Series MRK and MRM

Automatic Recirculation Valve for Pump Protection
For Nominal Pressures Up to 640 Bar/4500 lbs

CIRCOR ENERGY | Schroedahl

5/16 Version 1

Series MRK and MRM

The ultimate high pressure SCHROEDAHL Automatic Recirculation Valve, type MRK and MRM, is used as a pump protection system for centrifugal pumps for water applications.

SCHROEDAHL is the largest supplier of Automatic Recirculation Valves in the world. These ARVs, or pump protection systems, are our principal products. During the last 50 years, we have supplied more than 50,000 of these valves to satisfied customers all over the world. In addition to the long time existing MRM-type, we have succesfully devoloped the MRK-type.

Features

- Automatic bypass operation
- Modulating functioning
- Low maintenance
- Easy to install
- Damping of system pulsations
- Self-operated
- Reduces plant investment and operational costs

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Series MRK and MRM

Function MRM

The check valve (pos. 07, page 04) moves upwards with an increase in main flow and downwards with a decrease in flow. The movement of the check valve is transmitted directly via the lever (pos. 13, page 04) to the bypass system. When the check valve is closed, the bypass is completely open and full bypass flow is allowed to the deaerator (suction tank). With increasing main flow, the check valve is lifted off its seat and moves upwards. Only when the bypass is completely closed, full flow to the system is allowed. The valve is set in the factory in such a way that the specified minimum flow is reached when the check valve is seated (this means that the main flow is zero).

Function MRK

The MRK valve system is compromised of a check valve and a special control and throttle device for the minimum flow recirculation system (bypass system). The general valve functioning is related to the process flow quantity (flow sensitive). The bypass system itself consists of a primary regulating device (multi-staged), which is controlled by the main check valve and also a secondary, extra-special multi-staged pressure regulator. The functioning of the complete bypass is therefore split into 2 parts. Both parts (primary and secondary part) have to work together to fulfil the required pressure drop function as declared in our data sheet. The secondary part is controlled via the outer-connected pressure piping on the bypass section

The valve protects high pressure centrifugal pumps against overheating and cavitation problems by automatically maintaining a minimum flow when the system flow is at low load condition. At lower process flows, the check valve activates the bypass trim parts via a lever system, so that the pump is protected with the correct minimum flow. When the process/system flow starts (increases), the main check valve lifts off its seat and starts to operate (modulate) the bypass recirculation flow that returns to the system tank. When the check valve identifies enough system flow, the bypass closes automatically (switch point). If the system flow decreases again, then the bypass also starts to recirculate automatically.

