

- System Specification -

SYGEF ECTFE Piping System in ethylene chlorotrifluoroethylene (Halar ECTFE)

1. Scope

This specification covers requirements for the GF **SYGEF ECTFE** piping system intended for a wide range of applications in the industrial field but dedicated for chemical applications. All components of the **SYGEF ECTFE** piping systems comply with the following standards.

2. Basic System Data

2.1. Material Specification

SYGEF ECTFE pipes and fittings from GF Piping Systems manufactured from unpigmented and opaque Ethylene chlorotrifluoroethylene resin material. Pipes and fittings designed for industrial applications providing 25 years of operational lifetime with water at 20°C. The raw materials used designed for use with pressure bearing piping systems with long-term hydrostatic properties in compliance with EN ISO 10931, as supplied by GF Piping Systems.

2.2. Characteristics of SYGEF ECTFE

Characteristics	Value ^I	Unit	Test standard
Density	1.68	g/cm ³	EN ISO 1183-1/ ASTM D792
Yield stress at 23°C	≥ 30	N/mm ²	EN ISO 527-1
Tensile E-modulus at 23°C	≥ 1600	N/mm ²	ISO 527-1
Charpy notched impact strength at 23 °C	no break	kJ/m ²	EN ISO 179/1eA
Charpy notched impact strength at 0°C	≥ 6	kJ/m ²	EN ISO 179/1eA
Heat distortion temperature HDT (1.82 MPa)	≥ 65	°C	ASTM D648
Crystallite melting point	≥ 240	°C	ISO 11357-3, DSC/ ASTM D3418
Thermal conductivity at 40°C	0.15	W/mK	ASTM C177
Water absorption at 23°C/24 h	≤ 0.07	%	EN ISO 62
Color	opaque	-	-
Limiting oxygen index (LOI)	≥ 50	%	ASTM D 2863
Inner surface roughness for injection moulded and extruded components	Ra ≤ 0.5	µm	ISO 4287/ 4288
Temperature range material in °C	-76 to +130 (150) ^{II}	°C	
System temperature range with chemicals in C°	-20 to +80	°C	

^I) typically measured characteristics on material, should not be used for calculations

^{II}) only for short-term use – please contact GFPS

2.3. SYGEF ECTFE Product Range

All ECTFE components designed for industrial pressure piping applications with SDR21/ PN10 pressure rating.

Products	d20 DN15	d25 DN20	d32 DN25	d40 DN32	d50 DN40	d63 DN50	d75 DN65	d90 DN80	d110 DN100
Pipes									
Fittings									
Unions (FKM/ FFKM)									
Flanges PP-V/ PP-Steel									
Flange seal (TFM)									
Valves ²									
Automation									
Pipe clips									
IR fusion machines									

² Diaphragm Valve Type SDV, Butterfly valve Type 065

2.4. Conformance

The **SYGEF ECTFE** material specification meets the directives of GF Piping Systems. Therefore, GF Piping Systems is approved according to the different categories all over the world.

The reliability of SYGEF ECTFE pipes and fittings incl. IR-welding for harsh chemicals like concentrated H₂SO₄, H₂O₂, HNO₃ or NaOH has been tested and proven.

For additional information or special support on chemical applications, please contact GF Piping Systems support:

Contact:

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3. Pipes

All **SYGEF ECTFE** pipes as provided by GF Piping Systems are metric sizes from d20 (1/2") - d110 (4") and manufactured in compliance with the requirements of ISO 10931. Additionally the pipes are manufactured stress free and thermally annealed (specified internal stress $\leq 2.5 \text{ N/mm}^2$), without any voids, allowing a high grade of roundness, high degree of straightness and a smooth surface (see „2.2 Characteristics of SYGEF ECTFE“ – Inner surface finish for injection moulded and extruded components). Testing will be done in compliance with EN 10204.

Outer diameter, ovality and wall thickness are defined according to Table 1.

Tabelle 1: Measurement SDR21 / PN10

in millimeters

Nominal outer diameter	Min. wall thickness	Tolerance limit of outer diameter	Maximum deviation for ovality	Tolerance limit of wall thickness	Standard Dimension Ratio	Pipe series
d_n	e_{min}			a	SDR	S
20	1.9	+0.3	0.3	+0.4	11	5
25	1.9	+0.3	0.4	+0.4	13.6	6.3
32	2.4	+0.3	0.5	+0.5	13.6	6.3
40	2.4	+0.3	0.5	+0.5	17	8
50	3.0	+0.3	0.6	+0.5	17	8
63	3.0	+0.4	0.8	+0.5	21	10
75	3.6	+0.4	0.9	+0.6	21	10
90	4.3	+0.4	1.1	+0.7	21	10
110	5.3	+0.5	1.3	+0.8	21	10

The mean outer diameter (d_{em}) is the average value, which results from the measurements of the outer diameter at an interval of d_n and $0.1 d_n$ to the end of the test piece. It is determined by measuring the circumference to 0.1 mm accuracy with a measuring tape.

