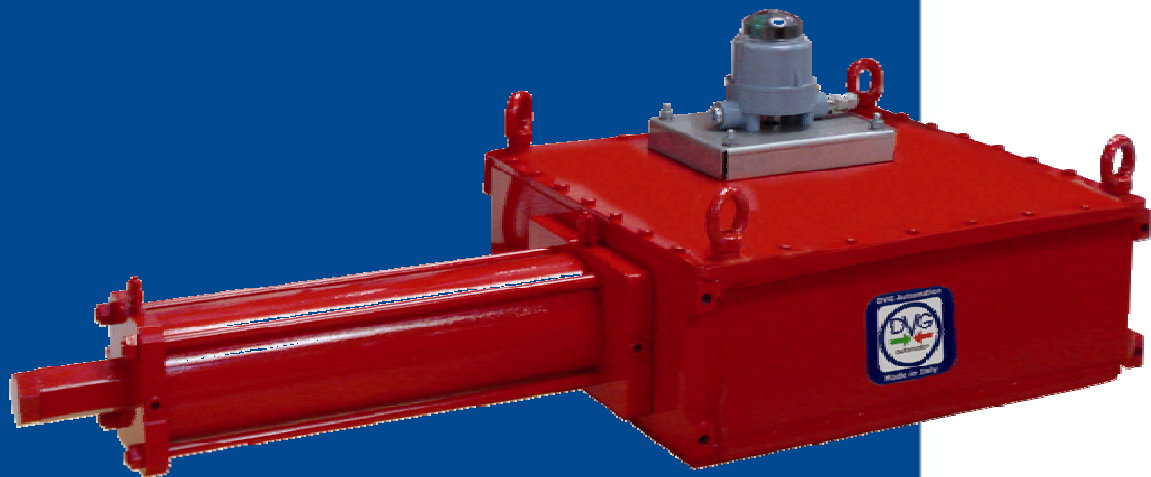




DVG Automation

“QT” SERIES
Direct Gas Actuators

PATENT PENDING
Nr PR2008A000006



INTRODUCTION

The DVG Automation “QT” Scotch Yoke Series incorporates several new design features to provide higher efficiency and cost effective solutions.

These actuators are compact in design but above all introduce a new generation of patented mechanism which minimizes wearing effect on all loaded & sliding parts, thus extending overall lifespan.

These features boost our QT Series for all modulating as well as heavy-duty services suitable for any quarter turn (90 deg) application.

OPERATING RANGE

The DVG Automation Double-acting QT Series Actuators are available with individual test and guaranteed minimum output torque ranging from **1,800 Nm (15,900 lb-in) to 180,000 Nm (1,593,000 lb-in)**
Higher output torques are available on request

The Direct Gas operating pressure for the QT Series ranges between **15 barg (290 psig) to 105 barg (1600 psig)**

Standard design construction allows operating temperature from **-30 degC (-22 degF) to +100 degC (+212 degF)**

Low temperature option extends operating range down to **-60 degC (-76 degF)**

Supply medium:
Sweet Gas (standard).

Special versions are available for fire-resistant, Sour Gas

KEY DESIGN FEATURES & ADVANTAGES

Scotch Yoke:

PATENTED mechanism introduces three main features:

Quad Guide Bars Design

Piston Rod-Guide Block New Design Connection

Closed Drive Yoke Wings for all housing sizes

Mechanism Guide System:

PATENTED Quad Guide Bar hard chromium plated minimizing guide block swing extending piston rod lifespan under heavy load &/or continuous modulating duty and avoiding any side load on valve stem.

Excellent surface finish and self lubricated bearings accomplish higher overall efficiency.

External Tie Rod:

External tie-rods, zinc based chemical coating which resists 500 – 1000 hours of salt fog, maintain cylinder integrity.

Symmetric or canted yoke:

QT Series is available with either symmetric or canted yoke design to cover as closely as possible valve resistive torque profile.

Water ingress protection:

Totally enclosed and weather-proof actuator is engineered to meet IP66, IP67 IP67M and NEMA 4 & 4X Specifications for submerged and high pressure water deluge applications.

Materials:

Cylinder Tube & all structural parts are manufactured in carbon steel material: no cast/grey iron or aluminium parts are used.

All pressure containing parts are supplied with 3.1 Certificate according to EN10204.

DVG Automation guarantees, where applicable, that actuators are designed and manufactured according to PED (97/23 CE) Directive.

Corrosion Prevention:

Cylinder tube is internally nickel-plated lined (minimum 25µm). Nickel-plating layer can be increased upon request.

External coating provides higher reliability in harsh environmental conditions as per ISO 12944 (Expected Durability) and in compliance with Norsok M-CR-501 requirements.

Seal:

Teflon ring with internal charging O-ring and external sealing O-ring prevents sticking phenomena after prolonged “stand still” and ensures reduced hysteresis and high sensitivity.

Bearing:

Dual piston PTFE sliding guide, yoke and guide block are mounted with steel bronze Teflon coated bushing to minimize wearing effect and obtain higher sensitivity.

ISO Valve Mounting:

The QT Series valve interface responds to ISO 5211 dimensional requirements according to specific torque range. Different arrangements can be evaluated to meet specific need (i.e. MSS SP-101, etc.); direct mounting is feasible if available space permits.

Labelling:

316 Stainless Steel embossed name plate ensures long lasting information preservation, thus guaranteeing lifetime traceability.

