POMPE A PISTONI ASSIALI PER CIRCUITO CHIUSO A CILINDRATA VARIABILE

VARIABLE DISPLACEMENT CLOSED CIRCUIT AXIAL PISTON PUMPS

AXIALKOLBENVERSTELLPUMPEN FÜR DEN GESCHLOSSENEN KREISLAUF

HM PS

398SCP0043A01

HM PS

POMPE A PISTONI ASSIALI A CILINDRATA VARIABILE
VARIABLE DISPLACEMENT AXIAL PISTON PUMPS
AXIALKOLBENVERSTELLPUMPEN

Le pompe a pistoni assiali serie HM PS sono state concepite per operare in circuito chiuso.
I vari sistemi di comando disponibili le rendono facilmente adattabili alle esigenze applicative sia per il settore industriale che per quello della movimentazione.
Lo sviluppo di gruppi rotanti appositamente concepiti, unito ad uno studio accurato delle sezioni di passaggio dell'olio, consentono a queste pompe di raggiungere elevate velocità di rotazione,
come quelle consentite dai moderni motori diesel, garantendo una elevata affidabilità per pressioni di funzionamento fino a 350 bar di picco.
Le pompe possono essere composte in versione tandem, utilizzando le opportune predisposizioni disponibili a richiesta.

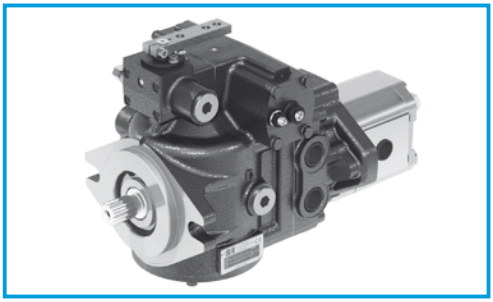
CARATTERISTICHE PRINCIPALI:
- cilindrate da 17 cc a 34 cc
- flangia SAE B
- gruppi rotanti a 9 pistoni per un funzionamento più regolare rispetto ai gruppi a 7 pistoni
- piattello distributore bimetallico
- possibilità di pompa integrata di carico che pressurizza il circuito ed evita la cavitazione
- By-pass a vite integrato
- bassa rumorosità

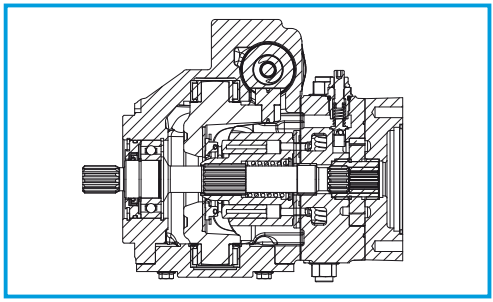
Axial piston pumps series HM PS have been designed to operate in a closed circuit.
The available control systems make it easy to use these pumps in any application for industrial and mobile fields.
Development of rotating groups, especially designed, united to an accurate study of oil passage sections, allow high speed rotation, like required by modern diesel engines, giving extreme reliability for working peak pressure up to 350 bar.
It is possible to couple tandem versions, by means of coupling flanges optionally available.

MAIN FEATURES:
- *displacement from 17 cc to 34 cc*
- *SAE B flange*
- *rotating groups with 9 pistons make a more regular operation than a 7 pistons rotating group*
- *bimetallic distributor plate*
- *optional of integrated boost pump that pressurizes the circuit and avoids cavitation*
- *integrated by-pass screw*
- *low noise*

Die Axialkolbenpumpen der Serie HM PS wurden für den Betrieb im geschlossenen Kreislauf konzipiert.Die verschiedenen lieferbaren Steuerungssysteme eignen sich sowohl für stationäre als auch für mobile Anwendungen im Allgemeinen.
Speziell entwickelte Zylinderblöcke mit optimalen Saugverhältnissen ermöglichen, wie von modernen Antriebsaggregaten gefordert, den Einsatz bei hohen Pumpendrehzahlen, wobei ein kontinuierlicher Arbeitsdruck mit einem Spitzenwert von 350 Bar gewährleistet ist.
Unter Anwendung der auf Anfrage erhältlichen Anbauflansche können die Pumpen in der Tandemversion geliefert werden.

DIE WICHTIGSTEN EIGENSCHAFTEN:
- Hubraum von 17 cc bi 34 cc
- Flansch SAE B
- Rotationsaggregate mit 9 Kolben für einen regelmäßigeren Betrieb als mit 7 Kolben-Rotationsaggregaten
- Bimetall-Verteilerscheibe
- Möglichkeit eines Schwingsystems, das auf Bronzeplatten oder Wälzlagern montiert ist
- Möglichkeit einer integrierten Ladepumpe für die Druckbeaufschlagung des Kreislaufs zur Vermeidung des Hohlsogs
- Geräuscharmut





DATI TECNICI
TECHNICAL DATA
TECHNISCHE MERKMALE

GRUPPO *GROUP* BAUREIHE	CILINDRATA TEORICA *NOMINAL DISPLACEMENT* FÖRDERVOLUMEN		PRESSIONE *PRESSURE* DRUCK						VELOCITÀ *DI ROTAZIONE SPEED* DREHZAHL		MASSA *WEIGHT* GEWICHT	
			CONTINUA *CONTINUOUS* DAUER		INTERMITTENTE *INTERMITTENT* INTERMITTIERENDER		PICCO *PEAK* SPITZEN		MAX	MIN		
	cm³	in³	bar	psi	bar	psi	bar	psi	min⁻¹	min⁻¹	kg	lbs
HM PS	17	1,04	280	4060	300	4350	350	4568	3600	500	20,2	44,4
	19	1,16	280	4060	300	4350	350	4568	3600	500	20,2	44,4
	21	1,29	280	4060	300	4350	350	4568	3600	500	20,2	44,4
	23	1,40	280	4060	300	4350	350	4568	3600	500	20,2	44,4
	25	1,52	280	4060	300	4350	350	4568	3600	500	20,2	44,4
	28	1,71	280	4060	300	4350	350	4568	3600	500	20,2	44,4
	30	1,83	280	4060	300	4350	350	4568	3600	500	20,2	44,4
	32	1,95	280	4060	300	4350	350	4568	3600	500	20,2	44,4
	34	2,07	280	4060	300	4350	350	4568	3600	500	20,2	44,4

PRESSIONE CONTINUA: pressione media del normale range di pressioni di funzionamento
PRESSIONE INTERMITTENTE: pressione che può essere mantenuta per periodi brevi (circa il 10% del ciclo di lavoro)
PRESSIONE DI PICCO: pressione massima permessa regolata dalle valvole di max.(max. 1-2% del ciclo di lavoro)

CONTINUOUS PRESSURE: average pressure of the normal operating pressure range
INTERMITTENT PRESSURE: pressure that can be maintained for short periods (for about 10% of the work cycle)
PEAK PRESSURE: maximum allowable pressure regulated by maximum relief valves (max 1-2% of the work cycle)

KONTINUIERLICHER DRUCK: durchschnittlicher Druck der normalen Betriebsdruckreihe
INTERMITTIERENDER DRUCK: Druck, der für kurze Zeitabschnitte beibehalten werden kann (etwa 10% des Betriebszyklus)
SPITZENDRUCK: zugelassener Höchstdruck, von den Höchstdruckventilen geregelt (max. 1-2% des Betriebszyklus)

