

Digital electronic drives for SSP servopumps

fieldbus, smart start-up



SMART TUNING



P/Q CONTROL



SMART START-UP



MULTIPLE AXIS



D-MP-T-SP-NP-022/K

① Drive power supply - input

② Servomotor power supply - output

③ Serial RS485 communication port

④ IN/OUT signals

⑤ Fieldbus

⑥ Servomotor resolver

D-MP

Electronic drive exploits the modern technology of servo drives to accurately control pressure and flow in hydraulic systems through Smart Servopumps (SSP).

Atos PC software allows to customize the SSP configuration and via the Smart Start-up function guides the user step by step during the commissioning phases (see AS050).

Multiple axis function allows to manage customized settings for up to 4 axes (see AS050).

General Features:

- DB9 serial port RS485 always present
- Fieldbus communication connector for CANopen and PROFIBUS DP
- RJ45 ethernet communication connectors input/output for EtherCAT, PROFINET
- DB15 resolver connector always present
- Operating temperature range: 0 ÷ +40 °C
- IP20: for drives type 022 ÷ 100
- IP00: for drives type 140 ÷ 210
- CE mark according to LVD and EMC directive

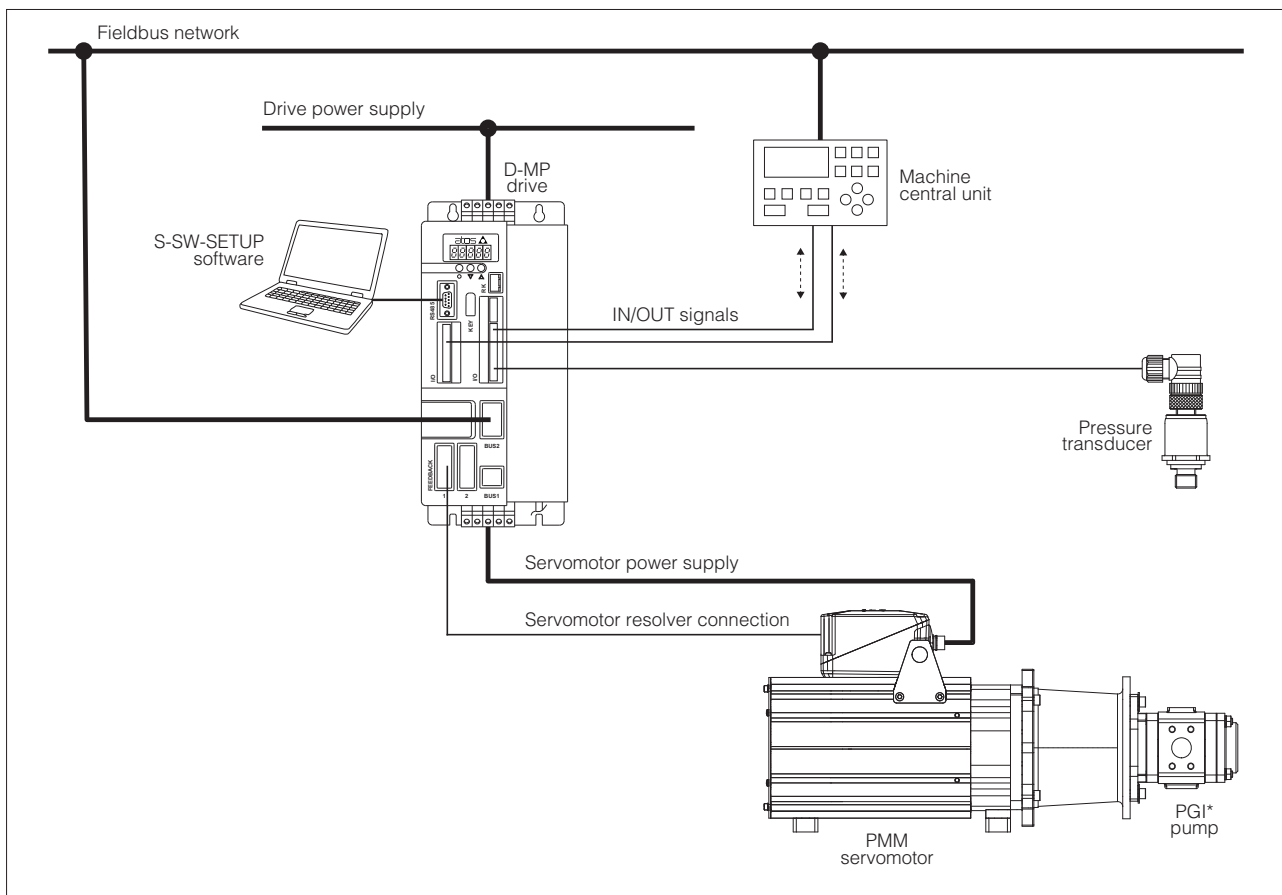
Software Features:

- Intuitive graphic interface
- Smart Start-up
- Multiple axis
- Smart tuning
- Setting of SSP functional parameters
- Complete diagnostics
- Internal oscilloscope function

1 MODEL CODE

| | | | | | | | | |
|---|---|-------------|---|--|---|------------|---|----------|
| D-MP | - | T-SP | - | NP | - | 022 | / | * |
| Electronic drive in wall mounting format | | | | Option, see section 12 : K = Safe Torque Off (STO) | | | | |
| Control mode: T-SP = high performances P/Q control | | | | | | | | |
| Fieldbus interface, serial port RS485 always present: NP = Not Present BC = CANopen BP = PROFIBUS DP EH = EtherCAT EP = PROFINET RT/IRT | | | | Rated current [Arms], see section 6 : 022 = 22 A 060 = 57,5 A 140 = 140 A 032 = 32 A 090 = 87 A 165 = 165 A 046 = 46 A 100 = 100 A 210 = 210 A | | | | |

2 BLOCK DIAGRAM EXAMPLE



3 DRIVE SETTINGS AND PROGRAMMING TOOLS - see tech. table AS800

Drive functional parameters and configurations, can be easily set and optimized using Atos S-SW-SETUP programming software connected via serial port RS485 to the drive. For fieldbus versions, the software permits drive parameterization through serial port RS485 also if the drive is connected to the central machine unit via fieldbus.

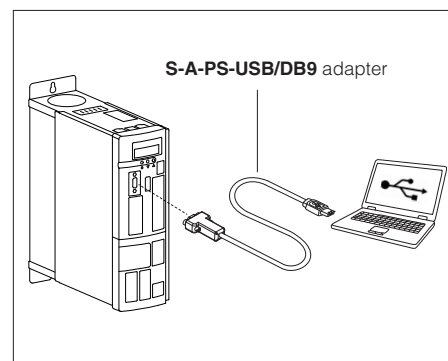
S-SW-SETUP permits to have many features so as Smart Start-up, Multiple axis and Smart tuning for an easy and rapid commissioning. For detailed info refer to **AS050**.

S-SW-SETUP support:

| | |
|------------------|---------------|
| NP (Serial) | |
| BC (CANopen) | EH (EtherCAT) |
| BP (PROFIBUS DP) | EP (PROFINET) |

Note: for detailed descriptions of settings, wirings and installation procedures, please refer to the user manual included in the S-SW-SETUP

Serial port RS485 connection



4 FIELDBUS - see tech. table GS510

Fieldbus allows drive direct communication with machine control unit for digital reference, drive diagnostics and settings. These execution allow to operate the drive through fieldbus or analog signals available on the connectors.