Travel stops:

External travel stops with protective cap ensure precise angular stroke adjustment 90 -5deg/+5deg.

Versatility & Modularity: key features for a successful design

The QT series has been designed with modular concept in mind so to have field repairable housing, power and override modules available as individual sub-assemblies to optimize spare parts inventory. Each module can be removed, serviced &/or replaced while actuator is still assembled onto the valve, without interrupting the process.

Specifically power module is designed and constructed to allow pressure testing independently from the housing.

Safety:

Lifting point by means of DIN certified eyelet located on actuator housing.

OPTIONAL FEATURES

Mounting pad:

Accessory mounting pad allows dual side mounting & does not require any fixing modification in case of rear side assembly.

Manual Override:

DVG Automation provides hydraulic manual override (MH) to operate the valve in absence of power supply. Hydraulic manual override is mounted directly on actuator cylinder and includes: hand-pump, directional control valve, oil tank, relief valve. Additional ancillary control equipment can be provided upon request.

Mechanical locking device

This device is wafer-mounted between the actuator and the valve, normally integrated in valve mounting hardware. It offers basic partial stroke testing for Emergency Shutdown Valve automated package and it can be used for other safety process applications. The locking device mechanically limits the valve/actuator assembly travel to 20deg (or as per specific Customer request) clockwise or counter-clockwise. Once disengaged, the complete assembly is free to travel for the entire stroke with no interference.

CONTROL SYSTEM

Actuator Control Systems are integral part of any automated valve package. Our QT Series Actuators can be equipped with an extensive range of auxiliary components specifically engineered and integrated to meet the largest variety of Customers' requests.

DVG Automation has already pre-engineered different solutions to meet the most commonly required control systems. These solutions offer reduced lead time, simplified purchasing, commissioning and start-up activities. Please contact factory for any additional detail.

Standard control system:

- Local Manual Control
- Local and Remote Control
- Local and Remote c/w Pressure Pilot ESD Logic (High to Close or to Open, Low to Close or to Open)
- Local and Remote Control c/w Electric Fail Safe (to Close or to Open)

Extended Features:

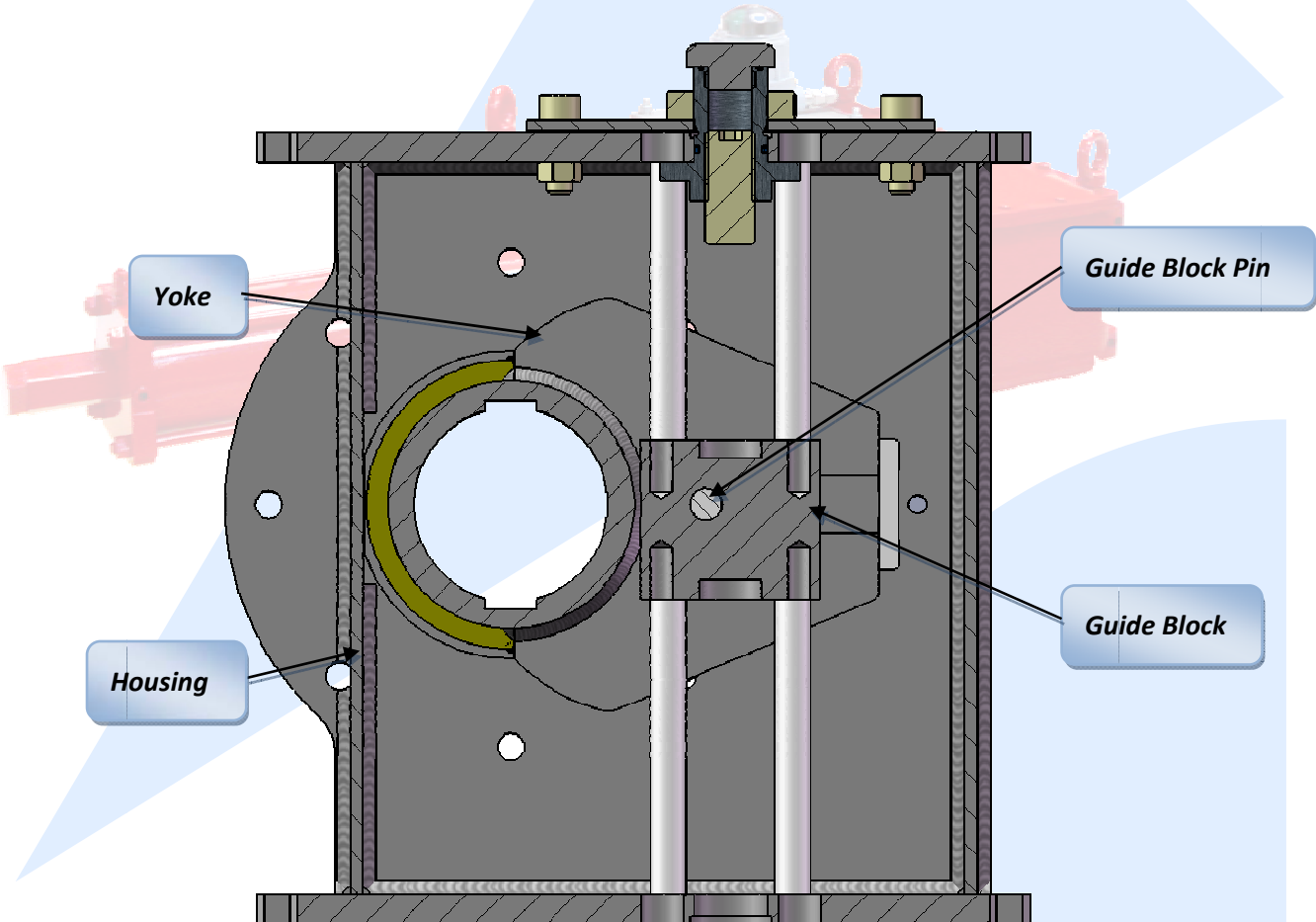
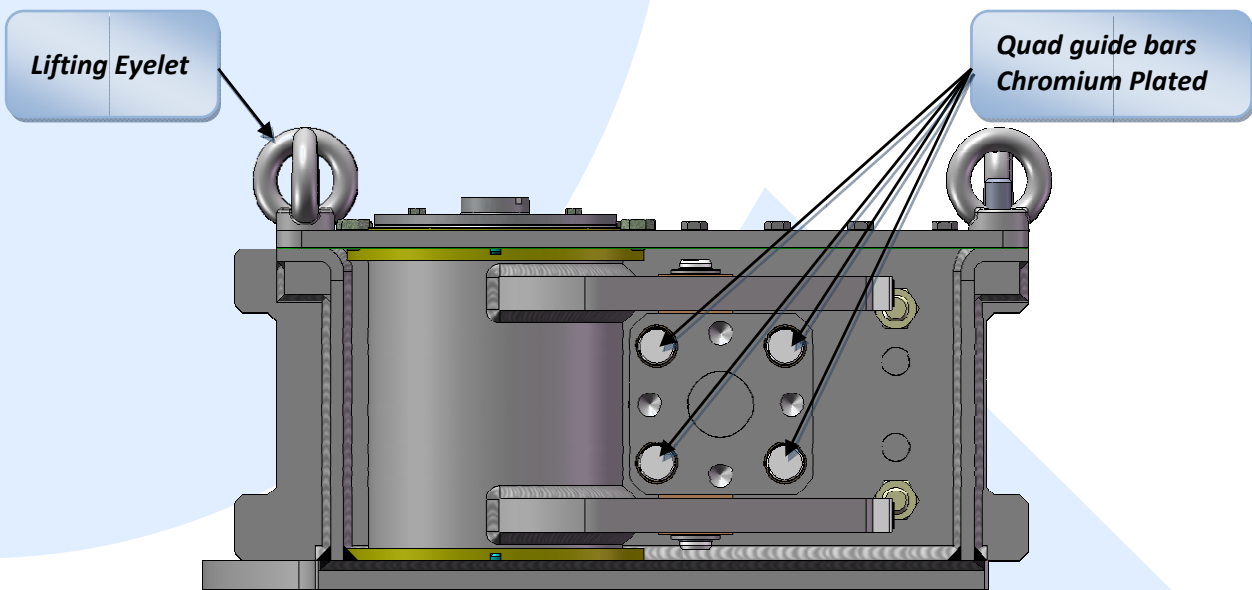
- Automatic Line Break Control
- Torque Limiting Devices