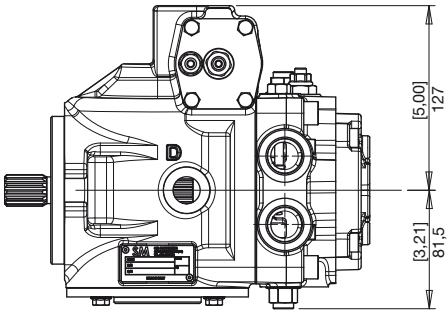
POMPA DI ALIMENTAZIONE
BOOST PUMP
SPEISEPUMPE

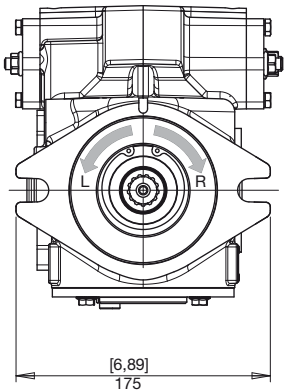
HM PS	CILINDRATA *DISPLACEMENT* FORDERVOLUMEN		PRESSIONE *PRESSURE* DRUCK	
	cm^3	in^3	bar	psi
POMPA SINGOLA *SINGLE PUMP* PUMPE	10	0.61	20	290
POMPE TANDEM (una sovralimentazione) *TANDEM PUMPS (one boost pump)* MEHRFACHPUMPEN (eine Speisepumpe)	13	0.79	20	290
POMPE TANDEM (due sovralimentazioni) *TANDEM PUMPS (two boost pumps)* MEHRFACHPUMPEN (zwei Speisepumpen)	10+10	0.61+0.61	20	290

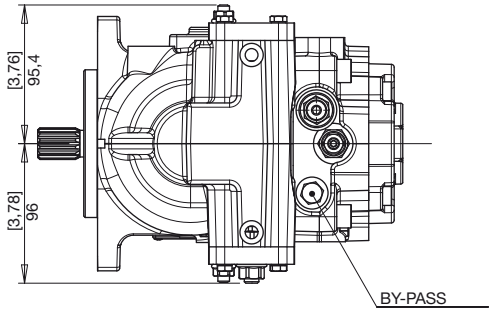
MOMENTO POLARE DI INERZIA
INERTIAL MASS
TRÄGHEITSMOMENT

approx. 13,6 x 10^{-4} Kg m^2

DIMENSIONI
SIZE
ABMESSUNGEN



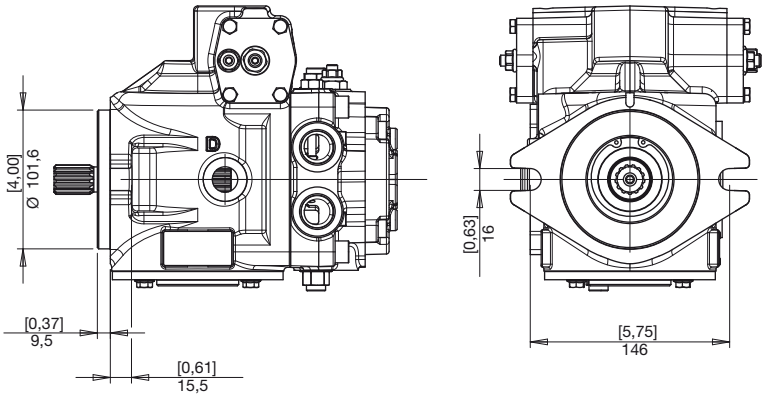




FLANGE
FLANGES
FLANSCHE

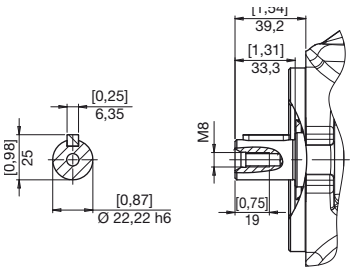
HM PS

B **SAE B**
SAE B
SAE B

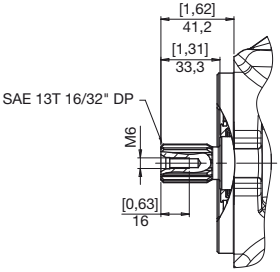


ESTREMITÀ ALBERI
SPLINE SHAFTS
WELLENPROFILE

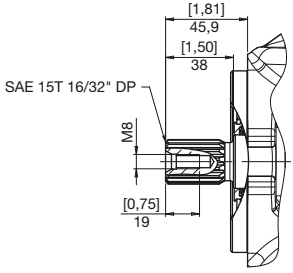
J **COPPIA MAX** **220 N•m**
MAX TORQUE
MAX DREHMOMENT



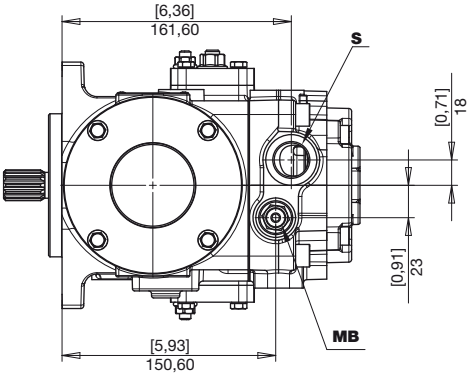
9 **COPPIA MAX** **310 N•m**
MAX TORQUE
MAX DREHMOMENT

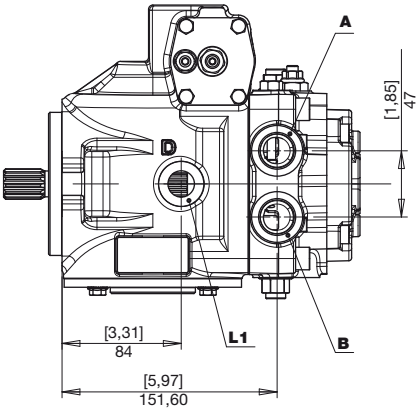


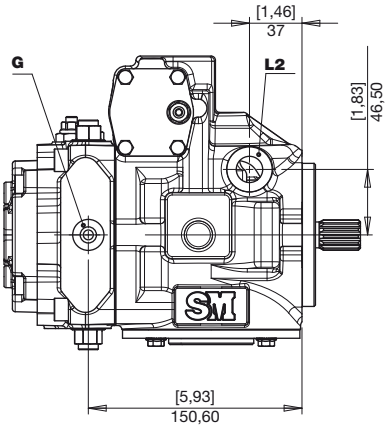
3 **COPPIA MAX** **460 N•m**
MAX TORQUE
MAX DREHMOMENT

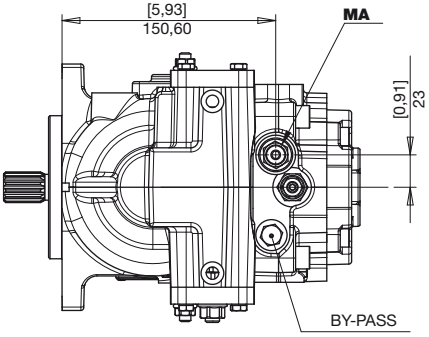


BOCCHE
PORTS
ANSCHLÜSSE



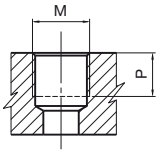




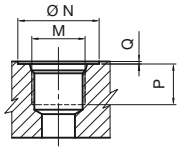


BOCCHE
PORTS
ANSCHLÜSSE

HM PS



TIPO *TYPE* TYP	M		P	
			mm	in
G1	1/8" GAS BSPP	8	8	0,31
G2	1/4" GAS BSPP	17	9	0,35
G4	1/2" GAS BSPP	70	14,5	0,57
G6	3/4" GAS BSPP	90	19	0,75