The minimum and maximum wall thickness is determined to 0.1 mm, whereby the measurement points should be distributed on the pipe circumference as evenly as possible. All measured values must be within the allowable tolerance limit.

Ovality is the difference between the measured maximum and the measured minimum external diameter (d_e) at the same cross-section. It is calculated to 0.1 mm and measured immediately after production. The ovality requirement applies to the timepoint of manufacture.

3.1. Product Marking

The pipes are embossed with a permanent identification during the production process to ensure full traceability.

All pipes are marked permanently and consecutively

- Material identification incl. material code: +GF+ SYGEF ECTFE
- Pipe diameter, wall thickness, SDR and PN
- Product standard: ISO 10931
- Manufacture date, shift and machine number

3.2. Packaging and Labeling

The packaging must ensure that the pipes are not damaged during transportation. Packaging and labelling must meet the following requirements:

- Pipes capped on each end
- Each pipe separately and single bagged in a specified bagging material
- Identification of the content, in type, quantity and product details
- Information about standards covered by the product
- Content of the label must fulfil legal requirements
- Labels must be EAN coded for automatic identification
- Comply to GF standards as well as to international standards such as ISPM 15

4. Fittings

All **SYGEF ECTFE** fittings are butt fusion type, metric sizes d20 (1/2") - d110 (4"). They are manufactured by GF Piping Systems in compliance with EN ISO 10931 and need to be tested according to EN 10204. The fittings are manufactured with a smooth surface (R_a -value $\leq 0,5 \mu\text{m}$ for all injection moulded items). All threaded connections have pipe threads in accordance with the requirements of ISO 7-1. All butt fusion fittings are manufactured with optimal industrial short spigot lengths designed for use with fusion machine IR-63 Plus, IR-110 Plus and IR-110 A welding machine supplied by GF Piping Systems.

O-rings used for unions in combination with industrial chemical applications shall be EPDM, FKM or FFKM (Kalrez) supplied by GF Piping Systems.

4.1. Product Marking

The fittings are embossed with a permanent identification during the production process to ensure full traceability.

Each part is marked in compliance to EN ISO 10931:

- Logo of the manufacturer
- SDR (Standard Dimension Ratio) or PN (Pressure Nominal) or S (pipe series)
- Dimension
- Material
- Permanently embossed date indicating the year and the production series

4.2. Packaging and Labeling

The packaging must ensure that the fittings are not damaged during transportation. Packaging and labelling must meet the following requirements:

- All components are single bagged in specified bagging material
- Identification of the content, in type, quantity and product details
- Information about standards covered by the product
- Content of the label must fulfil legal requirements
- Labels must be EAN coded for automatic identification
- Comply to GF standards as well as to international standards such as ISPM 15

5. Accessories

5.1. Backing Flanges

5.1.1 PP-Steel Flanges

Backing flanges in metric sizes DN15-400 shall be designed according to ISO 9624, in a thermo plastic-oriented design, consisting of glass fibre reinforced polypropylene, PP-GF30, graphite black and UV stabilized with steel inserts. The backing flanges shall be marked with dimension, PN-value, standards, brand and lot number. Connecting dimensions metric according to ISO 7005, EN 1092; Bolt circle diameter PN10 (DN15-400) + PN16 (DN15-400); Inch: ASME B 16.5, BS 1560; class 150 (1/2" – 20").

5.1.2 PP-V Flanges

As an alternative backing flanges in metric sizes DN15-400 shall be designed according to ISO 9624, in a thermo plastic-oriented design, consisting of 100% glass fibre reinforced polypropylene, PP-GF30, graphite black and UV stabilized. These flanges are manufactured in a seamless technology injection moulding process by GF Piping Systems. The flange is optimized with a V-groove in the inner diameter to ensure an evenly distributed force on the thermo plastic flange adapter. The backing flanges shall be marked with dimension, PN-value, standards, brand and lot number. Connecting dimensions metric according to ISO 7005, EN 1092; Bolt circle diameter PN10; Inch: ASME B 16.5, BS 1560; class 150 (1/2" – 12").

5.2. Gaskets

Profile flange gaskets in metric sizes DN10–1000 shall consist of an elastomeric material (EPDM acc. EN 681, FKM or NBR acc. EN 682) designed with metal reinforcement for use with flange adaptors according ISO 10931. Gaskets shall be designed to be centered by the outer diameter.

5.3 Pipe Support System

Pipe Support System shall be KLIP-IT sizes d10-d400 supplied by GF Piping Systems.



6. Valves

All valves shall be of metric size manufactured by GF Piping Systems or manufactured to EN ISO 16135, 16136, 16137, 163138 and tested to the same standard.

7. Welding and assembly

All butt fusion fittings shall also be manufactured with optimal lengths designed for use with fusion machines IR-63 Plus, IR-110 Plus, IR-225 Plus, IR-110 A and IR-315 A from GF Piping Systems, providing welds with increased mechanical and chemical stability than conventional welding methods (socket- or butt fusion).