Please contact factory for any additional detail.

Position Monitor Device:

All positioning monitor devices can be assembled on top of our QT Series actuators, responding to any kind of technical requirement.

SCOTCH YOKE



PATENT PENDING
Nr PR2008A000006

QT Series double acting torque

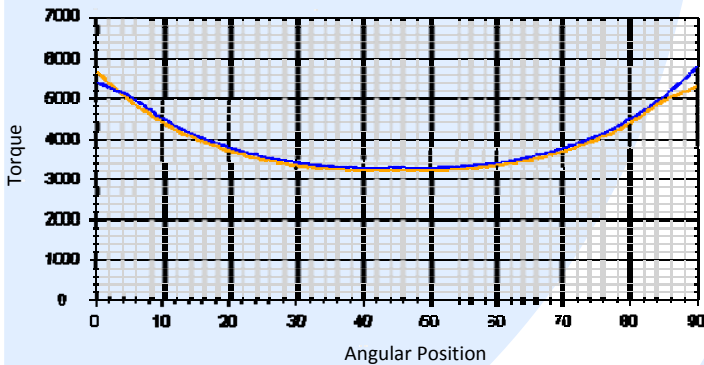
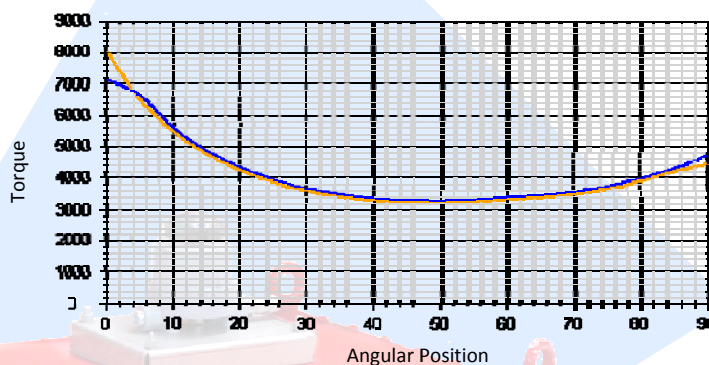