Automatic Recirculation Valve MRK and MRM: Typical Drawing

Figure 1: Valve Type MRM

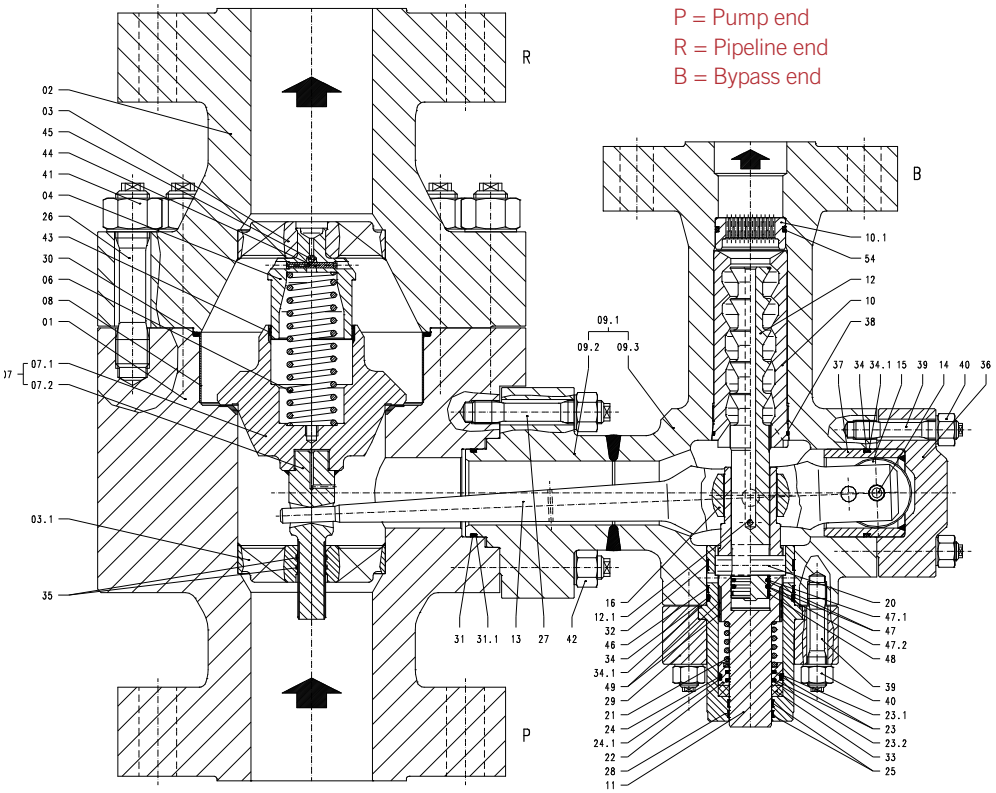
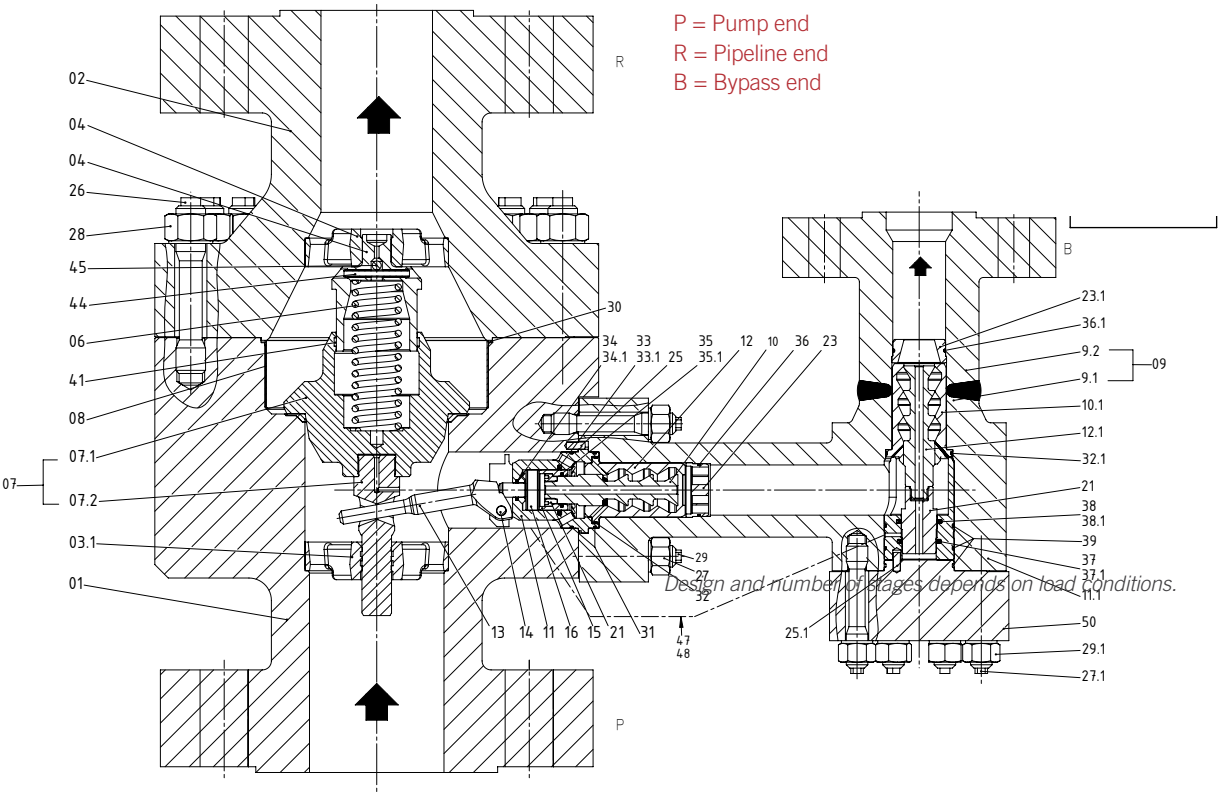


Figure 2: Valve Type MRK



Design and number of stages depends on load conditions.