5 GENERAL CHARACTERISTICS

| | |
|---------------------------|---|
| Assembly position | Wall mounting |
| Ambient temperature range | 0 ÷ 40°C; up to 45°C with current derated to 88% |
| Storage temperature range | -10 ÷ 60°C |
| Altitude | Up to 1000 m; current derating for higher altitudes |
| Humidity | <90% - condensation not permitted |
| Vibration | 0,2g |
| Cooling | Fan |
| Compliance | CE according to Low Voltage Directive (LVD) 2014/35/EU and to EMC directive 2014/30/EU RoHS Directive 2011/65/EU as last update by 2015/863/EU |

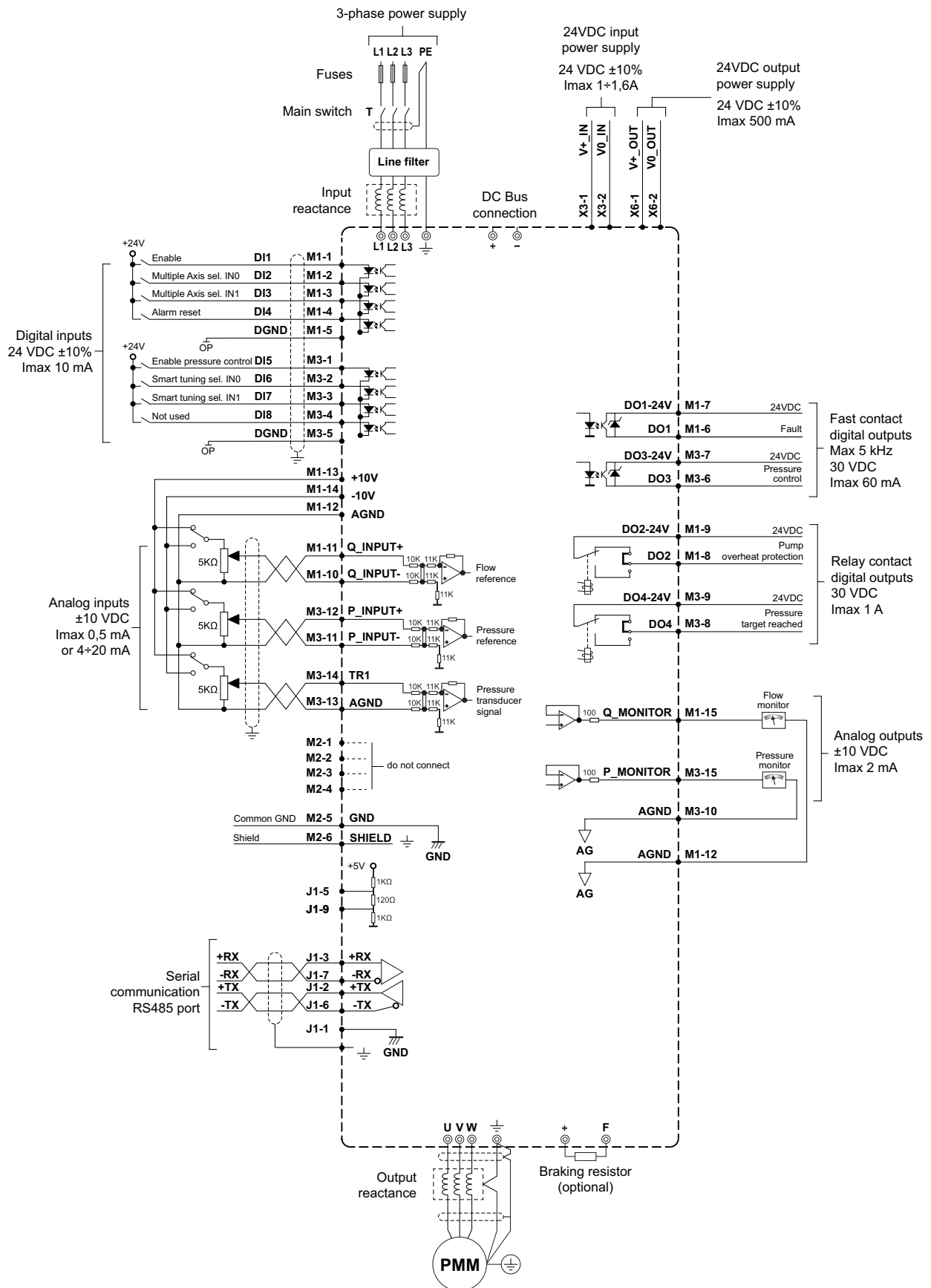
6 ELECTRICAL CHARACTERISTICS

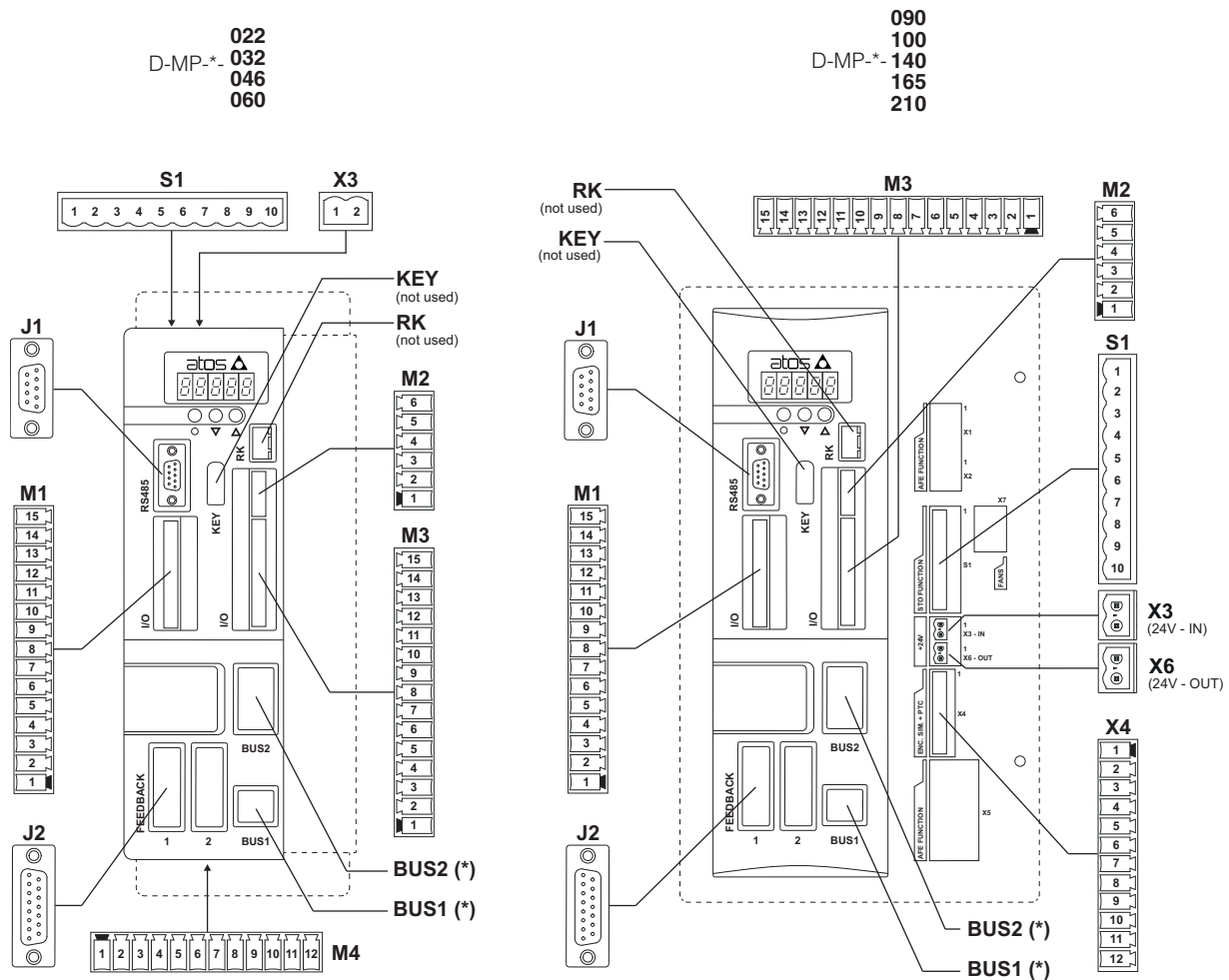
| Drive type | | 022 | 032 | 046 | 060 | 090 | 100 | 140 | 165 | 210 |
|--|-------|---|-----------------------------------|-----------------------------------|------|--|-----|-----|-----|-----|
| Rated current | [A] | 22 | 32 | 46 | 57.5 | 87 | 100 | 140 | 165 | 210 |
| Overload current (1) | [A] | 44 | 64 | 92 | 115 | 174 | 200 | 280 | 330 | 420 |
| Rated power | [kW] | 11 | 15 | 22 | 30 | 45 | 55 | 75 | 90 | 110 |
| Rated IN voltage | [V] | 200 V -10% ÷ 460 V +10% @ 45 ÷ 65 Hz | | | | 380 V -15% ÷ 460 V +10% @ 45 ÷ 65 Hz | | | | |
| DC Bus voltage | [V] | 280 V -10% ÷ 620 V +10% | | | | 530 V -15% ÷ 650 V +10% | | | | |
| PWM frequency (2) | [kHz] | 3 ÷ 14 | | | | | | | | |
| 24VDC input power supply | | 24 Vdc ±10% @ max 1,0 A for drives type 022, 032, 090, 100, 140, 165, 210 24 Vdc ±10% @ max 1,6 A for drives type 046, 060 | | | | | | | | |
| 24VDC output power supply | | 24 Vdc ±10% @ max 500 mA - only for drives type 090, 100, 140, 165, 210 | | | | | | | | |
| Digital inputs | | 24 Vdc ±10% @ max 10 mA | | | | | | | | |
| Digital outputs - fast contact | | 30 Vdc @ max 60 mA (max 5 kHz) | | | | | | | | |
| Digital outputs - relay contact | | 30 Vdc @ max 1 A | | | | | | | | |
| Analog inputs | | ±10 V @ max 0,5 mA or 4 ÷ 20 mA (settable with specific dip-switch - see user manual) | | | | | | | | |
| Analog outputs | | ±10 V @ max 2 mA | | | | | | | | |
| Pressure transducer power supply | | +24 Vdc @ max 100 mA (E-ATR-8 see tech table GS465) | | | | | | | | |
| Protection degree to DIN EN60529 | | IP20 for drives type 022, 032, 046, 060, 090, 100 IP00 for drives type 140, 165, 210 | | | | | | | | |
| Analog reference resolution | | 16 bit | | | | | | | | |
| Speed control mode | | Field-Oriented Control | | | | | | | | |
| Braking resistance | | External (see tech table AS810) | | | | | | | | |
| Filter | | External (see tech table AS810) | | | | | | | | |
| Reactance | | External - recommended for high power (> 45kW); see section 14 | | | | | | | | |
| Communication interface | | Serial Atos ASCII coding | CANopen EN50325-4 + DS408 | PROFIBUS DP EN50170-2/IEC61158 | | EtherCAT, PROFINET IO RT / IRT EC 61158 | | | | |
| Communication physical layer | | insulated RS485 | optical insulated CAN ISO11898 | optical insulated RS485 | | Fast Ethernet, insulated 100 Base TX | | | | |
| Recommended wiring cable for logic and 24Vdc power supply | | LiYCY shielded cables: 0,5 mm² max 30 m for logic - 1,5 mm² max 30 m for 24Vdc power supply Max conductor size: 1,5 mm² Notes: for pressure transducer wiring cable please consult the transducer datasheet | | | | | | | | |
| Recommended wiring cable for drive and servomotor power supply | | see section 13 | | | | | | | | |