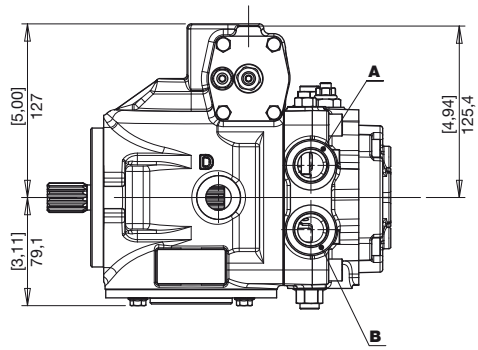


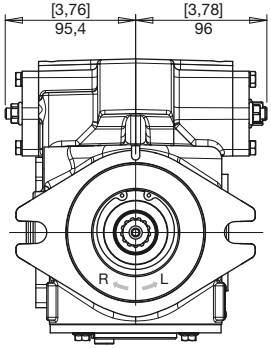
TIPO *TYPE* TYP	DIMENSIONE *SIZE* GRÖSSE	N		P		Q		M	
		mm	in	mm	in	mm	in		
U2	1/4"	20	0,79	12	0,47	0,3	0,01	7/16-20 UNF	17
U5	5/8"	34	1,34	18	0,71	0,3	0,01	3/4-16 UNF	70
U6	3/4"	41	1,61	20	0,79	0,3	0,01	1-1/16"-12 UNF	90

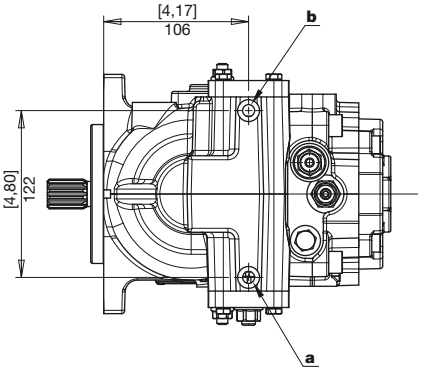
COMBINAZIONI
COMBINATIONS
KOMBINATIONEN

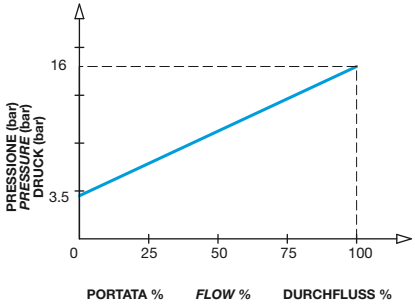
TIPO *TYPE* TYP	S ASPIRAZIONE *INLET* SAUGSEITE	A - B MANDATA *OUTLET* AUSGANG	L1 - L2 DRENAGGI *DRAIN* LECKÖLANSCHLUSS	PRESE PRESSIONE *PRESSURE INTAKE* DRUCKANSCHLÜSSE	
				MA-MB	G
G	G6	G6	G4	G1	G2
U	U6	U6	U5	G1	U2

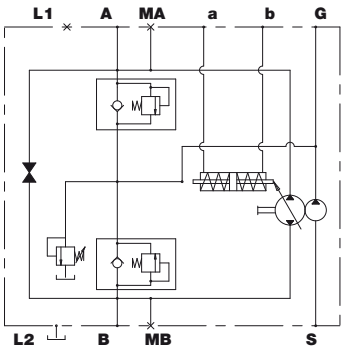
K IDRAULICO A DISTANZA
REMOTE HYDRAULIC
HYDRAULISCHE FERNSTEUERUNG









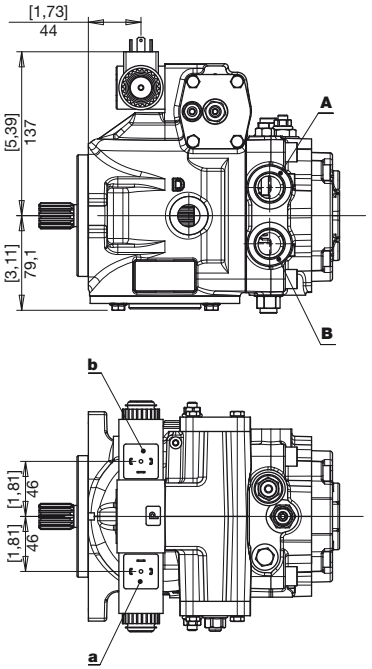


ROTAZIONE *DIRECTION* DREHRICHTUNG	PILOTAGGIO *PILOT PRESSURE* STEVERDRUCK	MANDATA *OUTPUT* AUSGANG
DESTRA *RIGHT* RECHTS	a	A
	b	B
SINISTRA *LEFT* LINKS	a	B
	b	A

		Versione GAS *GAS version* Version GAS		Versione UNF *UNF version* Version UNF	
		Filettatura *Thread* Gewinde	Profondità *Depth* Tiefe	Filettatura *Thread* Gewinde	Profondità *Depth* Tiefe
A **B**	Pilotaggio *Pilot* Pilot	G 1/8" BSPP	8 mm 0.31 in	7/16-20 UNF	12 mm 0.47 in

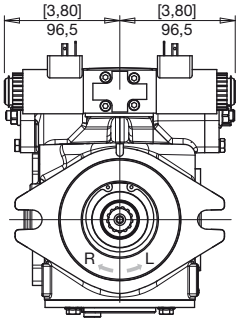
E F — 12 V 24 V

ELETTRICO ON/OFF CENTRO CHIUSO
ELECTRICAL ON/OFF, CLOSED CENTER
ELEKTRISCH ON/OFF, GESCHLOSSENES VENTIL



N Q — 12 V 24 V

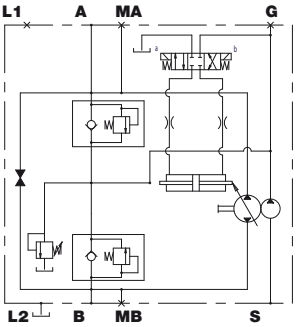
ELETTRICO ON/OFF CENTRO APERTO
ELECTRICAL ON/OFF, OPEN CENTER
ELEKTRISCH ON/OFF, GEÖFFNETES VENTIL



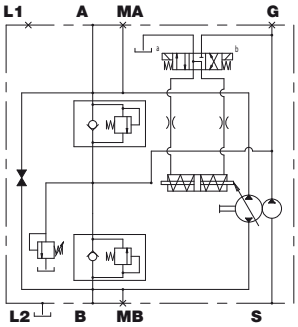
a	Solenoide *Solenoid* Solenoid	Connettori *Connectors* Verbindung	DIN 43650
b			

ROTAZIONE *DIRECTION* DREHRICHTUNG	SOLENOIDE IN TENSIONE *EXCITED SOLENOID* SOLENOID UNTER SPANNUNG	MANDATA *OUTPUT* AUSGANG
DESTRA *RIGHT* RECHTS	**a**	**A**
	b	**B**
SINISTRA *LEFT* LINKS	**a**	**B**
	b	**A**

