

Digital electronic drives for SSP servopumps

fieldbus, smart start-up

Phase-out components not recommended for new application - see table AS500-1 or higher for new series

SMART TUNING

P/Q CONTROL

SMART START-UP

MULTIPLE AXIS

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

① Drive power supply - input	④ IN/OUT signals
② Servomotor power supply - output	⑤ Fieldbus
③ Serial RS485 communication port	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

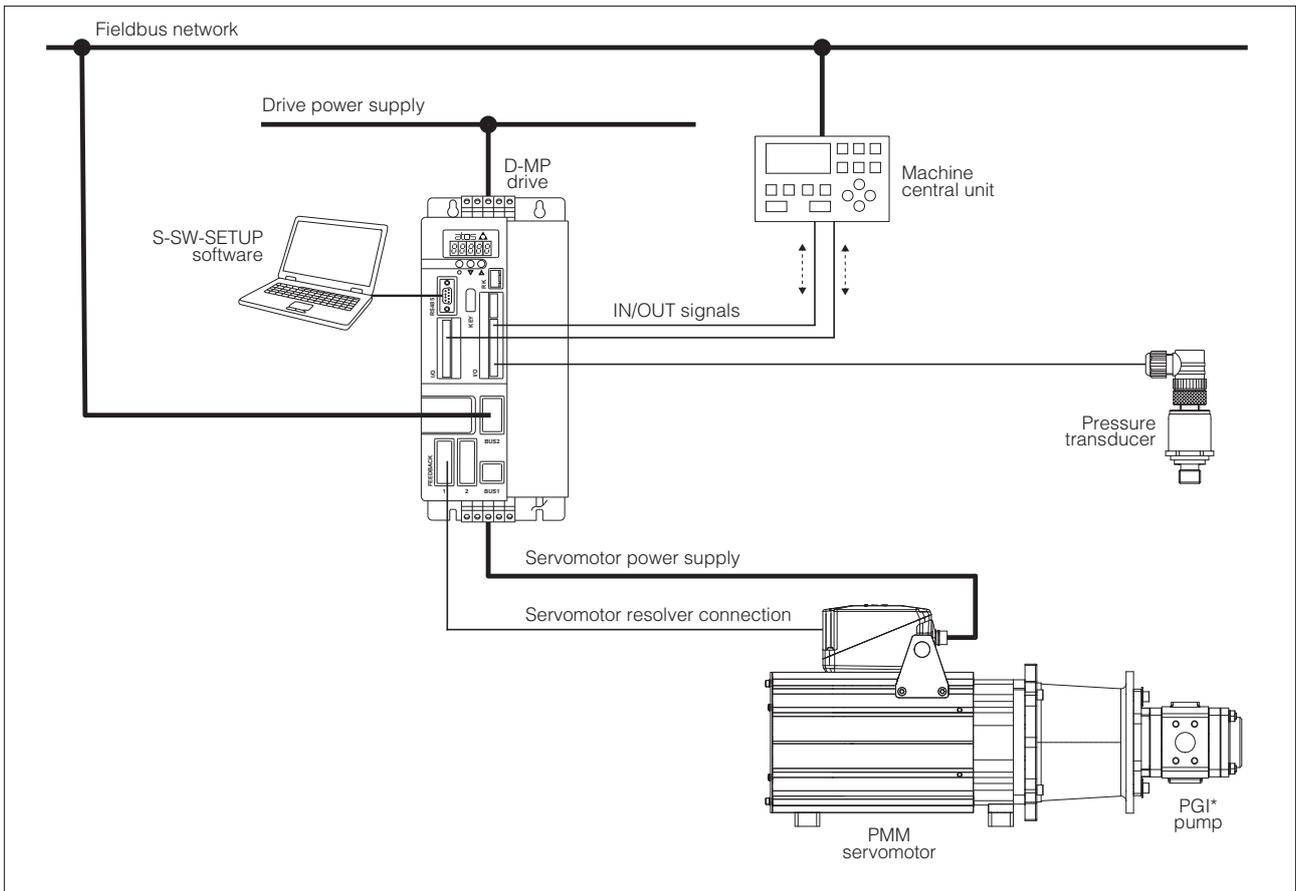
Software Features:

- 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							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	
Fieldbus interface , serial port RS485 always present: NP = Not Present BC = CANopen BP = PROFIBUS DP EH = EtherCAT EP = PROFINET RT/IRT								

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.

