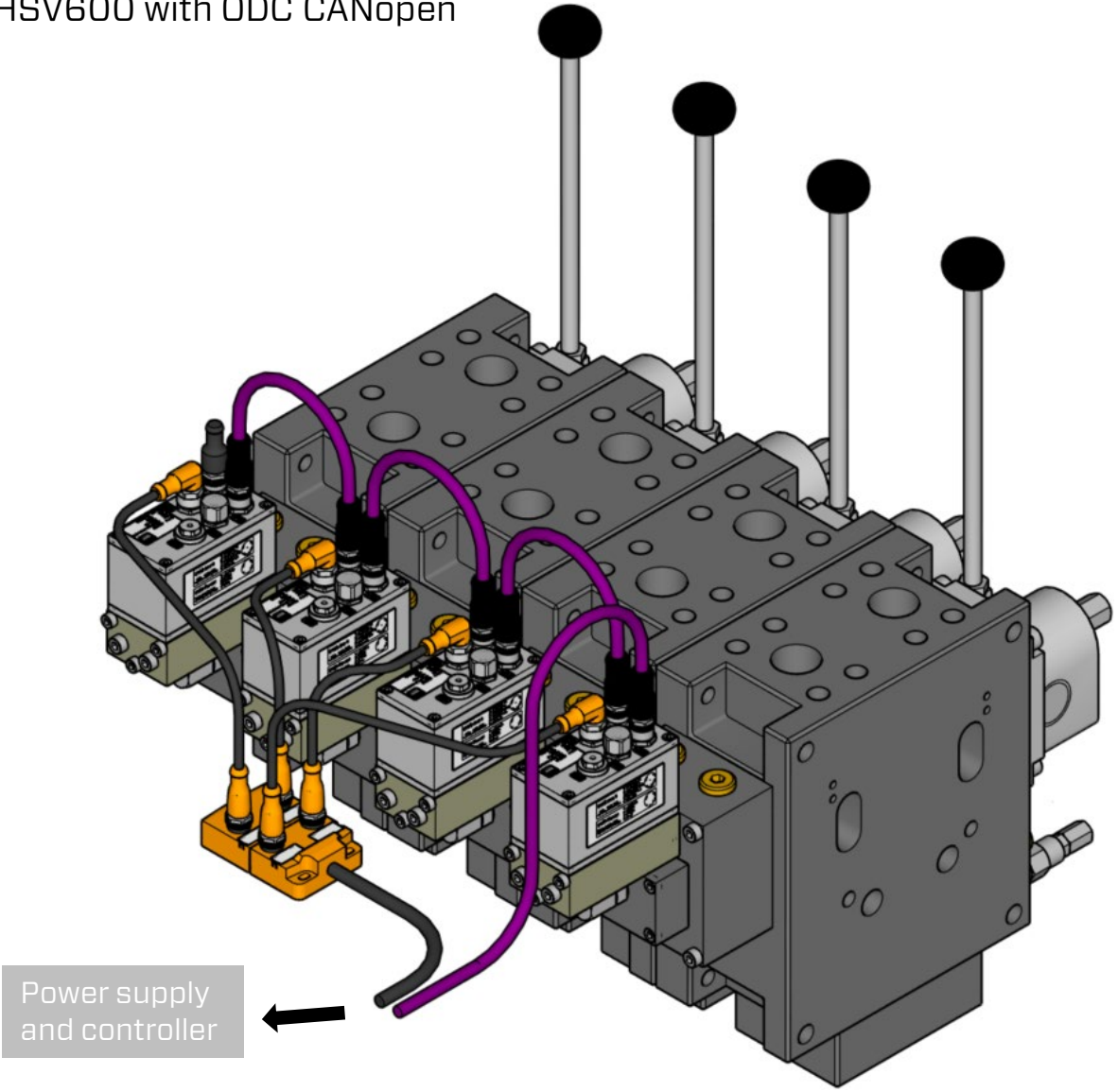


Above example, connection components needed:

| PRODUCT NO. | DESCRIPTION   | QTY |
|-------------|---|-----|
| 780065      | Sensor cabling M12, 5-pole, A-code, PUR grey 10 m<br>Distributor box 8 sockets, no LED indication     | 1   |
| 780055      | Sensor cable M12, 4-pole, A-code, PUR grey, 0,6 m<br>End "A"; Socket angled, End "B"; plug straight   | 4   |
| 780067      | Protection plug (for socket) M12  | 4   |
| 780056      | CAN cable M12, 4-pole, A-code, PUR silver, 10 m<br>End "A"; Plug straight, End "B"; open end          | 1   |
| 780063      | CAN cable M12, 5-pole, A-code, PUR silver, 0,15 m<br>End "A"; Socket straight, End "B"; plug straight | 3   |
| 768009      | Termination resistor M12, 120 Ohm pin 4-5<br>Socket straight  | 1   |
| 762719      | Protection cap (for plug) M12, metal  | 4   |

Connector components for ODC, connection examples

HSV600 with ODC CANopen



Above example, connection components needed

| PRODUCT NO. | DESCRIPTION  | QTY |
|-------------|--|-----|
| 762717      | Sensorcabling M12, 5-pole, A-code, PUR grey 10 m<br>Distributor box 4 sockets, no LED indication     | 1   |
| 780055      | Sensorcable M12, 4-pole, A-code, PUR grey, 0,6 m<br>End "A"; Socket angled, End "B"; plug straight   | 4   |
| 780056      | CAN cable M12, 4-pole, A-code, PUR silver, 10 m<br>End "A"; Plug straight, End "B"; open end         | 1   |
| 780058      | CAN cable M12, 5-pole, A-code, PUR silver, 0,3 m<br>End "A"; Socket straight, End "B"; plug straight | 3   |
| 768009      | Termination resistor M12, 120 Ohm pin 4-5<br>Socket straight   | 1   |
| 762719      | Protection cap (for plug) M12, metal   | 4   |

## 12. STORAGE

If storage longer than 6 months is expected, the valve must be kept in a dry room, free from dust and protected against sudden, large temperature variations.

The unit should be placed in an antistatic bag in a tempered room (+5 to +25°C). Recommended humidity is 20 – 50% RH.

For storage longer than 12 months, the valve must be filled with inhibition oil. Before use check all visible seals and flush with clean oil.