Figure 1

Torque for symmetric double acting QT

Figure 2

Torque for canted double acting QT



QT Series single acting torque

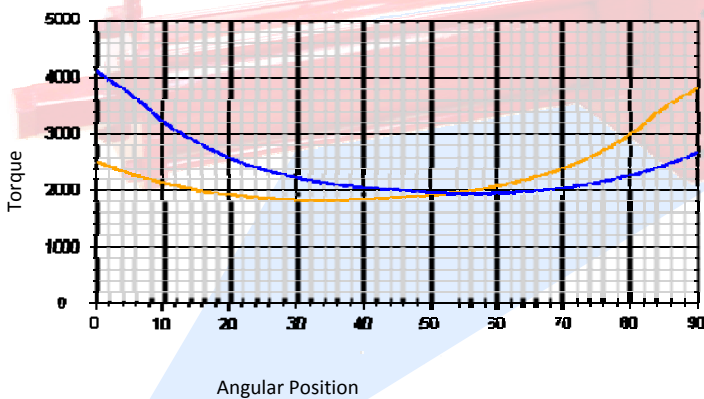
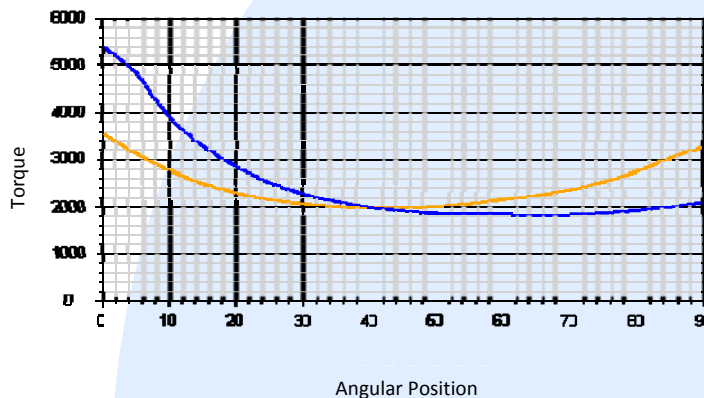