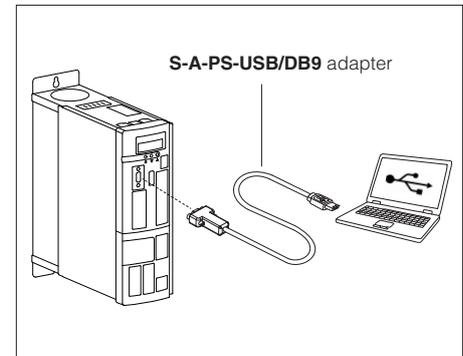
S-SW-SETUP permits to have many features so as Smart Start-up, Multiple axis and Smart tuning for an easy and rapid commissioning. For detailed info refer to **AS050**.

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

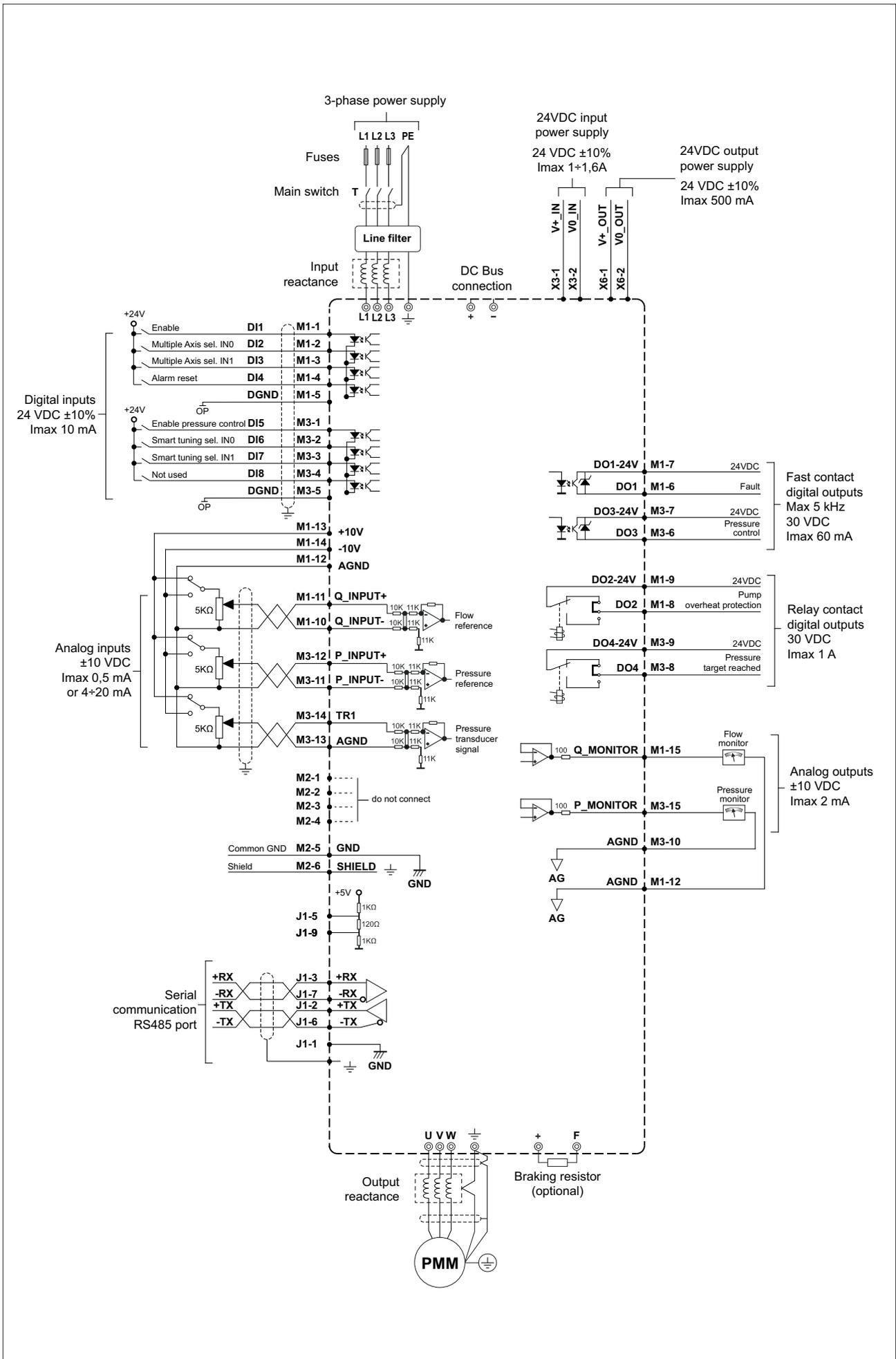
6 ELECTRICAL CHARACTERISTICS

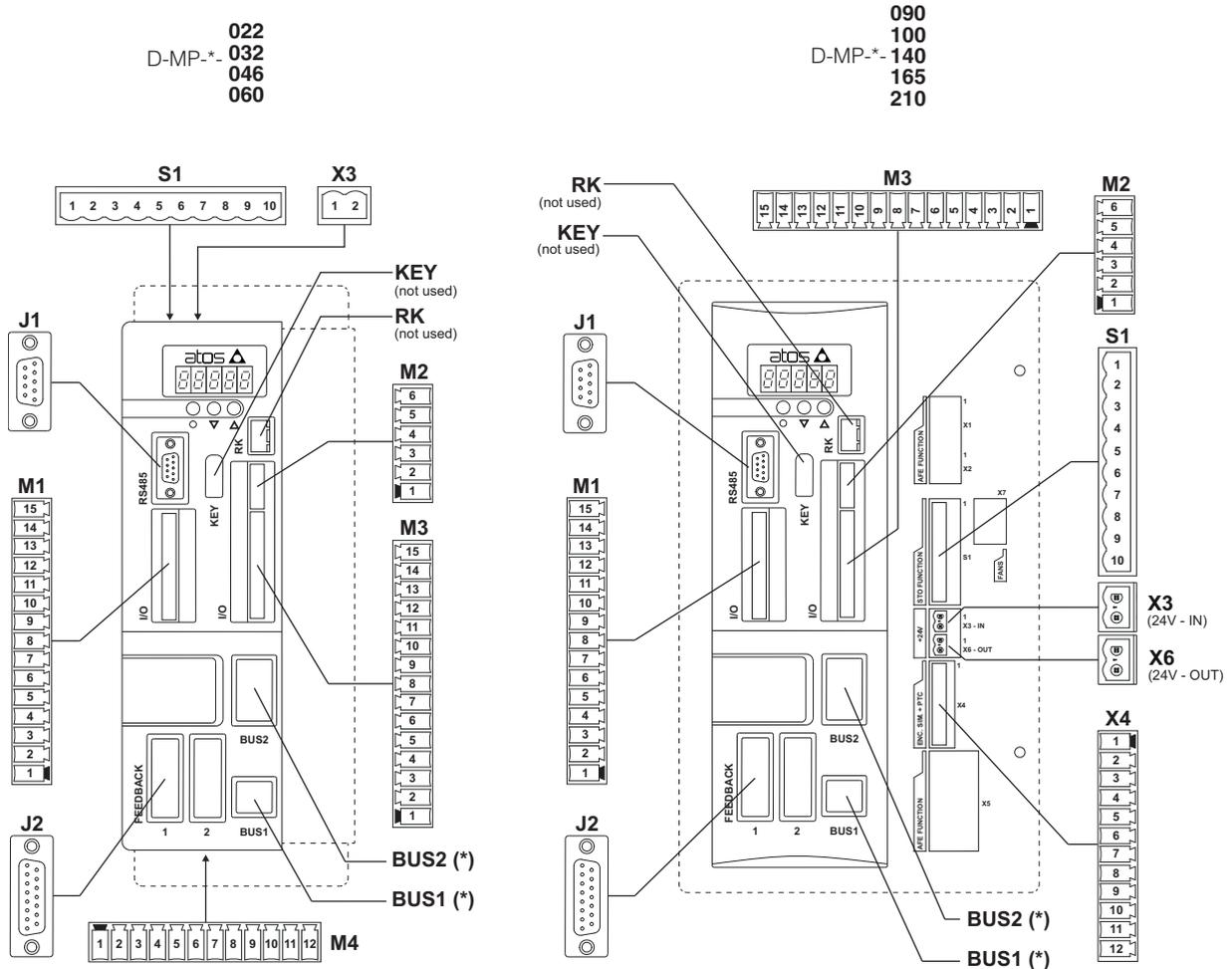
Drive type	022	032	046	060	090	100	140	165	210	
Rated current [A]	22	32	46	57.5	87	100	140	165	210	
Overload current (1) [A]	44	64	92	115	174	200	280	330	420	
Rated power [kW]	11	15	22	30	45	55	75	90	110	
Rated IN voltage [V]	200 V -10% ÷ 460 V +10% @ 45 ÷ 65 Hz				380 V -15% ÷ 460 V +10% @ 45 ÷ 65 Hz					
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 V _{DC} ±10% @ max 1,0 A for drives type 022, 032, 090, 100, 140, 165, 210 24 V _{DC} ±10% @ max 1,6 A for drives type 046, 060									
24VDC output power supply	24 V _{DC} ±10% @ max 500 mA - only for drives type 090, 100, 140, 165, 210									
Digital inputs	24 V _{DC} ±10% @ max 10 mA									
Digital outputs - fast contact	30 V _{DC} @ max 60 mA (max 5 kHz)									
Digital outputs - relay contact	30 V _{DC} @ 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 V _{DC} @ 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 24V _{DC} power supply	LiYCY shielded cables: 0,5 mm ² max 30 m for logic - 1,5 mm ² max 30 m for 24V _{DC} power supply Max conductor size: 1,5 mm ² 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