E F

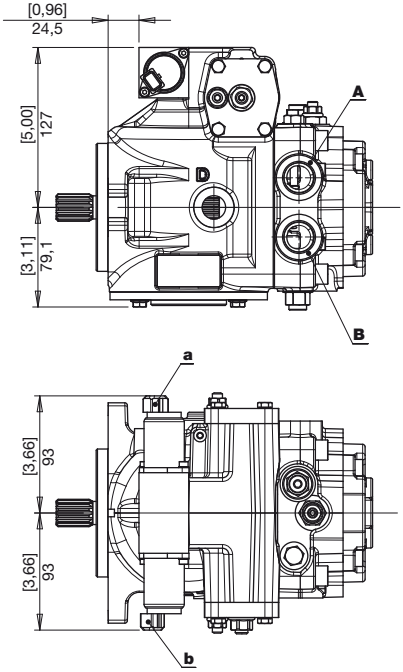


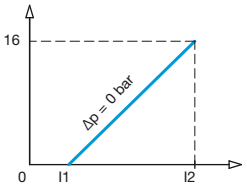
N Q



S — ELETTRICO PROPORZIONALE DIRETTO
ELECTRICAL PROPORTIONAL CONTROL
ELEKTRISCH PROPORTIONALSTEUERUNG

12 V



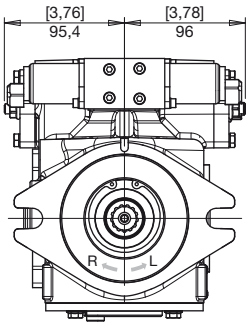


a	Solenoide *Solenoid* Solenoid	Connettori *Connectors* Verbindung	DIN 43650
b			

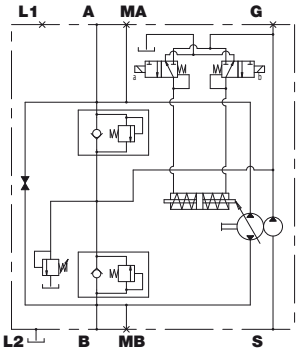
ROTAZIONE *DIRECTION* DREHRICHTUNG	SOLENOIDE IN TENSIONE *EXCITED SOLENOID* SOLENOID UNTER SPANNUNG	MANDATA *OUTPUT* AUSGANG
DESTRA *RIGHT* RECHTS	a	A
	b	B
SINISTRA *LEFT* LINKS	a	B
	b	A

W — ELETTRICO PROPORZIONALE DIRETTO
ELECTRONIC PROPORTIONAL CONTROL
ELEKTRONISCHE PROPORTIONALSTEUERUNG

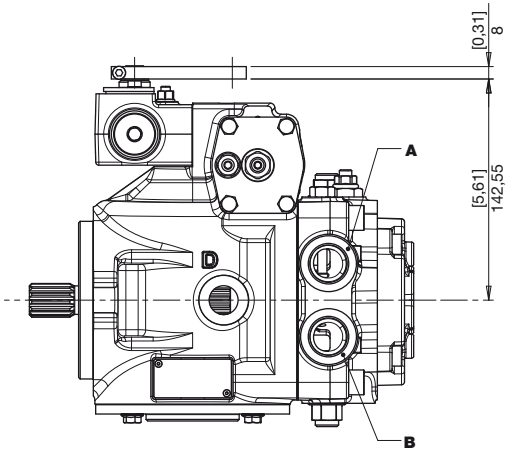
24 V

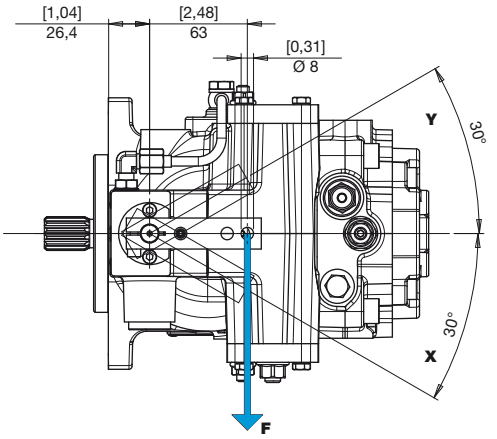


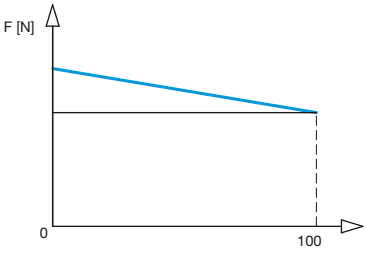
	S	W
Tensione nominale *Rated voltage* Nennspannung	12 V	24 V
Corrente min (I1) *Min. Current* Mindeststrom	600 mA	290 mA
Corrente max (I2) *Max. Current* Maximaler Strom	1000 mA	510 mA
Frequenza PWM *PWM Frequency* Frequenz PWM	100 Hz	



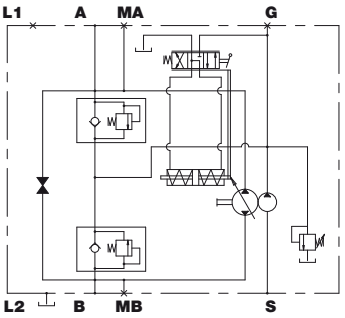
I **SERVOCOMANDO A LEVA**
LEVER-OPERATED SERVO-CONTROL
HYDRAULISCHE HEBEL-SERVOSTEUERUNG





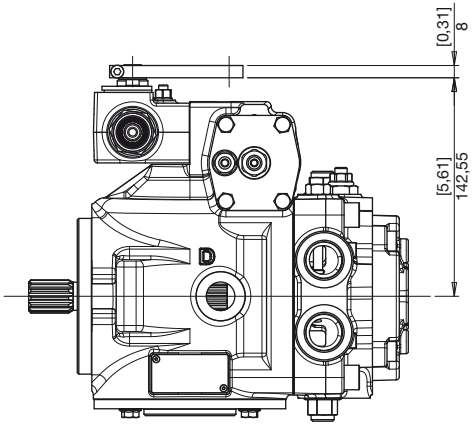


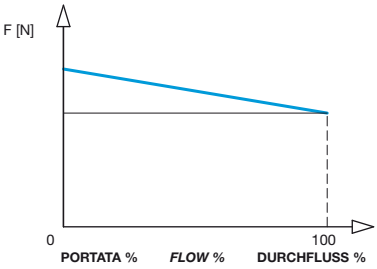
PORTATA % ***FLOW %*** **DURCHFLUSS %**

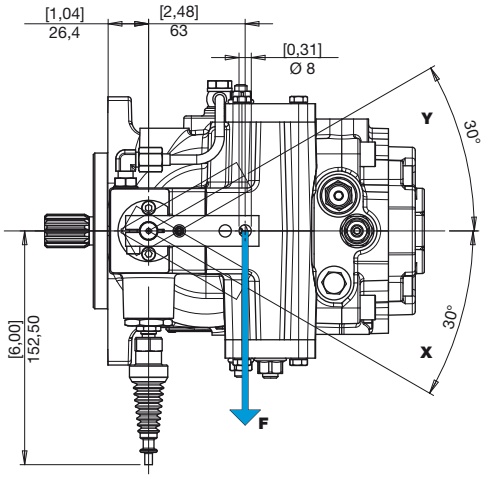


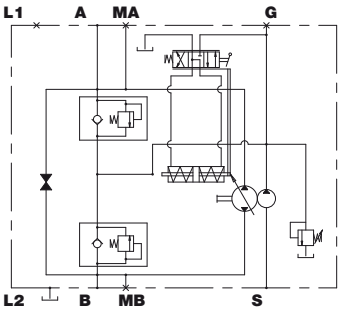
ROTAZIONE *DIRECTION* DREHRICHTUNG	LEVA COMANDO *CONTROL LEVER* STEUERHEBEL	MANDATA *OUTPUT* AUSGANG
DESTRA *RIGHT* RECHTS	Y	B
	X	A
SINISTRA *LEFT* LINKS	Y	A
	X	B

C **SERVOCOMANDO A LEVA CON INTERRUTTORE ELETTRICO**
LEVER-OPERATED SERVO-CONTROL WITH ELECTRIC SWITCH
HYDRAULISCHE HEBEL-SERVOSTEUERUNG MIT ELEKTRISCHE SCHALTER