Figure 3

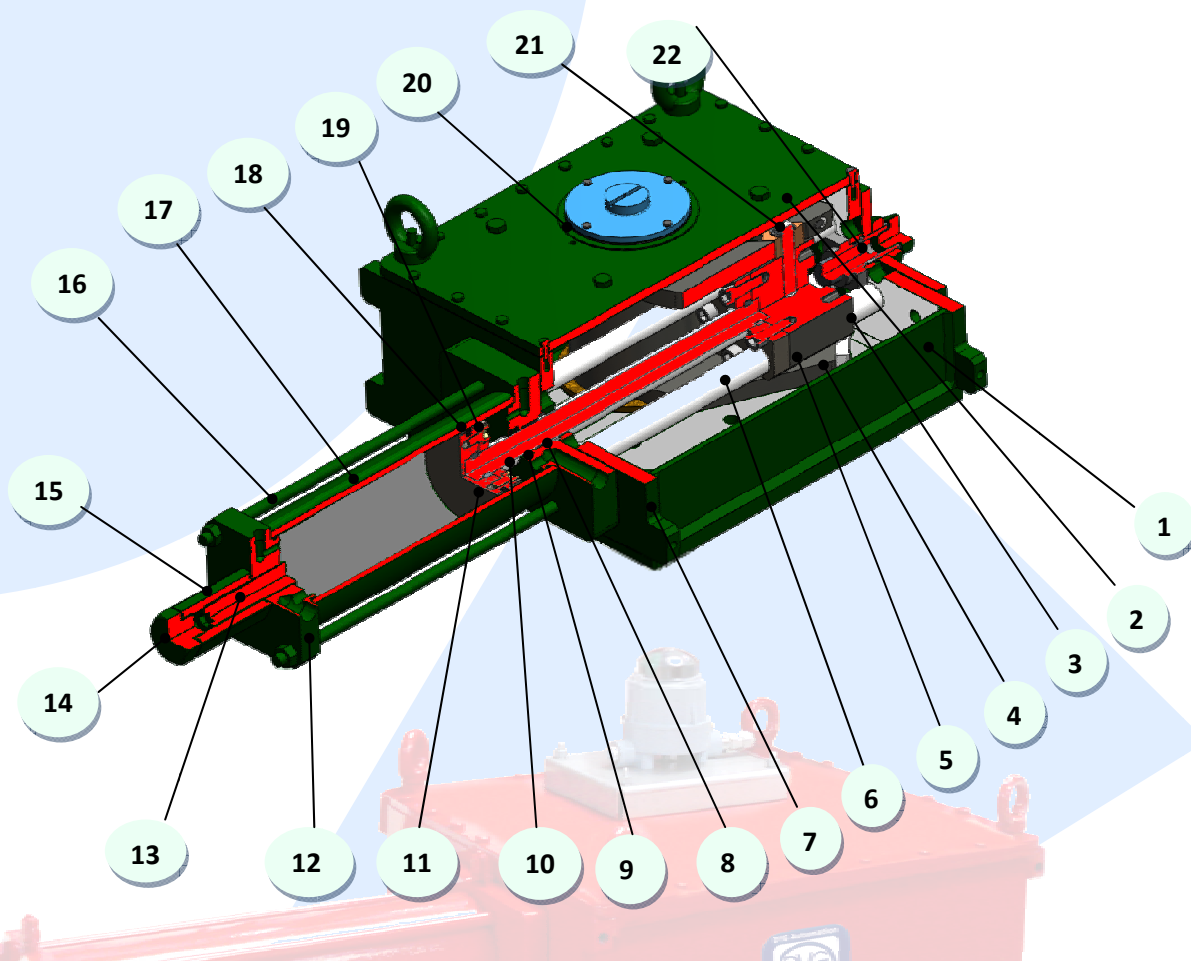
Torque for symmetric single acting QT

Figure 4

Torque for canted single acting QT

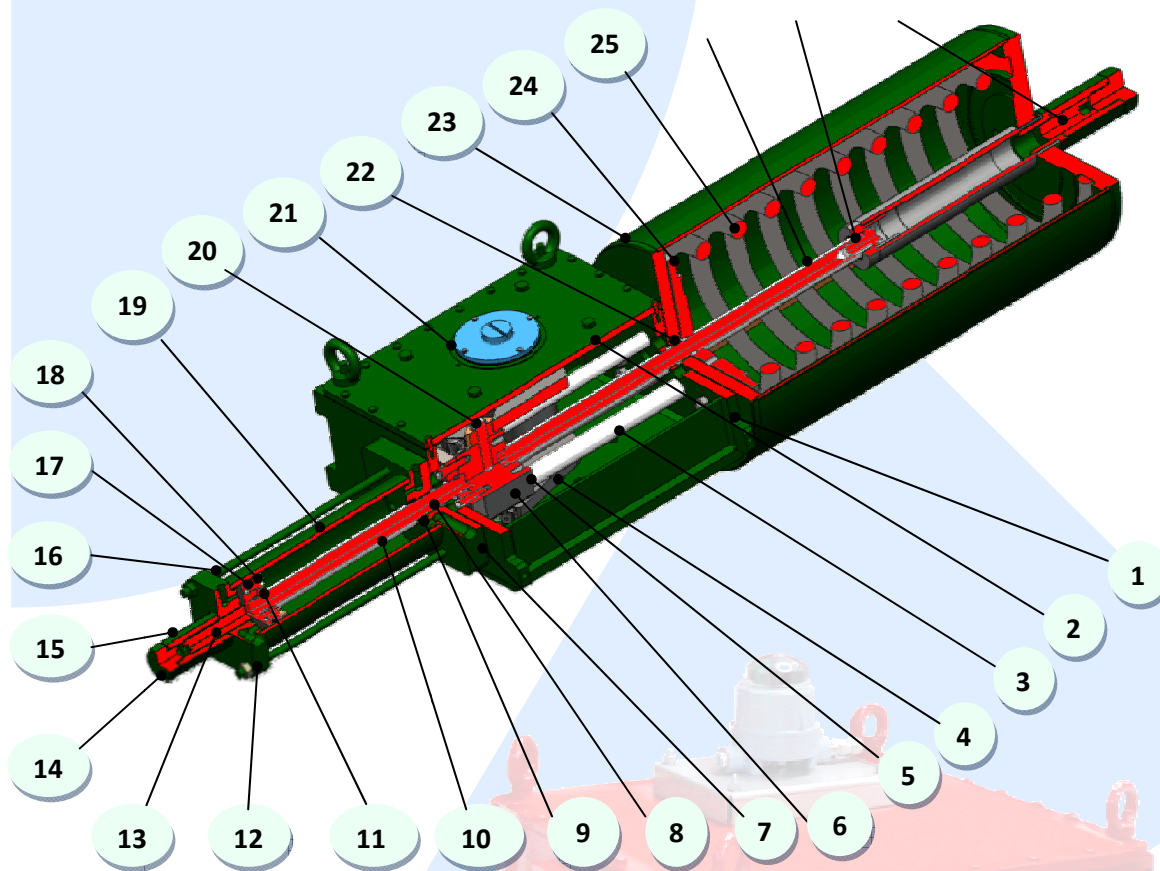


QTG Series double acting sectional drawing - QTG



Item	Description	EN Material	Equivalent to ASTM Material
1	Housing	S355 J2G3 EN 10025	ASTM A570 Gr. 50
2	Cover	S355 J2G3 EN 10025	ASTM A570 Gr. 50
3	Guide block bushing	Carbon steel + Bronze + PTFE	Carbon steel + Bronze + PTFE
4	Scotch yoke	S355 J2G3 EN 10025 - E355 EN 10297	ASTM A570 Gr. 50 + ASTM A500 Gr. C
5	Guide block	S355JR EN 10025	ASTM A572 Gr 50
6	Guide bar	42CrMo4 / 36CrNiMo4 EN 10083	AISI (9840)
7	Cylinder Head flange	S355 J2G3 EN 10025	ASTM A570 Gr. 50
8	Piston rod bushing	Carbon steel + Bronze + PTFE	Carbon steel + Bronze + PTFE
9	Piston rod seal	NBR (FKM – MFQ – CR)	NBR (FKM – MFQ – CR)
10	Piston rod	36CrNiMo4 EN 10083	AISI (9840)
11	Piston	S355 J2G3 EN 10025	ASTM A570 Gr. 50
12	Cylinder End flange	S355 J2G3 EN 10025	ASTM A570 Gr. 50
13	Travel stop screw	Class 45H ISO 4026	Class 45H ISO 4026
14	Plug	Class 8.8 ISO 4017	Class 8.8 ISO 4017
15	Stop screw protection	S235 J2G3 EN 10025	ASTM A570 Grade 50
16	Tie rod	ASTM A320L7	ASTM A320L7
17	Cylinder tube	E355K2+N EN10297 – E335+N EN10305	ASTM A500 Grade C
18	Piston seal	NBR (FKM – MFQ – CR)	NBR (FKM – MFQ – CR)
19	Piston sliding guide	PTFE+Graphite	PTFE+Graphite
20	Yoke bushing	Carbon steel + Bronze + PTFE	Carbon steel + Bronze + PTFE
21	Guide block pin	36CrNiMo4 EN 10083	AISI (9840)
22	Travel stop screw	Class 45H ISO 4026	Class 45H ISO 4026