Parts List (Example for MRM Type)

MRM Standard Parts List	
Item	Description
01	Lower Body
02	Upper Body
03	Stem Guide
03.1	Stem Guide
04	Guide Bolt
06	Spring
07	Check Valve Cpl.
07.1	Check Valve
07.2	Stem
08	Liner
09	Bypass Housing Cpl.
09.1	Flange
09.2	Bypass
10	Vortex Bushing
10.1	Orifice Plate
11	Plunger
12	Vortex Plug
12.1	Pin
13	Lever
14	Pin

MRM Standard Parts List	
Item	Description
15	Roller
16	Link Nut
20	Cotter
21	Spring
22	Gland
23	O-Ring
23.1	Step Seal
23.2	Glyd Ring
24	O-Ring
24.1	Guide Ring
25	Guide Ring
26	Stud Bolt
27	Stud Bolt
28	Packing Bushing
29	Packing Bushing Flange
30	O-Ring
31	O-Ring
31.1	Support Ring
32	Guide Ring
33	Packing Ring

MRM Standard Parts List	
Item	Description
34	O-Ring
34.1	Support Ring
35	Guide Ring
36	Cover
37	Bushing
38	O-Ring
39	Stud Bolt
40	Hexagon Nut
41	Hexagon Nut
42	Hexagon Nut
43	Guide Ring
44	Pin
45	Ball
46	Guide Ring
47	O-Ring
47.1	Step Seal
47.2	Glyd Ring
48	Guide Ring
49	Guide Ring
54	O-Ring

Materials

Standard housing materials available:

- Carbon steel ASTM A105, EN 1.0460
- Stainless steel ASTM A182, F316L, EN 1.4404 or ASTM A182 F347, EN 1.4550
- Duplex steel ASTM A479 (F51), EN 1.4462 or ASTM A479 (F55), EN 1.4501, plus materials for NORSOK applications.

The standard internals are made of stainless steel with a minimum chrome content of 13% (not valid for duplex housing material).

Other materials for housing and internals upon request.

Selection of the seal material according to medium and temperature conditions.

Selection of the housing material according to design pressure, design temperature and medium.

Valve Sizes

The MRMand MRK type valves are available in sizes from DN 80 (3”) to DN 300 (12”). Special sizes are available on request.

Connections

Flanges in accordance with EN or ASME; flanges in accordance with other standards (ISO, BS, JIS, NF) or hub connections upon request.

The valve in- and outlet can also be supplied with welding ends.

Operation Range Definition for MRK and MRM

The following two descriptions typically classify the pump protection application:

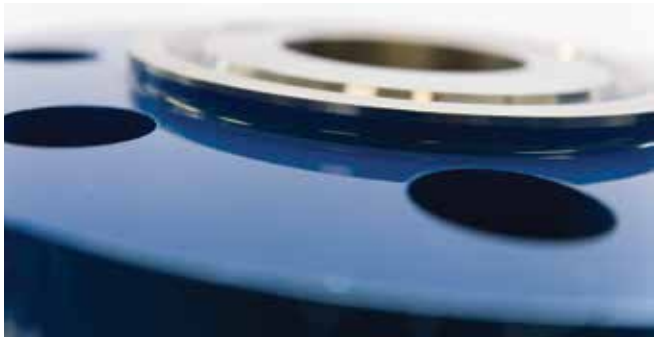
1. **Standard Operation Range Application, which is more typical for lower pressure applications rather than the high pressure MRK and MRM type applications:**

   The pump protection valves usually operate in the load range from 40% to 100% of the rated process flow. The automatic valve handles the typical time limited start-up and shut-down phase by automatically modulating the bypass control operation. MRK/MRM valves for high pressure services typically also need an adequately high bypass back pressure, e.g. an orifice restriction in the bypass line to prevent cavitation during the bypass flow phase.

MRK and MRM valves should follow the following classification:

2. **Full Operation Range Application, which is typical for MRK/MRM applications:**

   For high pressure MRK (also for MRM) applications with the explicit definition of the full load range from 0% to 100% process flow, it is mandatory before order placement to evaluate special design impacts on the valve. Otherwise, the application will be classified as a standard range type. For the high load range, depending on the existing bypass pressure level, it may be necessary to increase the bypass back pressure to prevent cavitation, also in the low load range where the bypass is in modulating action. Therefore, the installation of a special back pressure valve BPV is recommended for the full operation range application to ensure that the bypass pressure level is always at a suitable level.