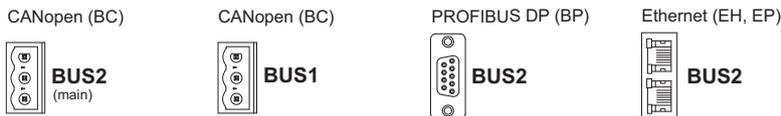
(2) Default is 5 kHz; only for drive type 140 default is 4 kHz

7 WIRING BLOCK DIAGRAM





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



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
		8.12
KEY	Not used	-
RK		

8.1 M1 connector - IN/OUT digital and analog signals

CONNECTOR	PIN	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
	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

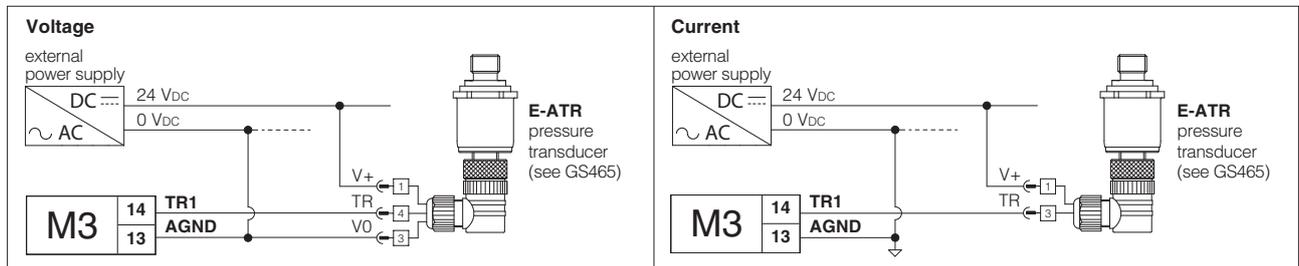
(1) Digital output with fast contact (2) Digital output with relay contact

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

CONNECTOR	PIN	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
	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
	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	

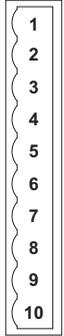
8.4 X3 connector - 24VDC input power supply

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

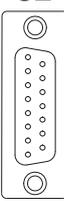
8.5 X6 connector - 24VDC output power supply - only for drives type 090 ÷ 210

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

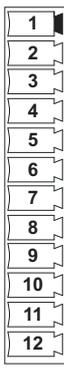
8.6 S1 connector - Safe Torque Off (STO) - only for /K option

CONNECTOR	PIN	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
	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 ±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 ±10 % - Current: min 200 mA	Gnd - power supply