QTG Series single acting sectional drawing - QTGS



Item	Description	EN Material	Equivalent to ASTM Material
1	Housing	S355 J2G3 EN 10025	ASTM A570 Gr. 50
2	Cover	S355 J2G3 EN 10025	ASTM A570 Gr. 50
3	Guide bar	42CrMo4 EN 10083	AISI (9840)
4	Scotch yoke	S355 J2G3 EN 10025 + E355 EN 10297	ASTM A570 Gr. 50 + ASTM A500 Gr. C
5	Guide block bushing	Carbon steel + Bronze + PTFE	Carbon steel + Bronze + PTFE
6	Guide block	S355JR EN 10025	ASTM A572 Gr 50
7	Cylinder Head flange	S355 J2G3 EN 10025	ASTM A570 Gr. 50
8	Piston rod bushing	Carbon steel + Bronze + PTFE	Carbon steel + Bronze + PTFE
9	Piston rod seal	NBR (FKM – MFQ – CR)	NBR (FKM – MFQ – CR)
10	Piston rod	42CrMo4 /36CrNiMo4 EN10083	AISI (9840)
11	Piston	S355 J2G3 EN 10025	ASTM A570 Gr. 50
12	Cylinder End flange	S355 J2G3 EN 10025	ASTM A570 Gr. 50
13	Travel stop screw	Class 45H ISO 4026	Class 45H ISO 4026
14	Plug	Class 8.8 ISO 4017	Class 8.8 ISO 4017
15	Stop screw protection	S235 J2G3 EN 10025	ASTM A570 Grade 50
16	Tie rod	ASTM A320L7	ASTM A320L7
17	Piston seal	NBR (FKM – MFQ – CR)	NBR (FKM – MFQ – CR)
18	Piston sliding guide	PTFE+Graphite	PTFE+Graphite
19	Cylinder tube	E355K2+N EN10297 – E355+N EN10305	ASTM A500 Grade C
20	Guide block pin	36CrNiMo4 EN 10083	AISI (9840)
21	Yoke bushing	Carbon steel + Bronze + PTFE	Carbon steel + Bronze + PTFE
22	Container rod bushing	Carbon steel + Bronze + PTFE	Carbon steel + Bronze + PTFE
23	Spring Cartridge tube	E355 EN 10297-10305	ASTM A500 Gr.C + ASTM A106 Gr.B
24	Spring cartridge load flange	S335 J2G3 EN 10025	ASTM A570 Gr. 50
25	Spring	EN 10270-2-FD5iCr	ASTM A-401
26	Spring cartridge rod	42CrMo4 EN 10083	AISI (9840)
27	Spring cartridge rod bushing	Carbon steel + Bronze + PTFE	Carbon steel + Bronze + PTFE
28	Travel stop screw	Class 45H ISO 4026	Class 45H ISO 4026

“QT” SERIES Direct Gas Actuators



QTG double acting - Output Torques (Nm) for symmetric yoke mechanism

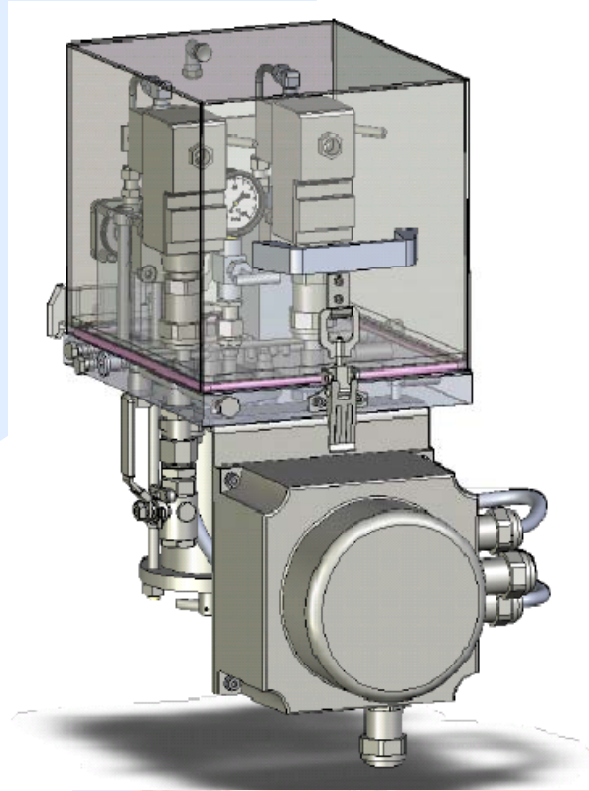
MODEL	Nm/Barg at 0°		Nm/Barg at 45°		Nm/Barg at 90°		DISPL (l)	Cylinder nominal Pressure (Barg)
	(OP)	(CL)	(OP)	(CL)	(OP)	(CL)		
QTG-010S-95	99	96	64	54	106	89	1.57	105
QTG-010S-120	158	159	96	90	169	148	2.5	105
QTG-016S-95	120	106	73	60	129	99	1.88	105
QTG-016S-120	192	183	117	104	206	170	3.01	105
QTG-016S-135	243	238	148	135	260	221	3.8	105
QTG-030S-120	291	277	177	158	312	259	4.51	105
QTG-030S-135	368	360	224	205	395	336	5.71	105
QTG-030S-150	454	453	277	257	488	422	7.04	105
QTG-060S-150	523	499	319	284	562	465	8.02	105
QTG-060S-175	713	702	434	399	765	654	10.92	105
QTG-120S-200	1056	1031	644	586	1133	961	16	105
QTG-120S-235	1458	1462	889	831	1564	1363	22.09	105
QTG-180S-235	1634	1550	996	881	1754	1445	24.49	105
QTG-180S-280	2320	2286	1415	1299	2490	2131	34.77	105