(1) 200% overload for maximum 3s and 155% for 30s

(2) Default is 5 kHz; only for drive type 140 default is 4 kHz

7 WIRING BLOCK DIAGRAM





(*) type of BUS1 and BUS2 connectors change according to the fieldbus interface (BUS1 connector available only for CANopen)

CANopen (BC)



CANopen (BC)



PROFIBUS DP (BP)

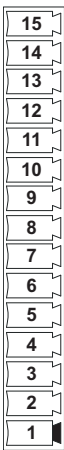


Ethernet (EH, EP)



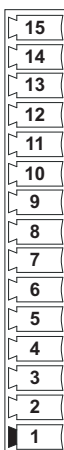
| Connectors | Description | See |
|-------------|--|------|
| M1 | IN/OUT analog and digital signals | 8.1 |
| M3 | IN/OUT analog and digital signals - P/Q control | 8.2 |
| M2 | Not used - available only for gnd and shield connections | 8.3 |
| X3 | 24VDC input power supply | 8.4 |
| X6 | 24VDC output power supply - only for 090, 100, 140, 165, 210 | 8.5 |
| S1 | Safe Torque Off (STO) - only for /K option | 8.6 |
| J2 | Servomotor resolver | 8.7 |
| M4 | Servomotor thermal sensor - for 022, 032, 046, 060 | 8.8 |
| X4 | Servomotor thermal sensor - for 090, 100, 140, 165, 210 | |
| J1 | Serial RS485 communication port | 8.9 |
| BUS1 | Fieldbus optional boards - only for BC, BP, EH, EP | 8.10 |
| BUS2 | | 8.11 |
| KEY | | 8.12 |
| RK | Not used | - |

8.1 M1 connector - IN/OUT digital and analog signals

| CONNECTOR | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|--|-----|-----------|--|---|
| M1  | 1 | DI1 | Enable (24 Vdc) or disable (0 Vdc) the servomotor control, referred to DGND | Input - on/off signal |
| | 2 | DI2 | Multiple axis selection IN0, referred to DGND | Input - on/off signal |
| | 3 | DI3 | Multiple axis selection IN1, referred to DGND | Input - on/off signal |
| | 4 | DI4 | Alarm reset | Input - on/off signal |
| | 5 | DGND | Common gnd for digital input | Common gnd |
| | 6 | DO1 (1) | Fault (0 Vdc) or normal working (24 Vdc), referred to DO1-24V | Output - on/off signal Software selectable |
| | 7 | DO1-24V | DO1 power supply 24 Vdc | Input - power supply |
| | 8 | DO2 (2) | Pump overheat protection active (24 Vdc) or not active (0 Vdc), referred to DO2-24V | Output - on/off signal Software selectable |
| | 9 | DO2-24V | DO2 power supply 24 Vdc | Input - power supply |
| | 10 | Q_INPUT- | Negative flow reference input signal for Q_INPUT+ | Input - analog signal |
| | 11 | Q_INPUT+ | Flow reference input signal: ± 10 Vdc / $4 \div 20$ mA maximum range Default is $0 \div 10$ Vdc | Input - analog signal Dip-switch selectable |
| | 12 | AGND | Common gnd for Q_MONITOR and stabilized power supply | Common gnd |
| | 13 | +10V | Stabilized power supply +10V - Current: max 10 mA | Output power supply |
| | 14 | -10V | Stabilized power supply -10V - Current: max 10 mA | Output power supply |
| | 15 | Q_MONITOR | Flow monitor output signal: ± 10 Vdc maximum range, referred to AGND | Output - analog signal Software selectable |

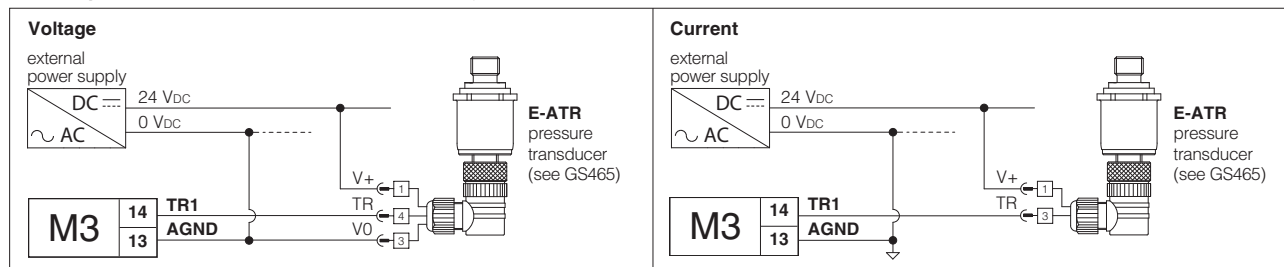
(1) Digital output with fast contact (2) Digital output with relay contact