8.7 J2 connector - Servomotor resolver - DB15 - 15 pin

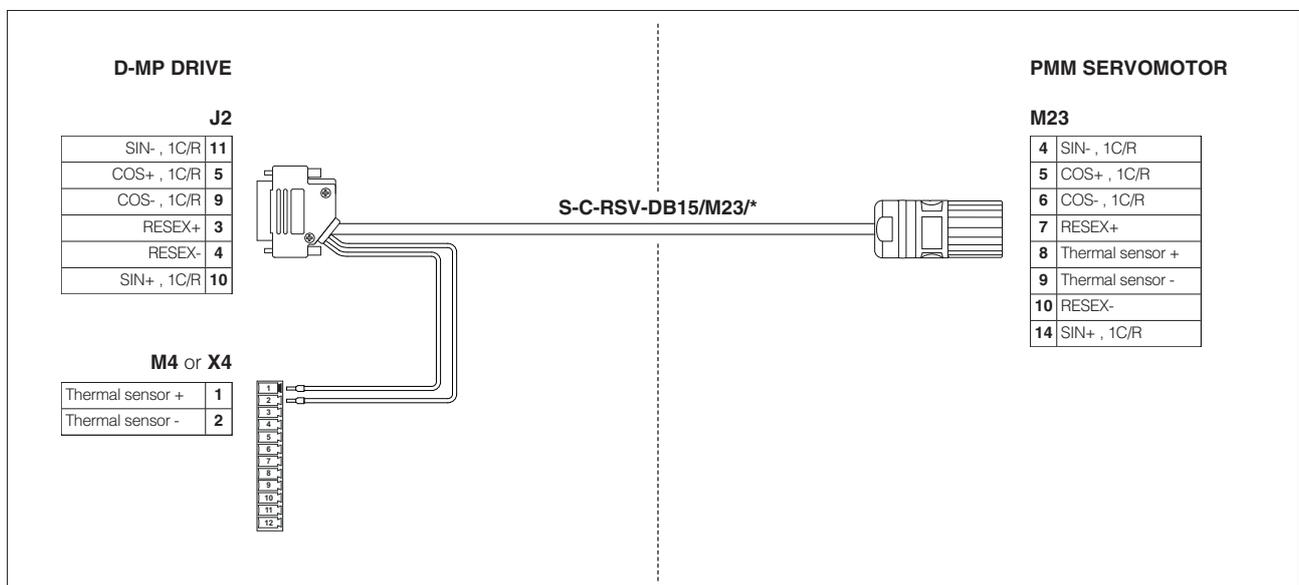
CONNECTOR	PIN	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
 <p>J2 female (drive view)</p>	1	NC	-	Do not connect
	2	NC	-	Do not connect
	3	RESEX+	Red	
	4	RESEX-	Blue	
	5	COS+ , 1C/R	Grey	
	6	NC	-	Do not connect
	7	NC	-	Do not connect
	8	NC	-	Do not connect
	9	COS- , 1C/R	Pink	
	10	SIN+ , 1C/R	Yellow	
	11	SIN- , 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
 <p>M4 - X4</p>	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

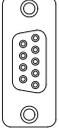
(1) M4 is for drives type 022 ÷ 060; X4 is for drives type 090 ÷ 210

Servomotor resolver cable connection - example - see tech table AS810

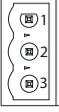
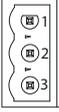


Note: for more information about PMM servomotor, please refer tech table AS400

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

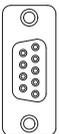
CONNECTOR	PIN	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
 <p>female (drive view)</p>	1	NC	-	Do not connect
	2	TX+	Transmitter	
	3	RX+	Receiver	
	4	NC	-	Do not connect
	5	NC	-	Do not connect
	6	TX-	Transmitter	
	7	RX-	Receiver	
	8	NC	-	Do not connect
	9	NC	-	Do not connect

8.10 BUS2 and BUS1 connectors - CANopen (BC)

CONNECTOR	PIN	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
 <p>main</p>	1	CAN_H	Bus line (high)	
	2	CAN_L	Bus line (low)	
	3	CAN_GND	Signal zero data line	
	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)