QTG double acting - Output Torques (Nm) for canted yoke mechanism

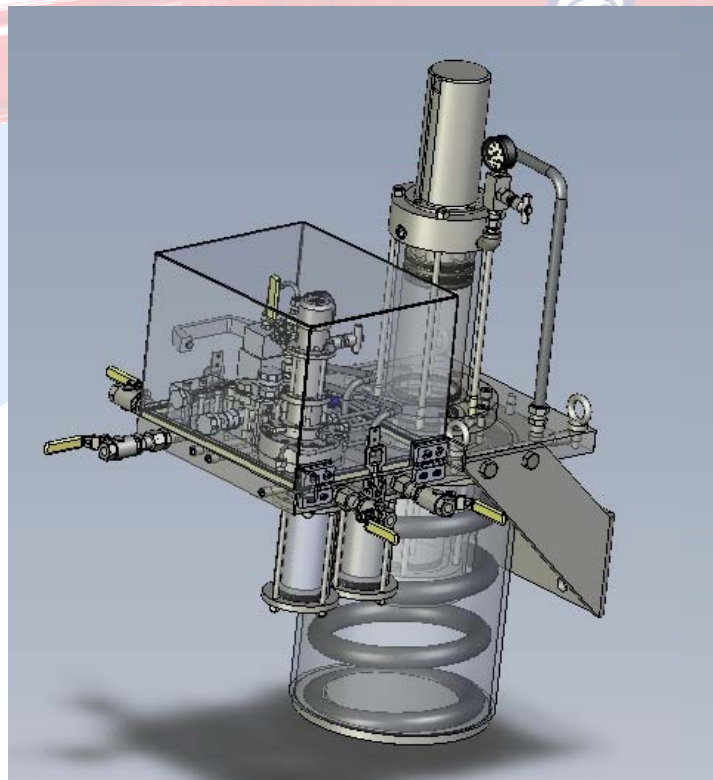
MODEL	Nm/Barg at 0°		Nm/Barg at 45°		Nm/Barg at 90°		DISPL (l)	Cylinder nominal Pressure (Barg)
	(OP)	(CL)	(OP)	(CL)	(OP)	(CL)		
QTG-010C-95	131	135	60	54	86	75	1.57	105
QTG-010C-120	209	225	96	90	138	124	2.5	105
QTG-016C-95	159	150	73	60	105	83	1.88	105
QTG-016C-120	253	259	117	104	167	143	3.01	105
QTG-016C-135	320	336	148	135	211	186	3.8	105
QTG-030C-120	384	393	178	158	253	217	4.51	105
QTG-030C-135	486	510	225	205	321	282	5.71	105
QTG-030C-150	600	642	278	258	396	354	7.04	105
QTG-060C-150	691	707	320	284	456	390	8.02	105
QTG-060C-175	941	994	435	400	621	549	10.92	105
QTG-120C-200	1394	1460	645	587	920	806	16	105
QTG-120C-235	1925	2071	891	833	1270	1143	22.09	105
QTG-180C-235	2158	2196	998	883	1424	1212	24.49	105
QTG-180C-280	3063	3238	1417	1302	2021	1787	34.77	105

QTG –Typical Control System I

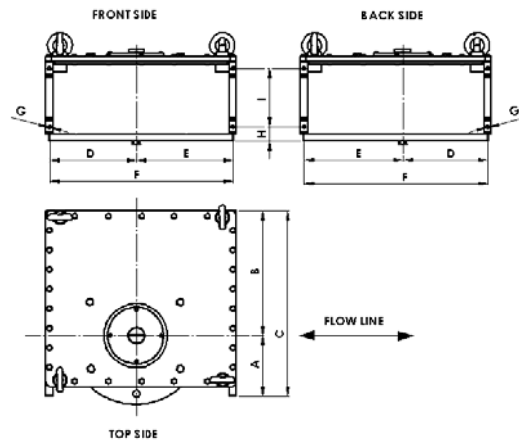
HPLR (High Pressure Local/Remote Control)



ALBC (Automatic line break control)