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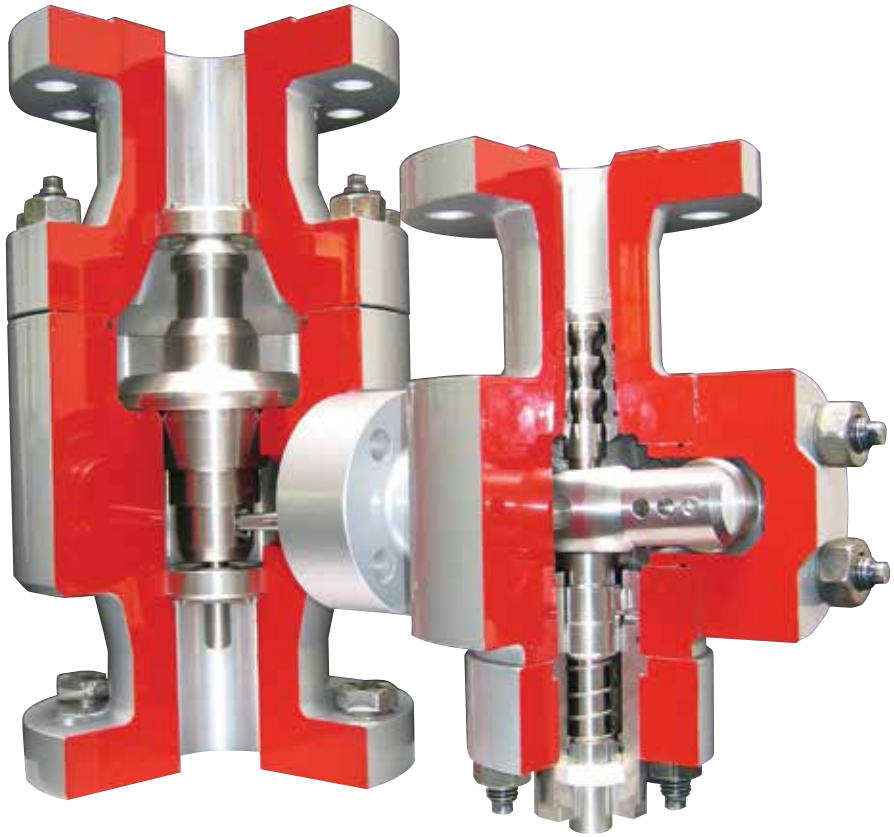
Type Description

Size Code	Pressure Class Code	Connection Code	Configuration Code
DN 80 (3") = 10	PN 63 Class 300 = 5	F = EN Flanges	V = Vertical Installation
DN 100 (4") = 11	PN 100 Class 600 = 6	U = ASME Flanges	H = Horizontal Installation
DN 125 (5") = 12	PN 160 Class 900 = 7	S = Welding Ends	A = Manual Start-up
DN 150 (6") = 13	PN 250 Class 1500 = 8		W = Oversized Bypass or Start-up Connection
DN 200 (8") = 15	PN 320 = 9		CS = Carbon Steel Body
DN 250 (10") = 16	PN 400 Class 2500 = 0		SS = Stainless Steel Body
DN 300 (12") = 17	PN 500 Class 3200 = A		SD = Duplex Steel Body
	PN 640 Class 4500 = B		

Example of Type Description for MRK and MRM Valves

MRM 150UVW-CS: valve type MRM, 8", Class 2500, ASME flanges, vertical installation, carbon steel housing material, oversized bypass connection



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Installation Information

The Automatic Recirculation Valve should be installed as close as possible to the centrifugal pump discharge, preferably directly on the outlet of the pump.

To prevent low frequency shocks caused by pulsation of the medium, the distance between pump outlet and valve inlet should not exceed 5 m with a straight pipe run at the inlet. Exceptions have to be communicated to SCHROEDAHL.

Vertical installation is preferred, but horizontal installation is also possible upon request. MRK and MRM valves operate at a low noise level and ensure a high reliability due to their sturdy design.