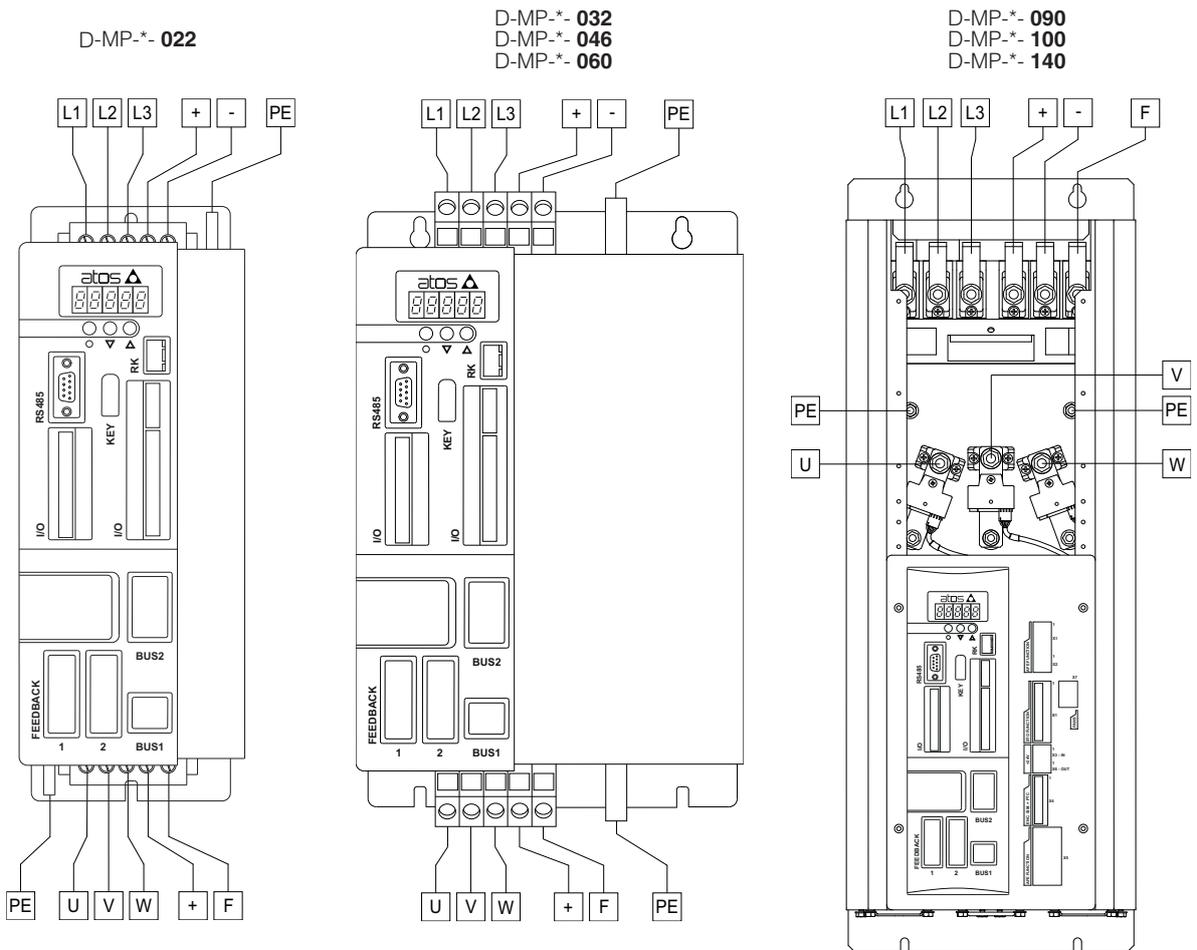
CONNECTOR	PIN	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
	1	SHIELD	Shield	
	2	NC	-	Do not connect
	3	LINE_B	Bus line (B)	
	4	DE	Control's signal for repeater	
	5	DGND	Data line and termination signal zero	
	6	+5V	Termination supply signal	
	7	NC	-	Do not connect
	8	LINE_A	Bus line (A)	
	9	NC	-	Do not connect

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

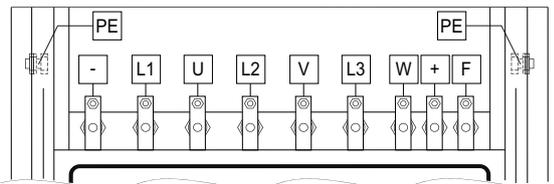
CONNECTOR	PIN	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
	1	TX+	Transmitter (white/orange)	
	2	RX+	Receiver (orange)	
	3	TX-	Transmitter (white/green)	
	4	NC	-	Do not connect
	5	NC	-	Do not connect
	6	RX-	Receiver (green)	
	7	NC	-	Do not connect
	8	NC	-	Do not connect

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

9 DRIVE AND SERVOMOTOR POWER CONNECTIONS



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

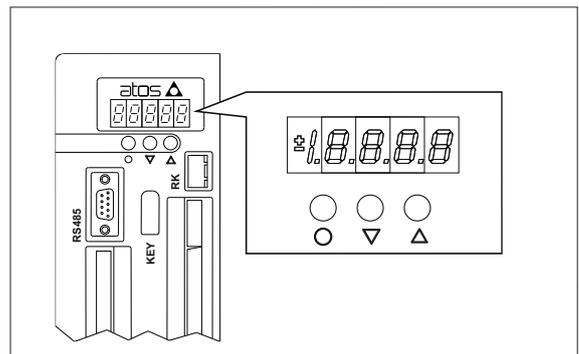


L1	Drive power supply - input
L2	
L3	
U	Servomotor power supply - output (pass the cables through the toroid inside present, without the shield and ground)
V	
W	
+	DC Bus connection
-	
+	Brake resistor connection
F	
PE	Connection PE and shield