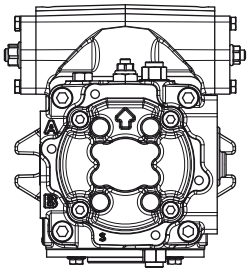


ROTAZIONE *DIRECTION* DREHRICHTUNG	LEVA COMANDO *CONTROL LEVER* STEUERHEBEL	MANDATA *OUTPUT* AUSGANG
DESTRA *RIGHT* RECHTS	Y	B
	X	A
SINISTRA *LEFT* LINKS	Y	A
	X	B

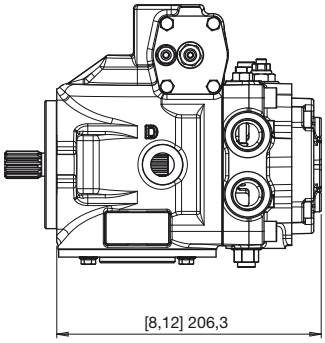
PREDISPOSIZIONI
VERSION
BAUART

HM PS

0 **NESSUNA PREDISPOSIZIONE SENZA POMPA SOVRALIMENTAZIONE**
NO AUXILIARY MOUNT WITHOUT CHARGE PUMP
OHNE ANSCHLUSSFLANSCH, OHNE SPEISEPUMPE

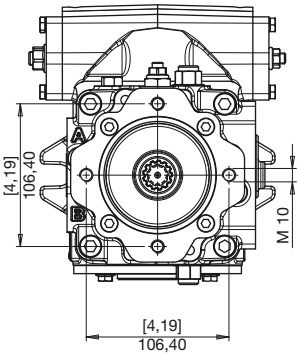


1 **NESSUNA PREDISPOSIZIONE CON POMPA SOVRALIMENTAZIONE**
NO AUXILIARY MOUNT WITH CHARGE PUMP
OHNE ANSCHLUSSFLANSCH MIT SPEISEPUMPE

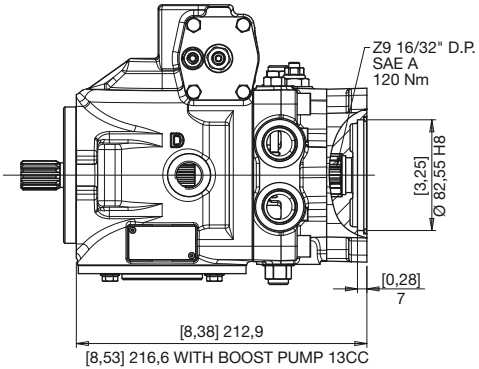


[8,27] 210 WITH BOOST PUMP 13cc

2 **SAE A CON POMPA SOVRALIMENTAZIONE**
SAE A WITH CHARGE PUMP
SAE A MIT SPEISEPUMPE



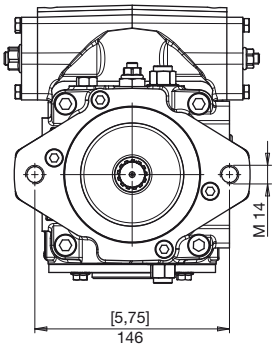
5 **SAE A SENZA POMPA SOVRALIMENTAZIONE**
SAE A WITHOUT CHARGE PUMP
SAE A OHNE SPEISEPUMPE



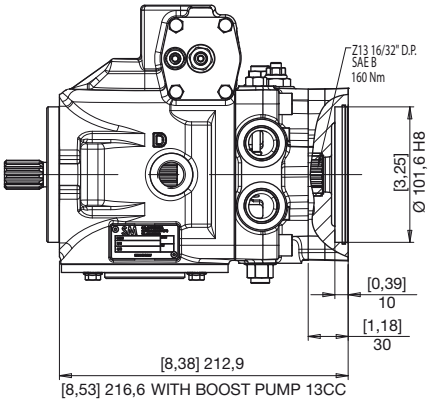
[8,53] 216,6 WITH BOOST PUMP 13CC

PREDISPOSIZIONI
VERSION
BAUART

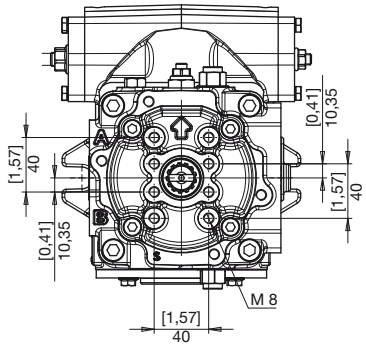
3 SAE B CON POMPA SOVRALIMENTAZIONE
SAE B WITH CHARGE PUMP
SAE B MIT SPEISEPUMPE



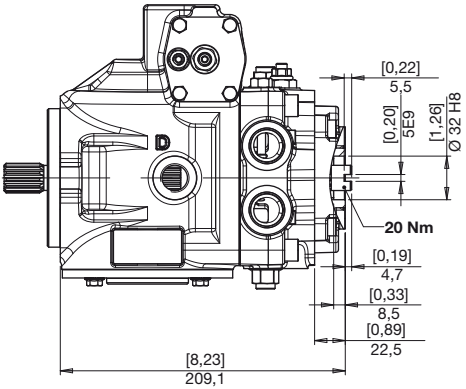
6 SAE B SENZA POMPA SOVRALIMENTAZIONE
SAE B WITHOUT CHARGE PUMP
SAE B OHNE SPEISEPUMPE



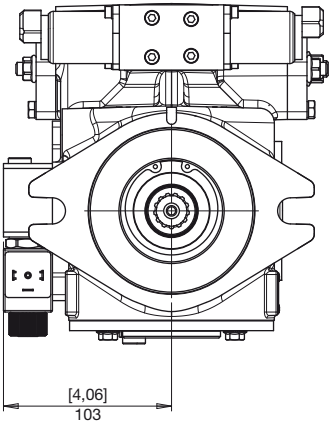
8 POMPA INGRANAGGI GR 1 CON POMPA SOVRALIMENTAZIONE
GR 1 GEAR PUMP WITH CHARGE PUMP
BAUREIHE GR 1 ZAHNRADPUMPE MIT SPEISEPUMPE

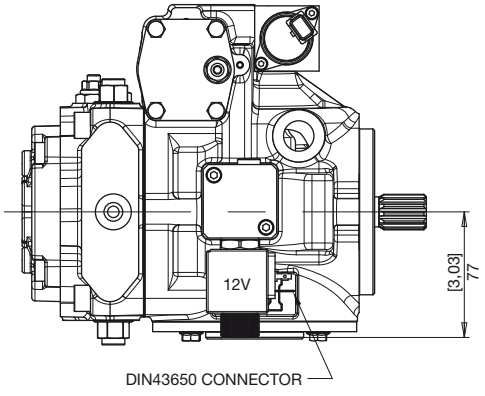


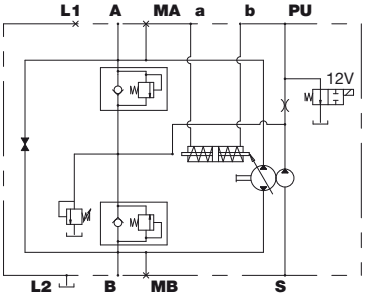
9 POMPA INGRANAGGI GR 1 SENZA POMPA DI SOVRALIMENTAZIONE
GR 1 GEAR PUMP WITHOUT CHARGE PUMP
BAUREIHE GR 1 ZAHNRADPUMPE OHNE SPEISEPUMPE