8.2 M3 connector - IN/OUT digital and analog signals - P/Q control connections


| CONNECTOR | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|---|-----|-----------|--|---|
| M3  | 1 | DI5 | Enable (24 Vdc) or disable (0 Vdc) the P/Q control, referred to DGND | Input - on/off signal |
| | 2 | DI6 | Smart tuning setting selection IN0, referred to DGND | Input - on/off signal |
| | 3 | DI7 | Smart tuning setting selection IN1, referred to DGND | Input - on/off signal |
| | 4 | DI8 | (not used) | - |
| | 5 | DGND | Common gnd for digital input | Common gnd |
| | 6 | DO3 (1) | Pressure control active (24 Vdc) or not active (0 Vdc), referred to DO3-24V | Output - on/off signal Software selectable |
| | 7 | DO3-24V | DO3 power supply 24 Vdc | Input - power supply |
| | 8 | DO4 (2) | Pressure target reached (24 Vdc) or not reached (0 Vdc), referred to DO4-24V | Output - on/off signal Software selectable |
| | 9 | DO4-24V | DO4 power supply 24 Vdc | Input - power supply |
| | 10 | AGND | Common gnd for P_MONITOR | Common gnd |
| | 11 | P_INPUT- | Negative pressure reference input signal for P_INPUT+ | Input - analog signal |
| | 12 | P_INPUT+ | Pressure reference input signal: ± 10 Vdc / $4 \div 20$ mA maximum range Default is $0 \div 10$ Vdc | Input - analog signal Dip-switch selectable |
| | 13 | AGND | Common gnd for transducer signal | Common gnd |
| | 14 | TR1 | Signal pressure transducer: ± 10 Vdc / $4 \div 20$ mA maximum range Default is $0 \div 10$ Vdc | Input - analog signal Dip-switch selectable |
| | 15 | P_MONITOR | Pressure monitor output signal: ± 10 Vdc maximum range, referred to AGND | Output - analog signal Software selectable |

(1) Digital output with fast contact (2) Digital output with relay contact



Remote pressure transducer connections - examples




8.3 M2 connector - not used - available only for common GND and SHIELD connection

| CONNECTOR | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|--|-----|--------|--------------------------|----------------|
| M2  | 1 | NC | - | Do not connect |
| | 2 | NC | - | Do not connect |
| | 3 | NC | - | Do not connect |
| | 4 | NC | - | Do not connect |
| | 5 | GND | Common gnd | |
| | 6 | SHIELD | Shield | |


8.4 X3 connector - 24VDC input power supply

| CONNECTORS | | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|---|---|-----|--------------|--------------------------|----------------------|
| X3  drives type 022 ÷ 060 | X3  drives type 090 ÷ 210 | 1 | V+_IN | Power supply 24 Vdc | Input - power supply |
| | | 2 | V0_IN | Power supply 0 Vdc | Gnd - power supply |


8.5 X6 connector - 24VDC output power supply - only for drives type 090 ÷ 210

| CONNECTOR | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|--|-----|---------------|--------------------------|-----------------------|
| X6  | 1 | V+_OUT | Power supply 24 Vdc | Output - power supply |
| | 2 | V0_OUT | Power supply 0 Vdc | Gnd - power supply |


8.6 S1 connector - Safe Torque Off (STO) - only for /K option

| CONNECTOR | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|---|-----|------------------|---|------------------------|
| S1  | 1 | STO2_A | Monitor for STO2 - second safety system channel | Output - on/off signal |
| | 2 | STO2_B | When the terminal board is powered, the contact is open Voltage: max 60 Vdc - Current: max 0,5 A | Output - on/off signal |
| | 3 | NC | - | Do not connect |
| | 4 | +24V_STO2 | Power supply for STO2 - second safety system channel | Input - power supply |
| | 5 | 0V_STO2 | Voltage: +24 Vdc $\pm 10\%$ - Current: min 200 mA | Gnd - power supply |
| | 6 | NC | - | Do not connect |
| | 7 | STO1_A | Monitor for STO1 - first safety system channel | Output - on/off signal |
| | 8 | STO1_B | When the terminal board is powered, the contact is open Voltage: max 60 Vdc - Current: max 0,5 A | Output - on/off signal |
| | 9 | +24V_STO1 | Power supply for STO1 - first safety system channel | Input - power supply |
| | 10 | 0V_STO1 | Voltage: +24 Vdc $\pm 10\%$ - Current: min 200 mA | Gnd - power supply |

8.7 J2 connector - Servomotor resolver - DB15 - 15 pin

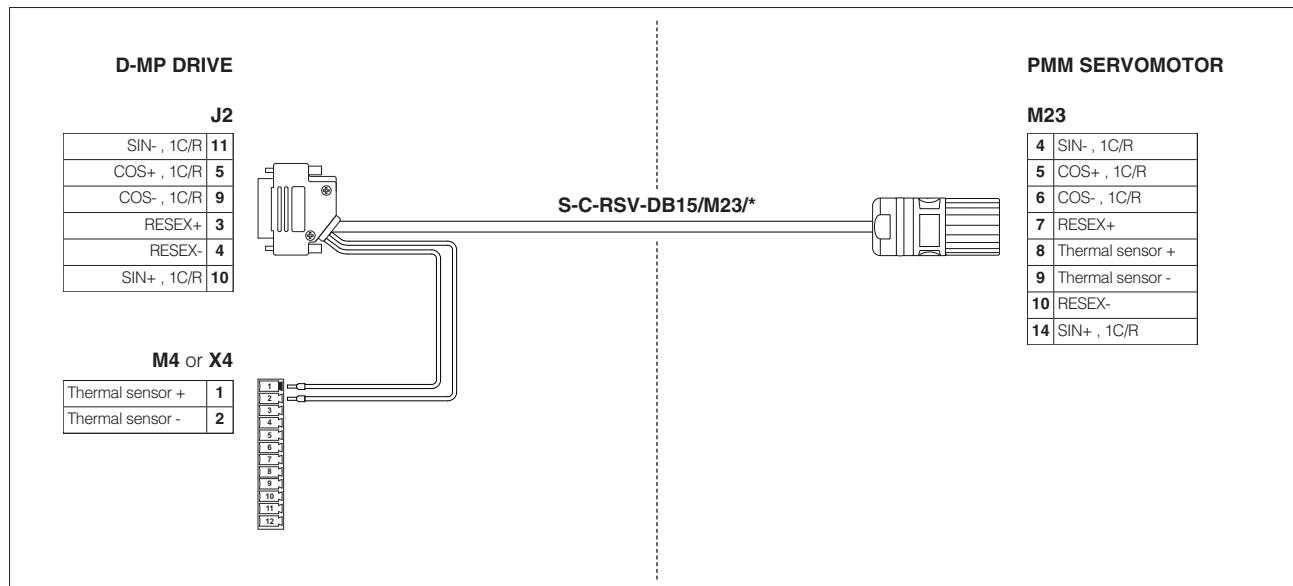
| CONNECTOR | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|--|-----|-------------|--------------------------|----------------|
| J2  female (drive view) | 1 | NC | - | Do not connect |
| | 2 | NC | - | Do not connect |
| | 3 | RESEX+ | Red | |
| | 4 | RESEX- | Blue | |
| | 5 | COS+ , 1C/R | Grey | |
| | 6 | NC | - | Do not connect |
| | 7 | NC | - | Do not connect |
| | 8 | NC | - | Do not connect |
| | 9 | COS- , 1C/R | Pink | |
| | 10 | SIN+ , 1C/R | Yellow | |
| | 11 | SIN- , 1C/R | Green | |
| | 12 | NC | - | Do not connect |
| | 13 | NC | - | Do not connect |
| | 14 | NC | - | Do not connect |
| | 15 | NC | - | Do not connect |

8.8 M4 - X4 connector - Servomotor thermal sensor (1)

| CONNECTOR | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|--|-----|------------------|--|-----------------------|
| M4 - X4  | 1 | Thermal sensor + | Servomotor thermal sensor - positive input (KTY or PT) | Input - analog signal |
| | 2 | Thermal sensor - | Servomotor thermal sensor - negative input (KTY or PT) | Input - analog signal |
| | 3 | GND | Shield connection for PT or KTY cables | Common gnd |
| | 4 | NC | - | Do not connect |
| | 5 | NC | - | Do not connect |
| | 6 | NC | - | Do not connect |
| | 7 | NC | - | Do not connect |
| | 8 | NC | - | Do not connect |
| | 9 | NC | - | Do not connect |
| | 10 | NC | - | Do not connect |
| | 11 | NC | - | Do not connect |
| | 12 | NC | - | Do not connect |

(1) M4 is for drives type 022 ÷ 060; X4 is for drives type 090 ÷ 210

Servomotor resolver cable connection - example - see tech table AS810



Note: for more information about PMM servomotor, please refer tech table AS400

8.9 J1 connector - Serial RS485 communication port - DB9 - 9 pin

| CONNECTOR | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|---|-----|--------|--------------------------|----------------|
| J1 female (drive view) | 1 | NC | - | Do not connect |
| | 2 | TX+ | Transmitter | |
| | 3 | RX+ | Receiver | |
| | 4 | NC | - | Do not connect |
| | 5 | NC | - | Do not connect |
| | 6 | TX- | Transmitter | |
| | 7 | RX- | Receiver | |
| | 8 | NC | - | Do not connect |
| | 9 | NC | - | Do not connect |

8.10 BUS2 and BUS1 connectors - CANopen (BC)

| CONNECTOR | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|-------------------------|-----|---------|--------------------------|-------|
| BUS2 main | 1 | CAN_H | Bus line (high) | |
| | 2 | CAN_L | Bus line (low) | |
| | 3 | CAN_GND | Signal zero data line | |
| BUS1 | 1 | CAN_H | Bus line (high) | |
| | 2 | CAN_L | Bus line (low) | |
| | 3 | CAN_GND | Signal zero data line | |

Note: on the board are present two dip-switch; one allows to terminate the fieldbus network while the other allows the simultaneous use of both connectors as input and output. For more information about setting dip-switch, please refer user manual.