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 V_{dc}, normal working corresponds to 24 V_{dc}.
 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 V_{dc}, normal working corresponds to 0 V_{dc}.
 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 0V_{dc}, P/Q control is disabled and the drive performs just flow control
 - when digital input is set to 24V_{dc}, P/Q control is enabled and the drive performs flow and pressure control
 Input is optoisolated from the internal regulation (24 V_{dc} ±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 V _{dc}	0
M3-3	0	0	24 V _{dc}

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 V_{dc}, while not active corresponds to 0 V_{dc}.
 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)

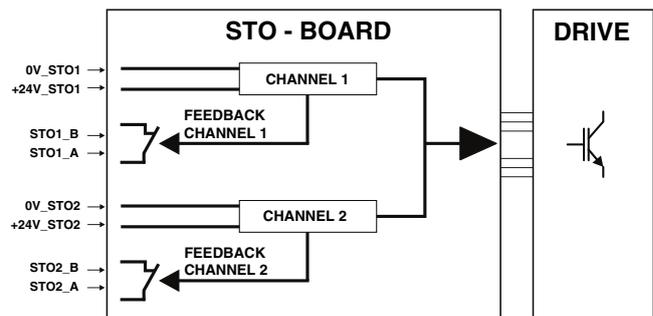
This output signal (pin 8 on M3) indicates if the pressure target has been reached. The pressure target reached corresponds to 24 V_{dc}, while not reached corresponds to 0 V_{dc}.
 Pressure target reached output signal can be used as digital output by software selection.
 Note: digital output with relay 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 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).
 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 (mm ²)		Protection Cables (mm ²)		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

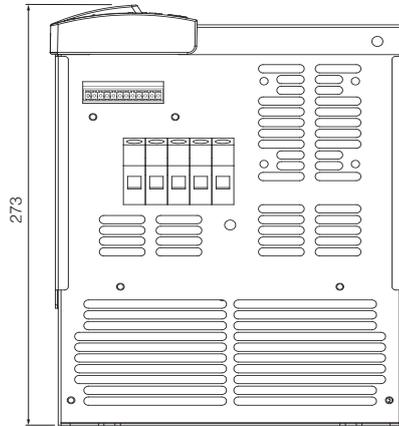
(1) The fuse rated current must be greater than the rated input current

(2) In brackets input fuses with DC Bus connection

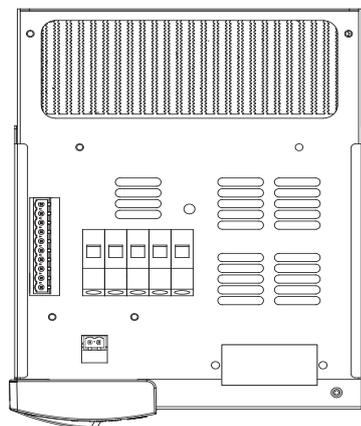
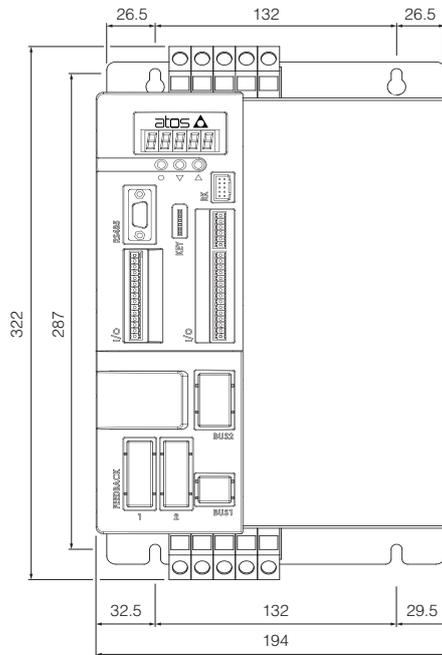
D-MP-*-046
D-MP-*-060