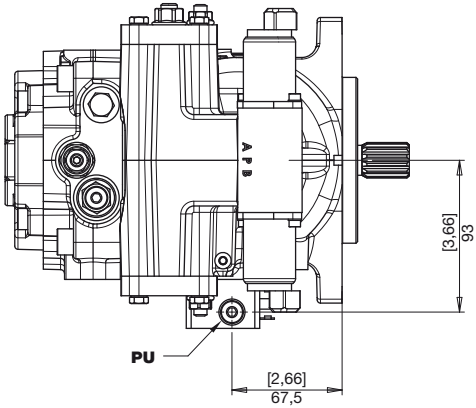


E **SICUREZZA OPERATORE ASSENTE 12V**
NO OPERATOR SAFETY 12V
SICHERUNG KEIN BEDIENER 12V



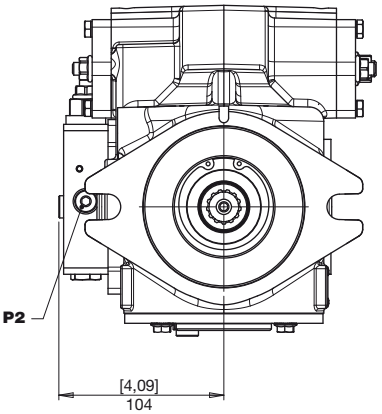


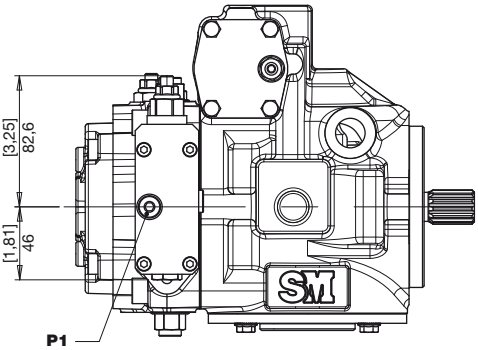


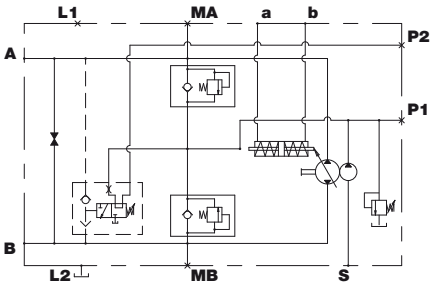


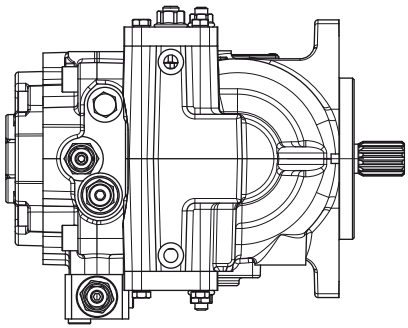
PU	Pilotaggio sblocco freno *Brake opening pressure* Bremse offnung druck	G 1/8" BSPP

J TAGLIO DI PRESSIONE
CUT-OFF
DRUCKABSCHNEIDUNG



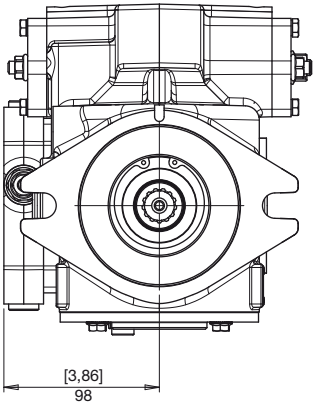


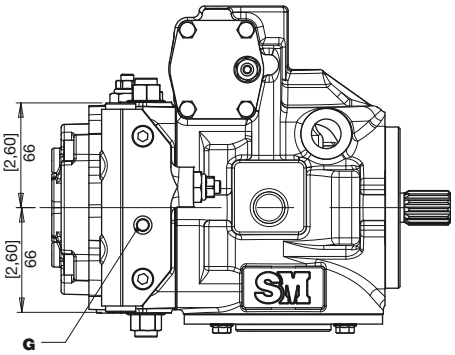


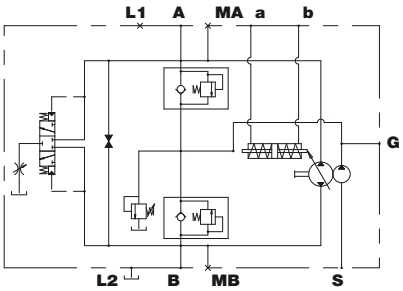


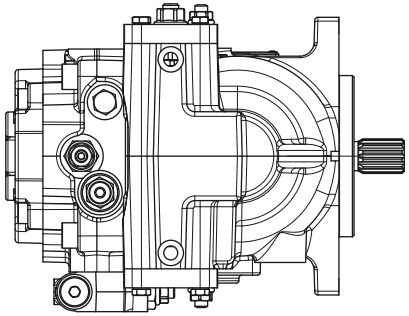
		Filettatura *Thread* Gewinde	Profondità *Depth* Tiefe
P1	Presa pressione *Pressure intake* Druckanschluß	G 1/8" BSPP	9 mm 0.35 in
P2			

V VALVOLA DI SCAMBIO
EXCHANGE VALVE
SPÜLVENTIL





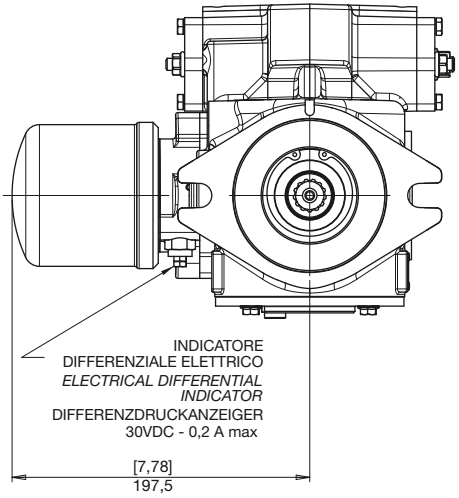


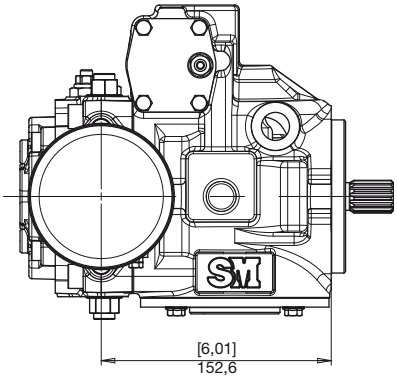


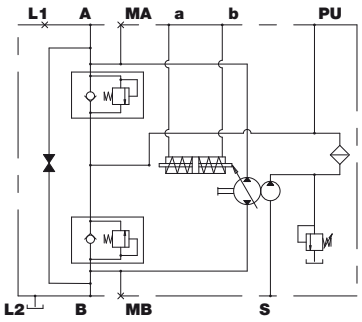
		Versione GAS *GAS version* Version GAS		Versione UNF *UNF version* Version UNF	
		Filettatura *Thread* Gewinde	Profondità *Depth* Tiefe	Filettatura *Thread* Gewinde	Profondità *Depth* Tiefe
G	Presa bassa pressione *Test port boost pressure* Messanschluß Speisedruck	G 1/4” BSPP	12 mm 0.47 in	7/16-20 UNF	12 mm 0.47 in

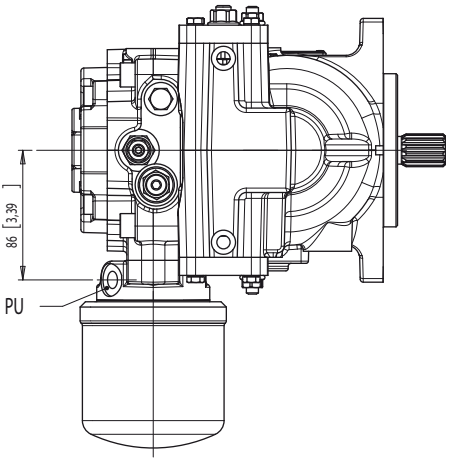
ACCESSORI
ACCESSORIES
ZUBEHÖR

X **FILTRO CON INDICATORE DI INTASAMENTO ELETTRICO**
FILTER WITH ELECTRIC CLOGGING INDICATOR
FILTER MIT ELEKTRISCHEM VERSTOPFUNGSANZEIGER