8.11 BUS2 connector - PROFIBUS DP (BP)

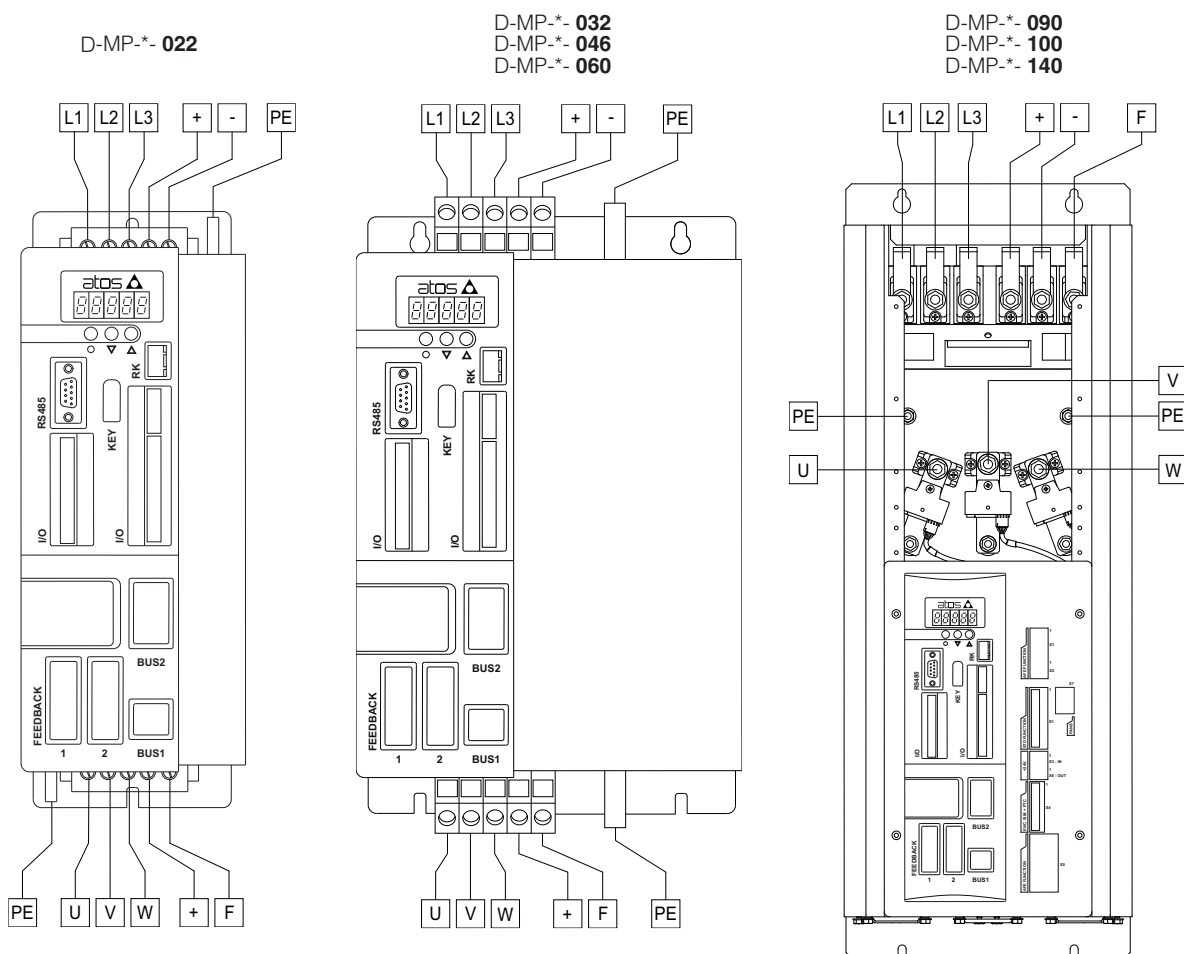
| CONNECTOR | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|-----------------|-----|--------|---------------------------------------|----------------|
| BUS2 | 1 | SHIELD | Shield | |
| | 2 | NC | - | Do not connect |
| | 3 | LINE_B | Bus line (B) | |
| | 4 | DE | Control's signal for repeater | |
| | 5 | DGND | Data line and termination signal zero | |
| | 6 | +5V | Termination supply signal | |
| | 7 | NC | - | Do not connect |
| | 8 | LINE_A | Bus line (A) | |
| | 9 | NC | - | Do not connect |

8.12 BUS2 connectors IN/OUT - Ethernet (EH, EP)

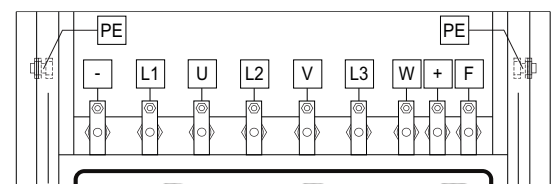
| CONNECTOR | PIN | SIGNAL | TECHNICAL SPECIFICATIONS | NOTES |
|------------------------------|-----|--------|----------------------------|----------------|
| BUS2 IN OUT | 1 | TX+ | Transmitter (white/orange) | |
| | 2 | RX+ | Receiver (orange) | |
| | 3 | TX- | Transmitter (white/green) | |
| | 4 | NC | - | Do not connect |
| | 5 | NC | - | Do not connect |
| | 6 | RX- | Receiver (green) | |
| | 7 | NC | - | Do not connect |
| | 8 | NC | - | Do not connect |

Note: perform the cables connection following the IN and OUT indications

9 DRIVE AND SERVOMOTOR POWER CONNECTIONS



D-MP-*- 165
D-MP-*- 210

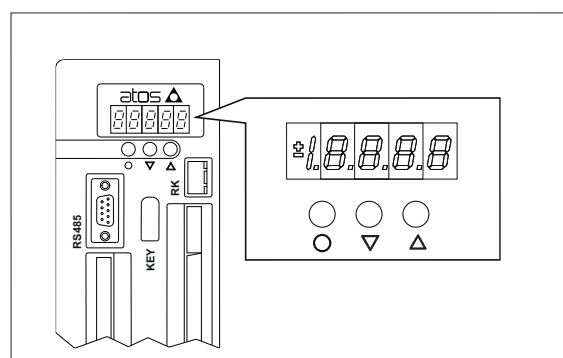


| | |
|-----------|--|
| L1 | |
| L2 | Drive power supply - input |
| L3 | |
| U | Servomotor power supply - output |
| V | (pass the cables through the toroid inside present, without the shield and ground) |
| W | |
| + | |
| - | DC Bus connection |
| + | |
| F | Brake resistor connection |
| PE | Connection PE and shield |

10 DISPLAY

On the drive front panel is available a numeric display to view the drive status: run or stop.

Note: the 3 keys, ● (S selection), ▼ (- decrease), ▲ (+ increase) are not used



11 POWER SUPPLY AND SIGNALS SPECIFICATIONS

Atos digital drives are CE marked according to the applicable directives (e.g. Immunity and Emission EMC Directive).

Installation, wirings and start-up procedures must be performed according to the general prescriptions shown in tech table **AS050** and in the user manuals included in the S-SW-SETUP programming software.

Generic electrical output signals of the drive (e.g. fault or monitor signals) must not be directly used to activate safety functions, like to switch-ON/OFF the machine's safety components, as prescribed by the European standards (Safety requirements of fluid technology systems and components-hydraulics, ISO 4413).

11.1 Drive power supply (L1, L2, L3)

The drive must be connected to the main power supply trough terminals L1, L2, L3 and with the ground cable connected to the PE stud (see section [9](#)).