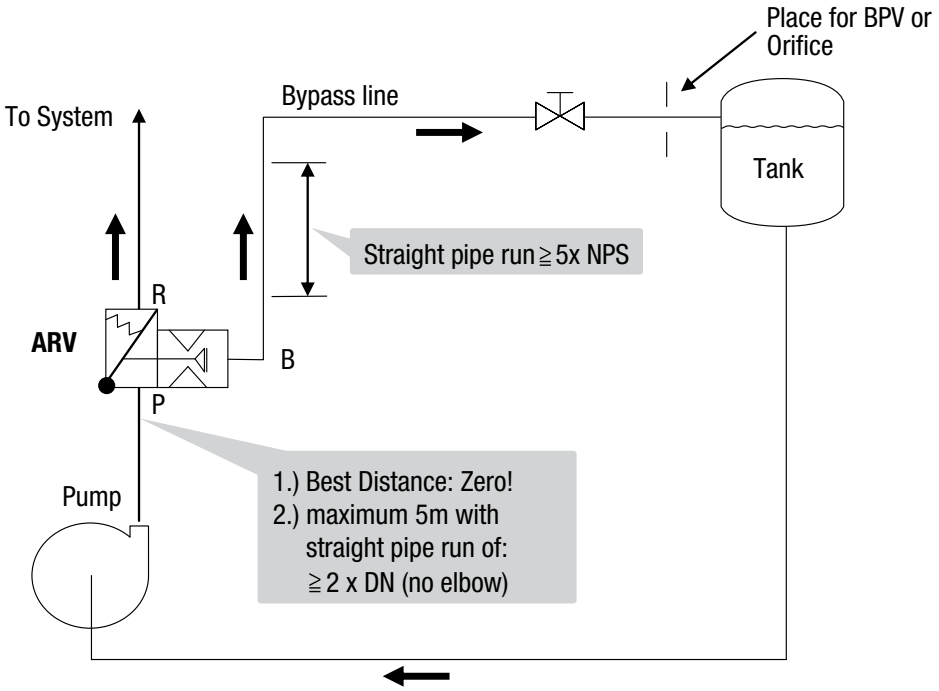
The recommended filter at the pump inlet should have a maximum mesh size of 0.3 to 0.5 mm. During commissioning we recommend a smaller filter mesh size (e.g. 0.1 mm).

Maintenance, Spares and Testing

Maintenance instructions are available upon request or at www.schroedahl.com.

Typically we recommend an inspection after commissioning (a gasket set is then required); after two years of operation, we recommend a bypass set (one complete bypass unit) for your stock.

A complete valve performance test run is recommended to be done together with the original pump. The bypass Kv/Cv value test can be certified at our test facility. Please contact SCHROEDAHL for additional information.



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Automatic Recirculation Valve Technical Data