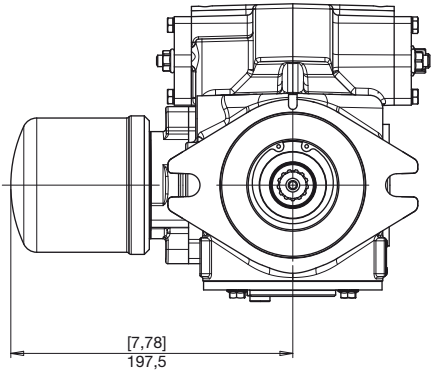


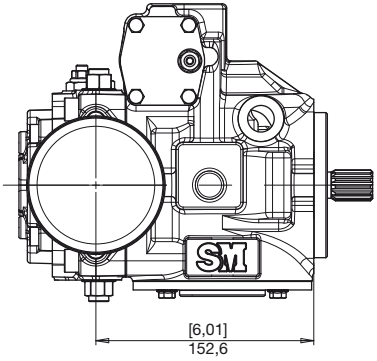


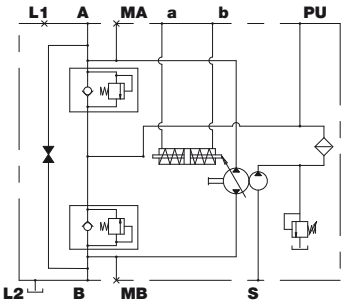


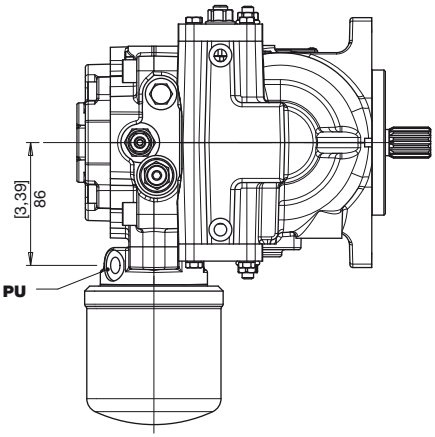
PU	Presa olio filtrato *Filtered oil intake* Anschluss Filtriertes Öl	G 1/4" BSPP

Y **FILTRO SENZA INDICATORE DI INTASAMENTO**
FILTER WITHOUT ELECTRIC CLOGGING INDICATOR
FILTER OHNE ELEKTRISCHEN VERSTOPFUNGSANZEIGER









PU	Presa olio filtrato *Filtered oil intake* Anschluss Filtriertes Ol	G 1/4" BSPP

ISTRUZIONI PER L'ORDINAZIONE
ORDERING INSTRUCTIONS
BESTELLANLEITUNG

HM	PS	19	R	S	V	G	K	E	A	1	0	...

PRODOTTO
PRODUCT
PRODUKT

CILINDRATA
DISPLACEMENT
FÖRDERVOLUMEN

17 = 17 cc	25 = 25 cc
19 = 19 cc	28 = 28 cc
21 = 21 cc	30 = 30 cc
22 = 22 cc	32 = 32 cc
23 = 23 cc	34 = 34 cc

SENSO DI ROTAZIONE
ROTATION
DREHRICHTUNG

R - Destra *Right* Rechts
L - Sinistra *Left* Links

S - Pompa singola *Single pump* Einzelne Pumpe

C - Pompa post. Tandem *Tandem rear pump* Hintere Tandem-Pumpe

ESTREMITÀ D'ALBERO
SHAFT PROFILE
WELLENENDE

J - Ø 22,22
9 - 13T SAE 16/32" DP
3 - 15T SAE 16/32" DP

BOCCHE
PORTS
ANSCHLÜSSE

G - Gas
U - UNF

TARATURA VALVOLE
VALVE SETTING
VENTILE

B - 150 bar
D - 180 bar
E - 210 bar
H - 230 bar
G - 250 bar
I - 280 bar
L - 300 bar
M - 320 bar
O - 350 bar

COMANDO ***CONTROL*** **STEUERUNG**

E - Elettrico ON/OFF centro chiuso (12V)
F - Elettrico ON/OFF centro chiuso (24V)
N - Elettrico ON/OFF centro aperto (12V)
Q - Elettrico ON/OFF centro aperto (24V)
S - Elettronico proporzionale (12V)
W - Elettronico proporzionale (24V)
K - Idraulico a distanza
I - Idraulico manuale
C - Idraulico manuale con interruttore elettrico

***E** - Electrical on/off, closed center (12V)*
***F** - Electrical on/off, closed center (24V)*
***N** - Electrical on/off, open center (12V)*
***Q** - Electrical on/off, open center (24V)*
***S** - Electronical proportional (12V)*
***W** - Electronical proportional (24V)*
***K** - Remote hydraulic*
***I** - Manual hydraulic*
***C** - Manual hydraulic with electrical switch*

E - Elektrische Steuerung on/off geshlosseness Ventil (12V)
F - Elektrische Steuerung on/off geshlosseness Ventil (24V)
N - Elektrische Steuerung on/off geöffnetes Ventil (12V)
Q - Elektrische Steuerung on/off geöffnetes Ventil (24V)
S - Elektronische Proportionalsteuerung (12V)
W - Elektronische Proportionalsteuerung (24V)
K - Hydraulische Fernesteuerung
I - Manuell Hydraulische
C - Manuell Hydraulische mit elektrischer Schalter

ESECUZIONI SPECIALI
SPECIAL VERSIONS
SONDERBAUARTEN

ACCESSORI
ACCESSORIES
ZUBEHÖR

0 - Nessuno
E - Sicurezza operatore assente
V - Valvola di scambio regolabile
U - Valvola di scambio fissa
X - Filtro con indicatore di intasamento
Y - Filtro senza indicatore di intasamento
J - Taglio di pressione

0 - No accessories
E - No operator safety
V - Exchange valve adjustable
U - Exchange valve fixed
X - Filter with electric clogging indicator
Y - Filter without electric clogging indicator
J - Cut-off

0 - Ohne Zubehör
E - Sicherung kein arbeiter
V - Spülventil
U - Spülventil
X -Filter mit Verstopfungsanzeiger
Y - Filter ohne Verstopfungsanzeiger
J - Druckabschneidung

PREDISPOSIZIONI ***VERSION*** **BAUART**

0 - nessuna, senza pompa di alimentazione
1 - nessuna, con pompa di alimentazione
5 - SAE A, senza pompa di alimentazione
2 - SAE A, con pompa di alimentazione
6 - SAE B senza pompa di alimentazione
3 - SAE B con pompa di alimentazione
9 - GR1, senza pompa di alimentazione
8 - GR1, con pompa di alimentazione

***0** - No auxiliary mount without charge pump*
***1** - No auxiliary mount with charge pump*
***5** - SAE A mounting without charge pump*
***2** - SAE A mount with charge pump*
***6** - SAE B mount without charge pump*
***3** - SAE B mount with charge pump*
***9** - GR1 mount without charge pump*
***8** - GR1 mount with charge pump*