When connecting drives type 022 ÷ 60A to 3-phase supply mains we recommend using a 3-phase reactance (see tech table **AS810**).

For drives type 060 ÷ 210 the 3-phase input reactance is **mandatory**. The 3-phase reactance is used to reduce the current peaks on the diode bridge DB and the effective value of the current through the capacitors. It is also used to reduce interference from the supply line to the drive and from the drive to the line.

The drive must be wired steadily through appropriately sized cables (see section [13](#)).

Notes: drives type 022 ÷ 060 feature a soft-start function built in the drive;
the reactance can be omitted only for particular cases (in this case contact Atos technical office)



A correct installation to the main power supply is required according to IEC 61800-5-1



Ultra-fast fuses must be installed between the main power supply and the drive (see section [14](#))

11.2 Servomotor power supply (U, V, W)

The servomotor must be connected to terminals U, V, W and with the ground cable connected to the PE stud (see section [9](#)).

For drives type 090 ÷ 140 pass the servomotor 3-phase through the present toroid inside, without shield and ground. Connect the servomotor by means of shielded or armored cables only and ground the shield on the converter side as well as on servomotor side. If shielded cables cannot be used, the servomotor cables should be placed in a metallic raceway connected to ground.

Atos recommends to use a 3-phase reactance between the drive and the servomotor (see tech table **AS810**).

With cables longer than 50 meters, the reactance is obligatory.

Any short circuit between U, V, W will cause the drive to shut down. If the interruption between the servomotor and the drive is obtained by means of electromagnetic switches (such as contactors, thermal relays and the like) ensure that the drive is disabled before cutting off the connection between the servomotor and the drive (in order not to damage the contactors).

The servomotor must be wired steadily through appropriately sized cables (see section [13](#)).

11.3 24VDC input power supply (V+_{IN} and V0_{IN})

Through the pins 1 and 2 of the X3 connector (see 8.4) is possible to power the drive logic and servomotor sensor (mandatory for drives type 022 ÷ 060 no self powered).

The drives type 090 ÷ 210 generates internally an 24 V_{dc} auxiliary supply through the main power supply; the drive logic can be supply through X3 connector with an external 24 V_{dc} without produce conflict between the internally generated voltage and the auxiliary power supplied externally (is used the source with higher voltage level). This feature allows to configure the drive without main power supply and keep the drive logic switched on even in the absence of the drive main power supply.

11.4 24VDC output power supply (V+_{OUT} and V0_{OUT})

Only for drives type 090 ÷ 210 the 24V_{dc} output power supply is available on pins 1 and 2 of the X6 connector (see 8.5).

This voltage can be used only to provide an auxiliary supply for digital I/O to the drive and for /K option provides an auxiliary supply for STO channels function (the auxiliary supply must be interrupted by suitable safety contacts). The output current is internally limited to a 500mA; protection against external over-current and short-circuit.

11.5 Flow reference input signals (Q_{INPUT}+)

The drive is designed to receive an analog reference input signal (pin 11 on M1) for the servomotor rotation speed.

Flow reference input signal is factory preset, default is 0 ÷ 10 V_{dc}. Input signal can be reconfigured between voltage and current within a maximum range of ±10 V_{dc} or 4 ÷ 20 mA, using specific dip-switch present on the drive (see user manual).

Drive with fieldbus interface can be software set to receive reference signal directly from the machine control unit (fieldbus reference).

11.6 Pressure reference input signal (P_{INPUT}+)

The drive is designed to receive an analog reference input signal (pin 12 on M3) for the system pressure.

Pressure reference input signal is factory preset, default is 0 ÷ 10 V_{dc}. Input signal can be reconfigured between voltage and current within a maximum range of ±10 V_{dc} or 4 ÷ 20 mA, using specific dip-switch present on the drive (see user manual).

Drive with fieldbus interface can be software set to receive reference signal directly from the machine control unit (fieldbus reference).

11.7 Flow monitor output signal (Q_{MONITOR})

The drive generates an analog output signal (pin 15 on M1) for servomotor actual rotation speed.

The monitor output signal can be software set to show other signals available in the drive (see user manual).

11.8 Pressure monitor output signal (P_{MONITOR})

The drive generates an analog output signal (pin 15 on M3) to the system actual pressure.

The monitor output signal can be software set to show other signals available in the drive (see user manual).

11.9 Enable input signal (DI1)

To enable the servomotor control, supply a 24 V_{dc} on pin 1 of the M1: Enable input signal allows to enable/disable servomotor control, without removing the electrical power supply to the drive; it is used to keep active the communication and the other driver functions when the drive must be disabled for safety reasons. This condition **does not comply** with norms IEC 61508 and ISO 13849.

Enable input signal can be used as generic digital input by software selection.

Input is optoisolated from the internal regulation (24 V_{dc} ±10% @ I_{max} 10 mA).

11.10 Multiple axis selection input signal (DI2 and DI3)

Two on-off input signals are available on pin 2 and pin 3 of the M1 connector to select one of the four axis parameters setting, stored into the drive.

Switching the active setting of axis during the machine cycle allows to optimize the system dynamic response in different hydraulic working conditions (volume, flow, etc.).

Supply a 24 V_{dc} or a 0 V_{dc} on pin 2 and/or pin 3 of the M1, to select one of the PID settings as indicated by binary code table at side.

Input is optoisolated from the internal regulation (24 V_{dc} ±10% @ I_{max} 10 mA).

| PIN | AXIS SELECTION | | | |
|------|----------------|--------------------|--------------------|--------------------|
| | SET 1 | SET 2 | SET 3 | SET 4 |
| M1-2 | 0 | 24 V _{dc} | 0 | 24 V _{dc} |
| M1-3 | 0 | 0 | 24 V _{dc} | 24 V _{dc} |

11.11 Alarm reset input signal (DI4)

Alarm reset input signal allows to clear all alarms present into the drive: to reset the drive alarms, supply 24 V_{dc} on pin 4 of the M1.

Input is optoisolated from the internal regulation (24 V_{dc} ±10% @ I_{max} 10 mA).

11.12 Fault output signal (DO1)

Fault output signal (pin 6 on M1) indicates fault conditions of the drive (reference or transducer signal cable broken, maximum error exceeded, etc.). Fault presence corresponds to 0 Vdc, normal working corresponds to 24 Vdc.

Fault status is not affected by the status of the Enable input signal.

This output signal can be used as digital output by software selection.

Note: digital output with fast contact (max 5 kHz)

11.13 Pump overheat protection output signal (DO2)

This output signal (pin 8 on M1) indicates the working conditions to which the internal gear pump (PGI*) is subject to rapid overheating.

In case of /D option (see **AS100**) this digital output condition can be used to manage (using an external relay) the JO-DL cartridge installed on the manifold block.

Pump overheat protection presence of the pump corresponds to 24 Vdc, normal working corresponds to 0 Vdc.

Pump overheat protection logical output signal is not intended as a fault condition.

This output signal can be used as digital output by software selection.

Note: digital output with relay contact

11.14 Enable pressure input signal (DI5)

By default, the P/Q control is always active.

Through S-SW-SETUP software, it's possible to modify the configuration of the drive so that the P/Q control can be enabled/disabled via this digital input:

- when digital input is set to 0Vdc, P/Q control is disabled and the drive performs just flow control
- when digital input is set to 24Vdc, P/Q control is enabled and the drive performs flow and pressure control

Input is optoisolated from the internal regulation (24 Vdc \pm 10% @ I_{max} 10 mA).

11.15 Smart tuning selection input signals (DI6 and DI7)

Smart tuning setting can be switched from Dynamic (default) to Balanced or Smooth via software, fieldbus or using DI6 and DI7 digital inputs (pin 2 and 3 on M3), as shown at side; if requested, performances can be further customized directly tuning each single PID control parameter.

| PIN | SMART TUNING SELECTION | | |
|------|------------------------|----------|--------|
| | DYNAMIC | BALANCED | SMOOTH |
| M3-2 | 0 | 24 Vdc | 0 |
| M3-3 | 0 | 0 | 24 Vdc |

11.16 Pressure control active output signal (DO3)

Pressure control active output signal (pin 6 on M3) indicates the P/Q control status.

The pressure control active corresponds to 24 Vdc, while not active corresponds to 0 Vdc.

Pressure control status is not affected by the status of the Enable pressure input signal.