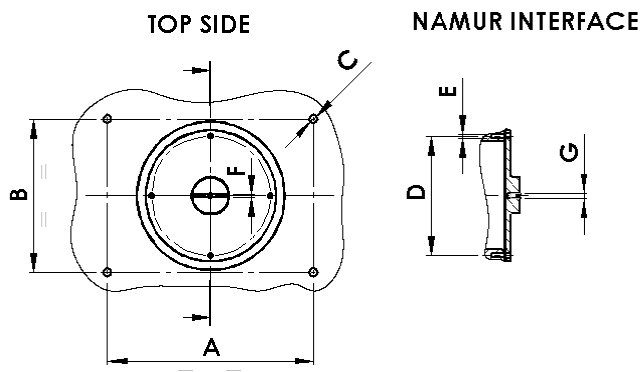


Housing Mounting holes and interface



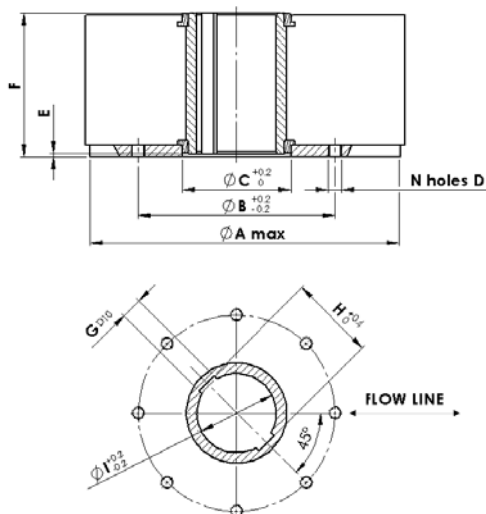
Model Size	A	B	C	D	E	F	G	H	I
10	129	267	396	185	208	393	N.4 M10	36	120
16	156	319	475	221	249	470	N.4 M10	36	150
30	206	432	638	310	350	660	N.4 M16	44	170
60	260	518	778	358	418	776	N.4 M20	62	205
120	250	600	850	425	495	910	N.4 M24	54	290
180	280	640	920	475	535	1010	N.4 M24	65	310

Cover and Yoke mounting holes



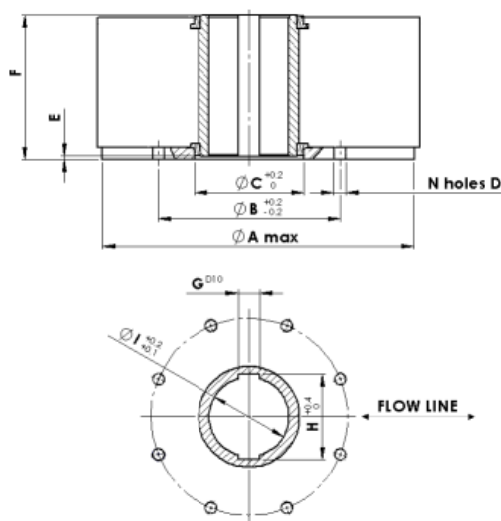
Model Size	A	B	C	D	E	F	G
10	200	140	N.4 M10	105	N.4 M4	4	M6
16	230	170	N.4 M10	132.5	N.4 M5	4	M6
30	240	180	N.4 M10	174	N.4 M5	4	M6
60	300	270	N.4 M12	212	N.4 M8	4	M6
120	300	270	N.4 M12	200	N.4 M8	4	M6
180	340	300	N.4 M16	240	N.4 M8	4	M6

Coupling dimensions for models 10-60



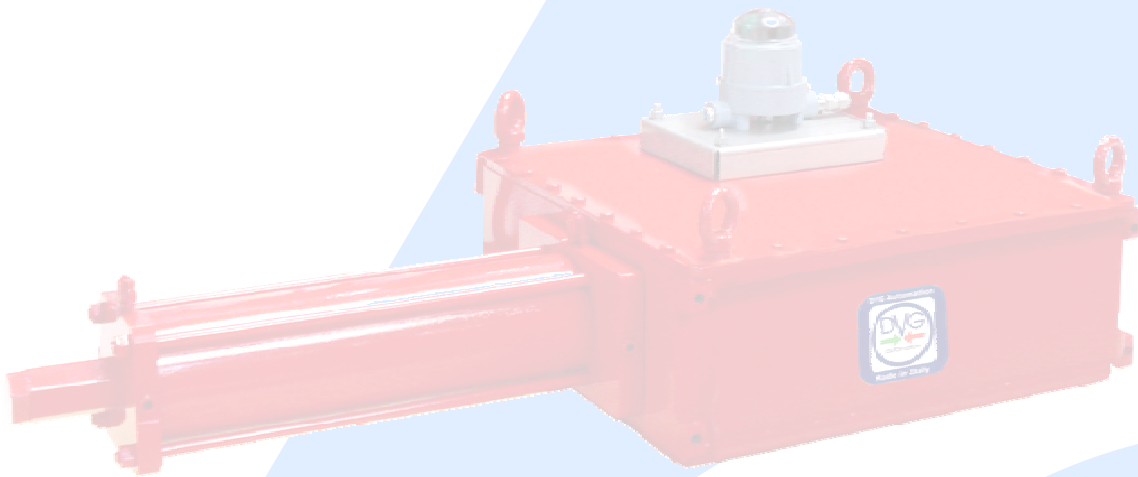
Model Size	A	B	C	D	E	F	G	H	I
10	300	254	130	N.8 M16	3	180	25	102.6	95
16	350	298	165	N.8 M20	4	215	32	128.8	120
30	415	356	210	N.8 M30	4	250	32	174.8	160
60	520	406	260	N.8 M36	5	315	32	209.8	195

Coupling dimensions for models 120-180



Model Size	A	B	C	D	E	F	G	H	I
120	560	483	250	N.12 M36	7	395	45	195.8	175
180	680	603	290	N.16 M36	8	410	45	220.8	200

NOTES:





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