0 - Ohne Anschlussflansch, ohne Speisepumpe
1 - Ohne Anschlussflansch, mit Speisepumpe
5 - SAE A-Anschlussflansch, ohne Speisepumpe
2 - SAE A -Anschlussflansch, mit Speisepumpe
6 - SAE B-Anschlussflansch, ohne Speisepumpe
3 - SAE B -Anschlussflansch, mit Speisepumpe
9 - GR1 ohne Speisepumpe
8 - GR1 mit Speisepumpe

TIPO DI OSCILLANTE
SWASPLATE TYPE
SCWENKSCHEIBENLAGERUNG

A - Montato su cuscinetti a rullini *Mounted on roller bearing* Rollengelagert

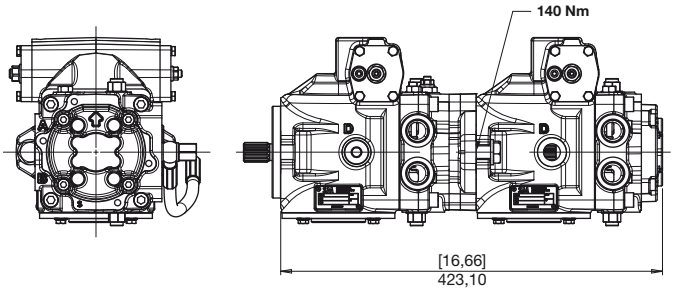
POMPA DOPPIA CON 1 POMPA DI SOVRALIMENTAZIONE
DOUBLE PUMP WITH 1 BOOST PUMP
TANDEMPUMPE MIT 1 SPEISEPUMPE

Il codice di ordinazione di una pompa multipla si ottiene sommando, come mostrato in esempio, i codici delle singole pompe (stadi) ricavati seguendo le regole di ordinazione delle pompe singole.

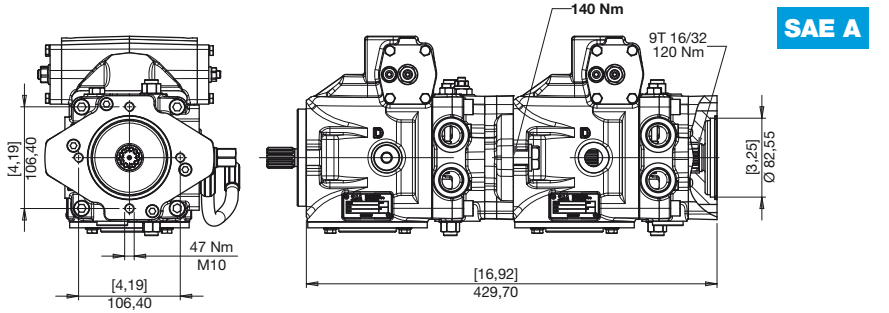
You build the ordering code of a multiple pump by summing the order code of the individual pumps, see our example.

Der Bestellschlüssel einer Mehrfachpumpe ergibt sich durch Summieren der Einzel-Bestellschlüssel, siehe Beispiel

1° STADIO *STAGE* STUFE													2° STADIO *STAGE* STUFE											
HM	PS	19	R	S	9	G	K	E	A	3	0	00	HM	PS	19	R	C	9	G	K	E	A	0	0	00



1° STADIO *STAGE* STUFE													2° STADIO *STAGE* STUFE											
HM	PS	19	R	S	9	G	K	E	A	3	0	00	HM	PS	19	R	C	9	G	K	E	A	5	0	00



Nelle pompe tandem con una pompa di sovralimentazione è obbligatorio installare nell'impianto un tubo di collegamento (non fornito) tra un drenaggio del primo stadio ed un drenaggio del secondo stadio.

- La configurazione Tandem standard è con pompa da 8cc nel primo stadio.
- Con albero rinforzato è disponibile una sola configurazione con pompa da 8cc nel secondo stadio.

In the tandem pumps with one boost pump it is mandatory to assemble in the plant a connecting pipe (not supplied) between a drain of the first stage and a drain of the second one.

- *The standard Tandem configuration is with a 8cm³ pump in the first stage.*
- *With reinforced shaft only one configuration with 8cm³ pump in the second stage is available.*

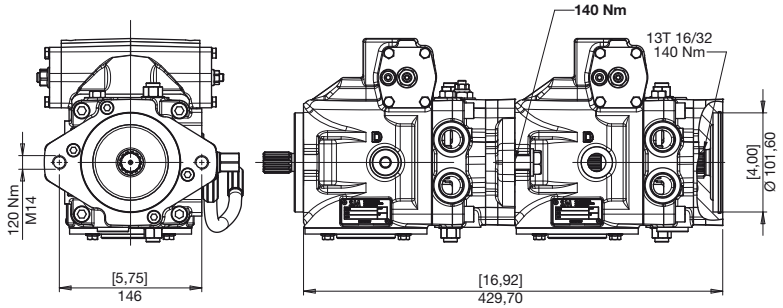
Bei den Tandempumpen mit einer Verstärkerpumpe muss in der Anlage ein Verbindungsrohr (nicht beigestellt) zwischen einer Drainage der ersten Stufe und einer Drainage der zweiten Stufe installiert werden.

- Die serienmäßige Tandemversion hat eine 8cc Pumpe in der ersten Stufe.
- Mit verstärkter Welle ist nur eine einzige Ausführung mit 8cc in der zweiten Stufe erhältlich.

1° STADIO *STAGE* STUFE — 2° STADIO *STAGE* STUFE

HM	PS	19	R	S	9	G	K	E	A	3	0	00	HM	PS	19	R	C	9	G	K	E	A	6	0	00

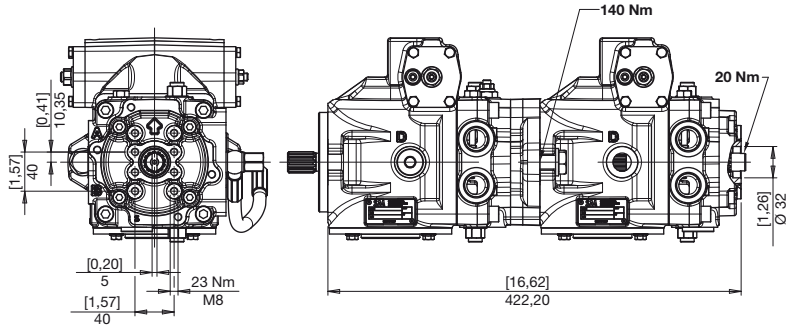
SAE B



1° STADIO *STAGE* STUFE — 2° STADIO *STAGE* STUFE

HM	PS	19	R	S	9	G	K	E	A	3	0	00	HM	PS	19	R	C	9	G	K	E	A	9	0	00

GR1



Nelle pompe tandem con una pompa di sovralimentazione è obbligatorio installare nell'impianto un tubo di collegamento (non fornito) tra un drenaggio del primo stadio ed un drenaggio del secondo stadio.

- La configurazione Tandem standard è con pompa da 8cc nel primo stadio.
- Con albero rinforzato è disponibile una sola configurazione con pompa da 8cc nel secondo stadio.

In the tandem pumps with one boost pump it is mandatory to assemble in the plant a connecting pipe (not supplied) between a drain of the first stage and a drain of the second one.

- *The standard Tandem configuration is with a 8cm³ pump in the first stage.*
- *With reinforced shaft only one configuration with 8cm³ pump in the second stage is available.*

Bei den Tandempumpen mit einer Verstärkerpumpe muss in der Anlage ein Verbindungsrohr (nicht beigestellt) zwischen einer Drainage der ersten Stufe und einer Drainage der zweiten Stufe installiert werden.

- Die serienmäßige Tandemversion hat eine 8cc Pumpe in der ersten Stufe.
- Mit verstärkter Welle ist nur eine einzige Ausführung mit 8cc in der zweiten Stufe erhältlich.