Pressure control output signal can be used as digital output by software selection.

Note: digital output with fast contact (max 5 kHz)

11.17 Pressure target reached output signal (DO4)

This output signal (pin 8 on M3) indicates if the pressure target has been reached.

The pressure target reached corresponds to 24 Vdc, while not reached corresponds to 0 Vdc.

Pressure target reached output signal can be used as digital output by software selection.

Note: digital output with relay contact

11.18 Remote pressure transducer input signals (TR1)

Analog remote pressure transducers can be directly connected to the drive.

Analog input signal (pin 14 on M3) is factory preset, default is 0 ÷ 10 Vdc. Input signal can be reconfigured between voltage and current within a maximum range of \pm 10 Vdc or 4 ÷ 20 mA, using specific dip-switch present on the drive (see user manual).

Refer to pressure transducer characteristics to select the transducer type according to specific application requirements.

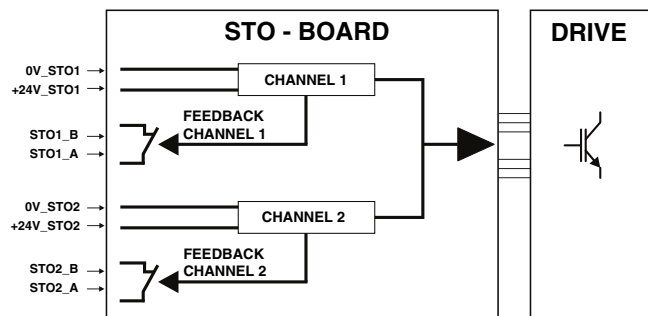
12 OPTIONS

K = The drive implements the Safe Torque Off (STO) function as a prevention of unexpected starts according to 2006/42/EC Machinery Directive (MD) - standard EN 61800-5-2.

This function prevents the generation of a rotating magnetic field removing the power semiconductor control voltage allowing short-term operations (such as cleaning and / or maintenance work on parts of non-electrical devices of the machine) without disconnecting drive power supply or the connection between the drive and the servomotor.

The STO function is implemented using two redundant channels each having its own signal feedback accessible from the outside, available on the S1 connector (see 8.6).

For detailed descriptions, please refer to the user manual.



The following table resumes the STO enabling/disabling conditions according to the drives size:

| | drive size 022 ÷ 140 | | | | | drive size 165 ÷ 210 | | | | |
|----------------|----------------------|-------|-----------|-------|------------|----------------------|-------|-----------|-------|------------|
| | +24V_STO1 | STO1 | +24V_STO2 | STO2 | STO Active | +24V_STO1 | STO1 | +24V_STO2 | STO2 | STO Active |
| STO OFF | +24V | OPEN | +24V | OPEN | OFF | +24V | OPEN | +24V | OPEN | OFF |
| STO ON | +24V | OPEN | +24V | CLOSE | (*) | 0V | CLOSE | 0V | CLOSE | ON |
| | 0V | CLOSE | 0V | OPEN | ON | | | | | |
| | 0V | CLOSE | 0V | CLOSE | ON | | | | | |

13 POWER AND PROTECTION CABLES SIZE

| Drive type | Servomotor type (1) | Power Cables (mm²) | | Protection Cables (mm²) | | Max length [m] |
|------------|---------------------|-----------------------|-------------------------|-------------------------|------------------|----------------------|
| | | drive L1 - L2 - L3 | servomotor U - V - W | drive PE | servomotor PE | drive and servomotor |
| D-MP-*-022 | PMM-*009 | 6 | 6 | 6 | 6 | 20 |
| D-MP-*-032 | PMM-*015 | 10 | 10 | 10 | 10 | |
| D-MP-*-046 | PMM-*024 | 16 | 25 | 16 | 25 | |
| D-MP-*-060 | PMM-*032 | 25 | 25 | 25 | 25 | |
| D-MP-*-090 | PMM-*042 | 35 | 35 | 25 | 25 | |
| D-MP-*-100 | PMM-*055 | 50 | 70 | 35 | 35 | |
| D-MP-*-140 | | 70 | 70 | 50 | 35 | |
| D-MP-*-165 | PMM-*080 | 120 | 120 | 70 | 70 | |
| D-MP-*-210 | PMM-*100 | | | | | |

(1) For more information about PMM servomotor, please refer tech table **AS400**

14 FUSES

| Drive type | Fuses - Min and Max value (2) [A] | Voltage [AC] | I ₂ T Maximum (A ₂ s) for AC input |
|----------------|--------------------------------------|-----------------|---|
| D-MP-*-022 | 25 - 40 (40 - 63) | 480 | 1200 |
| D-MP-*-032 | 40 - 63 (63 - 80) | 480 | 1200 |
| D-MP-*-046 | 50 - 80 (100 - 200) | 480 | 3900 |
| D-MP-*-060 | 80 - 100 (125 - 315) | 480 | 3900 |
| D-MP-*-090 (1) | 100 - 140 (160 - 450) | 480 | 9000 |
| D-MP-*-100 (1) | 125 - 160 (200 - 630) | 480 | 40000 |
| D-MP-*-140 (1) | 160 - 200 (315 - 700) | 480 | 62500 |
| D-MP-*-165 (1) | 200 - 250 (350 - 1000) | 480 | 62500 |
| D-MP-*-210 (1) | 250 - 315 (400 - 1250) | 480 | 160000 |



WARNING: the minimum values of the fuses are calculated for the drive that delivers the rated power

Notes:

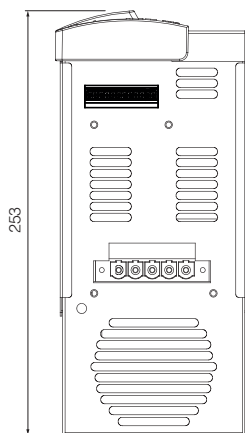
- all fuses must be ultra-fast type
- the fuses are calculated for a minimum short-circuit current of 10 times the rated current; the maximum short-circuit current must not be greater than 20 times the rated current

(1) The fuse rated current must be greater than the rated input current

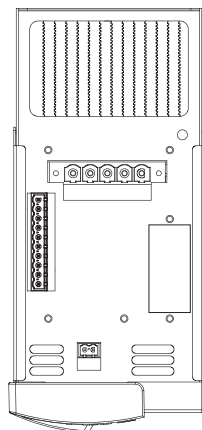
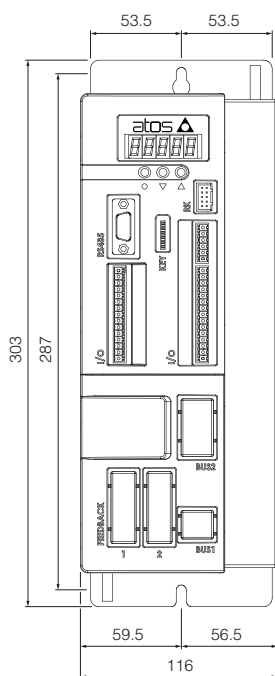
(2) In brackets input fuses with DC Bus connection

D-MP-*-022

Fixing screws = M4



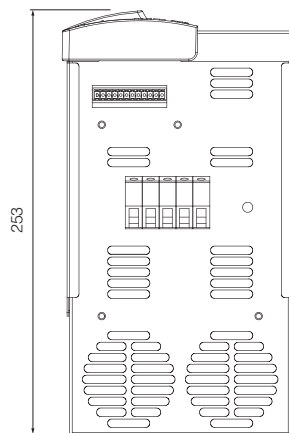
bottom view



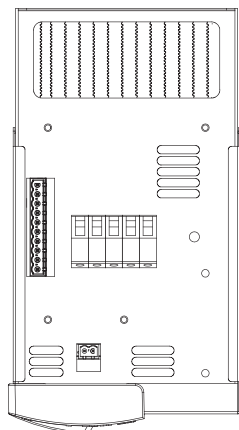
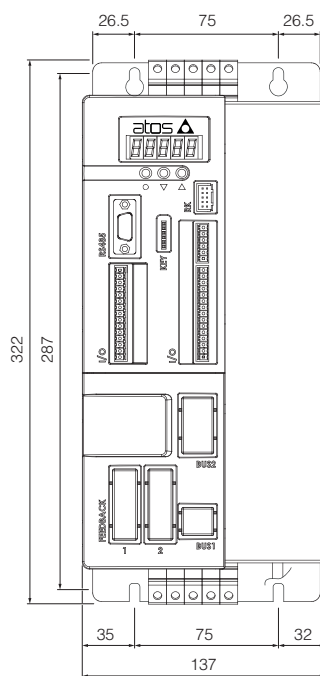
top view