Customer: _____ Project: _____

Enquiry no.: _____ Quantity: _____

Prior reference: _____ TAG-No: _____

Order Number: _____ _____

Automatic Recirculation Valve type: _____

Valve inlet DN _____ PN _____ Flange Code: _____

Valve outlet DN _____ PN _____ Installation: vertical _____ horizontal _____

Bypass outlet DN _____ PN _____ Paint: _____

Start-up DN _____ PN _____ Start-up: above _____ below check valve _____

Mat.-/test certificates: _____

Materials: Housing _____ Internals _____ Seals _____

Medium: _____ Operating temp. (°C): _____

S.G. (kg/m³): _____ Design temp. (°C): _____

Desing Pressure (barg): _____

H_0 = _____m

Q_M = _____m³/h H_M = _____m Suction pr. p_v _____barg

Q_{100} = _____m³/h H_{100} = _____m Differential pr. (p_1-p_n) _____bar

Q_{max} = _____m³/h H_{Qmax} = _____m Backpress p_N _____barg

Q_A = _____m³/h H_A = _____m Backpress p_A _____barg

Notes: _____

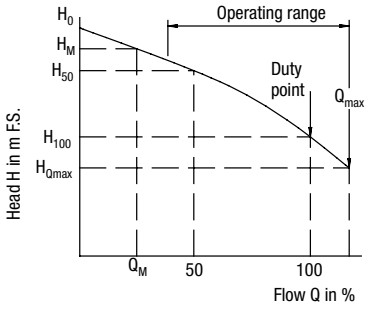
_____

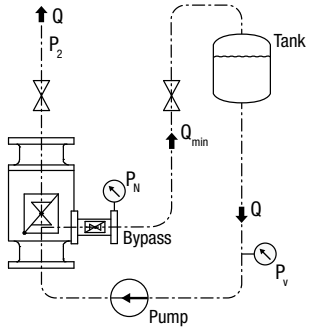
_____

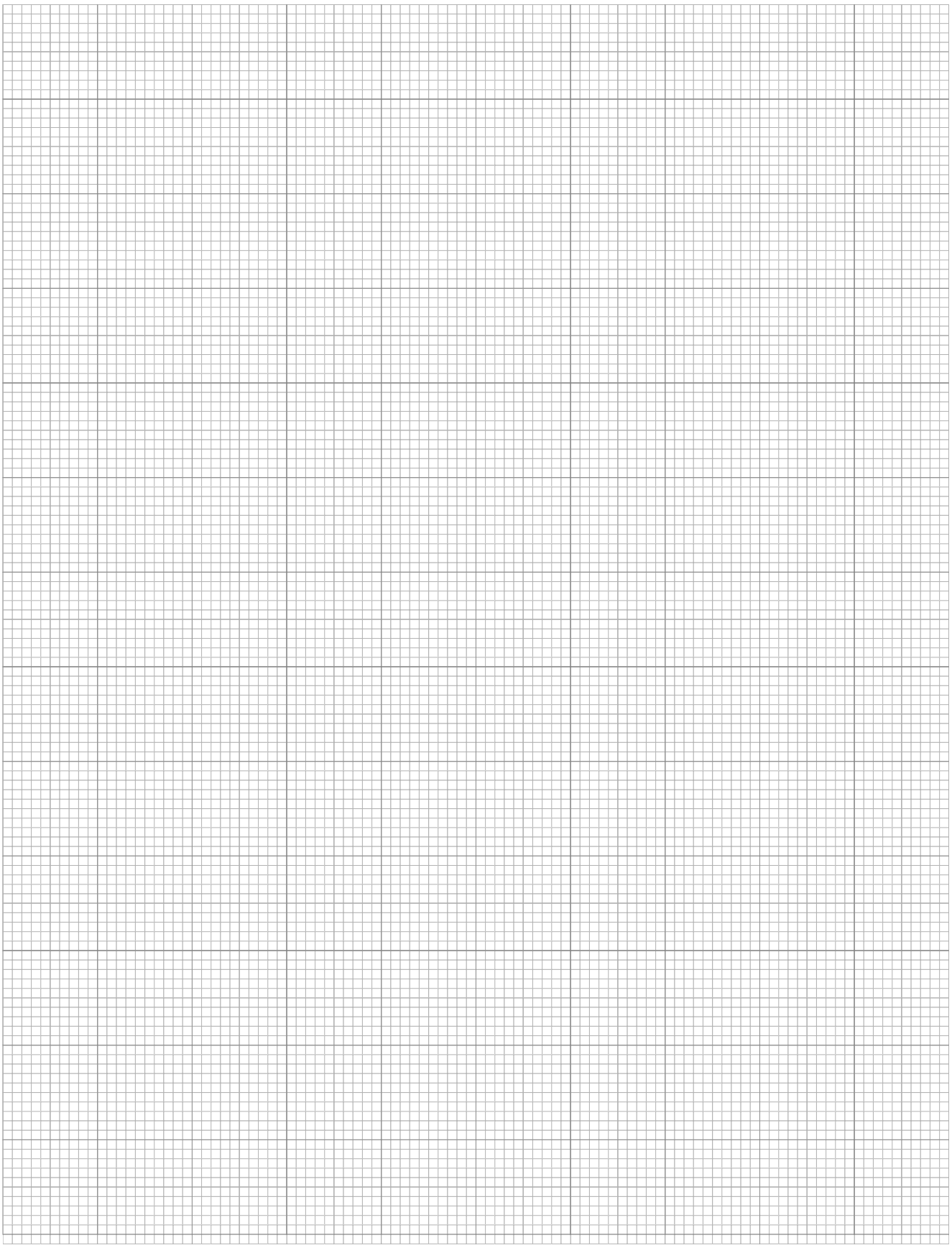
_____

Revision Date _____ Description _____

Name _____ Signature _____







CIRCOR Energy is a global manufacturer of highly engineered valves, fittings, pipeline and associated products for general, critical and severe service applications in the Oil & Gas, Power Generation and Process Industry markets. CIRCOR Energy continuously develops precision technologies to improve our customers' ability to control the flow of the world's natural resources.

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