Fixing screws = M4

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



bottom view

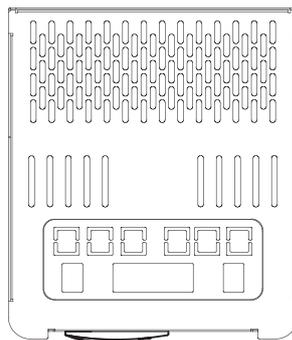
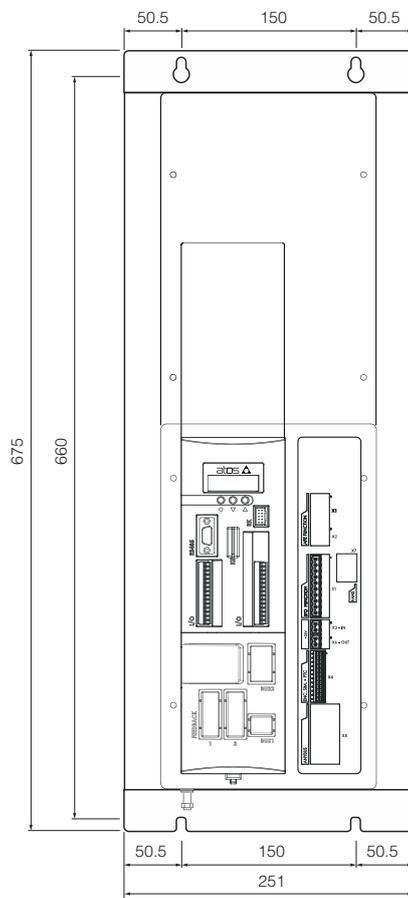
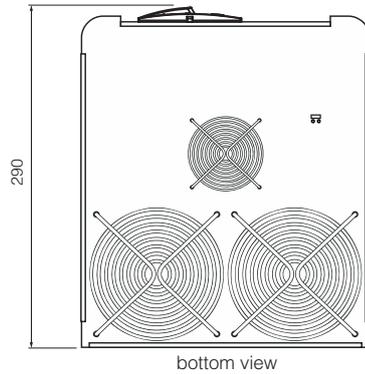


top view

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

Fixing screws = M6

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



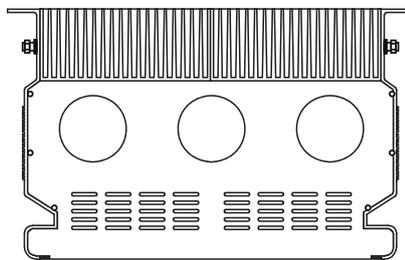
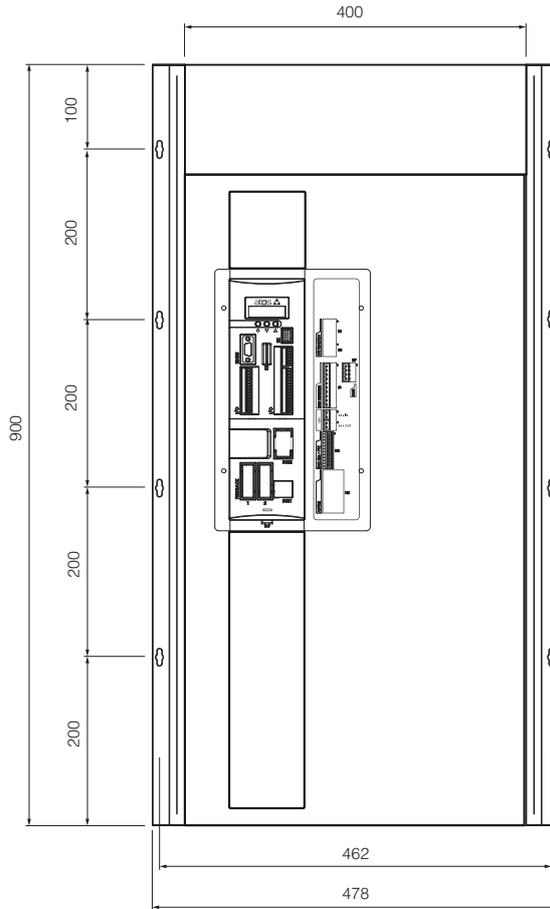
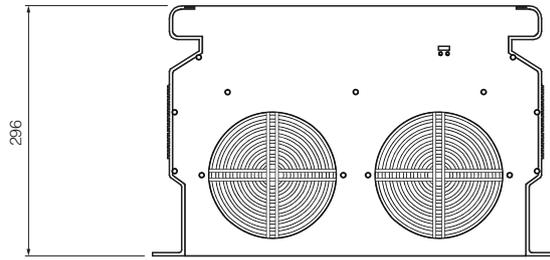
D-MP-*-165

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	AS800	Programming tools for pumps & servopumps
AS100	SSP Smart Servopumps	AS810	Accessories for servopumps
AS200	Sizing criteria for servopumps	AS910	Operating and maintenance information for servopumps
AS300	PGI cast iron internal gear pumps, high pressure	GS510	Fieldbus
AS350	PGIL aluminium internal gear pumps	S-MAN-HW	Servopumps installation manual
AS400	PMM high performance synchronous servomotors	S-MAN-SW	Servopumps programming software manual
		S-MAN-STO	Servopumps Safe Torque Off manual