D-MP-*-032

Fixing screws = M4



bottom view



top view

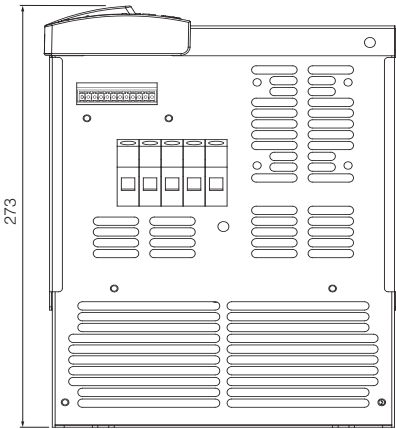
Mass [kg]

| | |
|------------|-----|
| D-MP-*-022 | 5.5 |
| D-MP-*-032 | 6.4 |

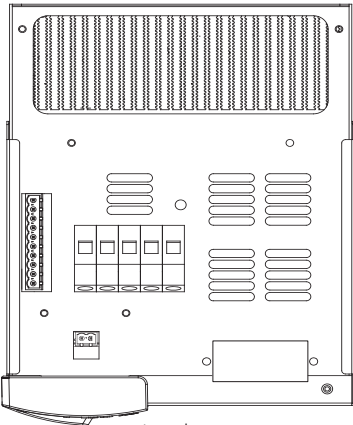
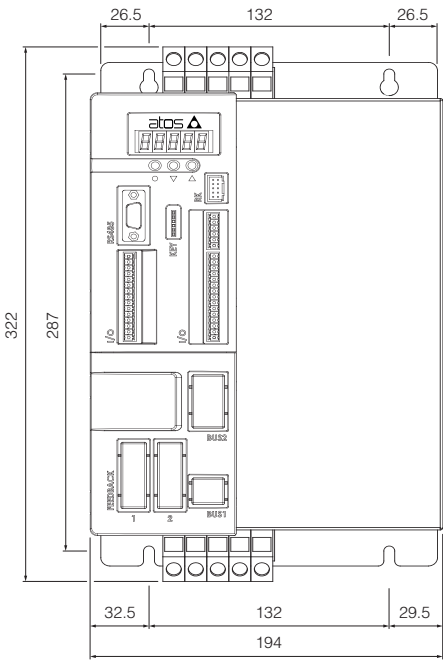
D-MP-*-046
D-MP-*-060

Fixing screws = M4

| Mass [kg] | |
|------------|-----|
| D-MP-*-046 | 9.3 |
| D-MP-*-060 | 10 |



bottom view

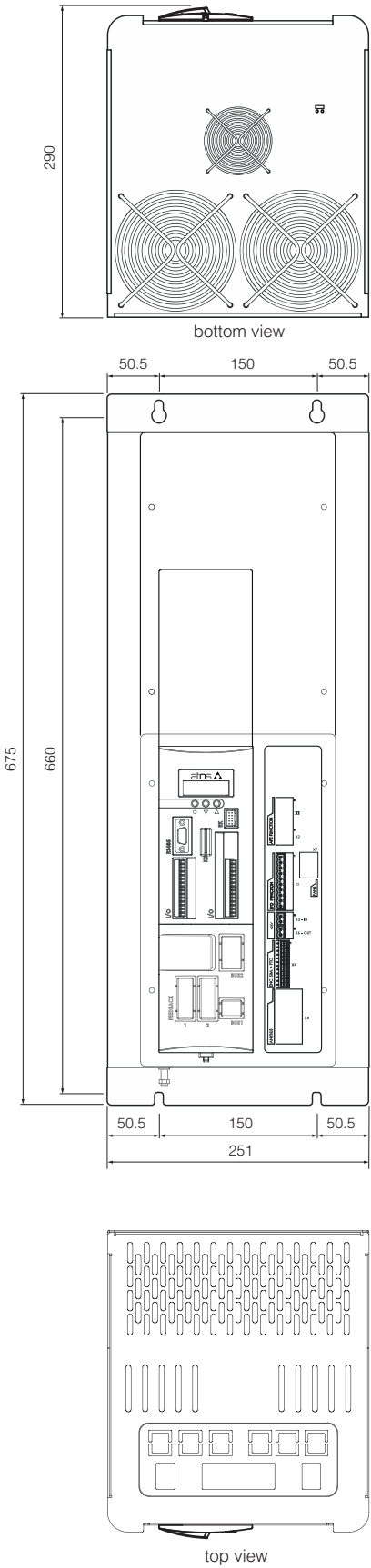


top view

D-MP-*-090
D-MP-*-100
D-MP-*-140

Fixing screws = M6

| Mass [kg] | |
|------------|----|
| D-MP-*-090 | 22 |
| D-MP-*-100 | |
| D-MP-*-140 | |



D-MP-*-165

D-MP-*-210

Fixing screws = M4

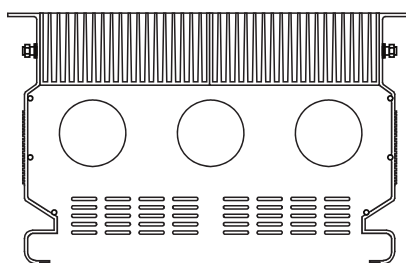
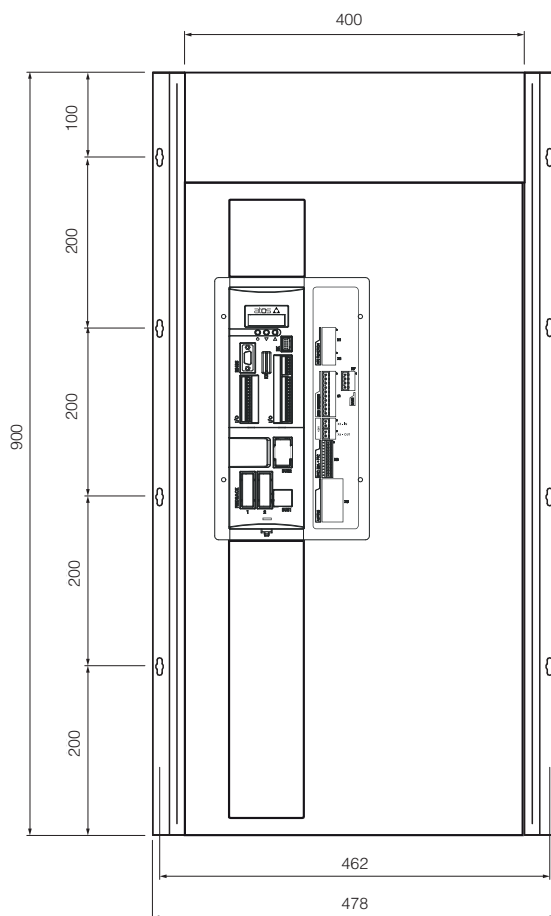
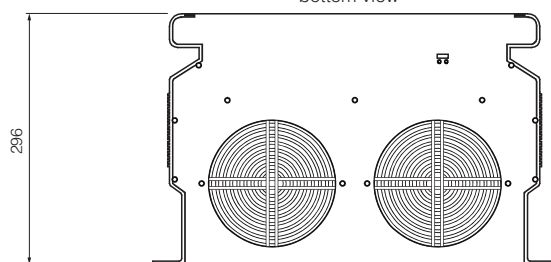
Mass [kg]

D-MP-*-165

65

D-MP-*-210

bottom view



top view

16 RELATED DOCUMENTATION

AS050 Basics for Smart Servopumps - SSP
AS100 SSP Smart Servopumps
AS200 Sizing criteria for servopumps
AS300 PGI cast iron internal gear pumps, high pressure
AS350 PGIL aluminium internal gear pumps
AS400 PMM high performance synchronous servomotors
AS510 Fieldbus

AS800 Programming tools for pumps & servopumps
AS810 Accessories for servopumps
AS910 Operating and maintenance information for servopumps
S-MAN-HW Servopumps installation manual
S-MAN-SW Servopumps programming software manual
S-MAN-STO Servopumps Safe Torque Off manual