The IR-Plus & IR-A fusion machines use non-contact radiant heating. The cooling time is calculated based on ambient temperature and the bead surface temperature for uniform reproducible weld beads for easy weld bead inspection.

Only persons who trained and certified by GF Piping Systems are allowed to perform fusion on the IR-Plus and IR-A machines.

The IR-weld beads (K-value, wall offset, width, heights, area and angle of the components) shall be measured and documented with the WBI Tool.

The welding and installation should be in accordance with GF Piping Systems guidelines to the Design, Installation and Use of Plastic Piping Systems.

8. Measurement & Control / Instrumentation

The following parameters can be measured (Sensors), indicated and/ or transmitted (transmitters) to PLC, PC and other Data Acquisition Systems. All products comply with the CE standard.

Parameter	Technology	Compatible liquids (*)
Flow	Paddlewheel	clean liquids
	Rotameter	clean liquids
	Magmeter	contaminated liquids
	Ultrasonic	all liquids
Level	Hydrostatic/Ultrasonic/Radar	all liquids
pH-ORP	Glas electrodes	all liquids
Conductivity	Contact	all liquids
Pressure	Piezoresistive	all liquids
Temperature	Pt1000	all liquids

(*) please check first the sensors limitations in material, pressure and temperature (data sheet) and chemical resistance list

8.1. Sensors

The sensors listed hereafter will transfer the measured value to a GF Piping Systems Transmitter, to indicate the measured value and allowing simple calibration and maintenance of the devices. Alternatively the measured values of the sensors can be sent directly to a PLC, PC or other local made electronics using either an analogue signal (4-20mA, open collector or sinusoidal voltage) or a digital signal called S3L (GF Signet serial signal).

If you need additional information or you like to use our Sensors with harsh chemicals please contact your local GF Piping Systems sales company or the GF Piping Systems support:

Contact:

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We are able to produce a wide range of our sensors in special material that fits perfect to your application.

8.1.1. Installation Fittings

Depending on the sensor type, special installation fittings shall be used for connection to the pipeline: Installation T-Fitting metric sizes DN15-50 with union ends for butt

fusion, Sensor thread connection for flow- and pH-sensors shall be 1 ¼" NPSM. For all further sensors, flanged sensor connections shall be used.

8.1.2. Flow sensors

8.1.2.1. Paddelwheel sensors

515 and 525 sensors:

All sensors of this family are "sinusoidal" sensors. This sensor from GF Signet requires no external power source to produce a signal. Internal to the body of the sensor is a wire coil which when excited by the rotor assembly produces a small sinusoidal signal. The rotor assembly consists of four paddles; inserted into each of the paddles of the rotor are magnets. As liquid flows past the rotor assembly it rotates each of the four paddles produces a sine wave signal as it passes the centre of the body (two paddles of the rotor produces a full AC sine wave). The sensors as manufactured by GF Signet produce a signal output, which is proportional to the flow rate. A K-factor (number of pulses generated by the sensor per 1 liter or 1 gallon of fluid the sensor) is used to define the size of the pipe that the sensor is inserted into.

2536 und 2537 sensors:

All sensors of this family of sensors are "Hall Effect" sensors. Internal to the GF Signet sensors body is an open collector relay. The sensor is supplied with a voltage from a transmitters or an external power supply ranging from 5 to 24 volts. This voltage is switched through the open collector relay as the paddlewheel (rotor) of the sensor rotates. The sensor's rotor assembly has four paddles. Inserted in two of the paddles is a magnet. As the paddles pass the centre of the sensors body, the magnetic field switches the open collector relay on and off which generates a square wave pulse as manufactured by GF Signet. Two pulses indicates a complete rotation (on/off cycle) of the open collector relay. The pulse output is directly proportional to the fluid velocity. A K-factor (number of pulses generated by the sensor per 1 liter or 1 gallon of fluid passing the sensor) is used to define the size of the pipe that the sensor is inserted into.

8.1.2.2. Rotameters

As supplied by GF Piping Systems are radially installed dismountable meters for flow rate measuring in industrial piping applications. If needed, minimum or maximum flow can also be monitored via limit switches. Also, analogue flow measurement with a 4-20mA Signal is possible.

The working principle of the rotameter is based in gravity and equilibrium of forces. If a medium flows upwards at a sufficient flow rate through the vertically mounted taper tube, the float is raised to the point at which a state of equilibrium sets in between the lifting force of the medium and the weight of the float. Since the mean rate of flow is proportional to the quantity flowing through per unit of time, this state of equilibrium

corresponds to the measurement of the instantaneous flow rate.

Following types and sizes are available:

- Type SK, DN10–65mm
- Type 335, DN25–65mm
- Type 350, DN25–65mm

8.1.2.3. Magmeter

The Magmeter sensor from GF Signet consists of two metallic pins that produce a small magnetic field across the inside of the pipe. The Magmeter measures the velocity of a conductive liquid (20 μ S or greater) as it moves across the magnetic field produced by the Magmeter. A voltage occurs on the sensor tips, which is directly proportional to the flow rate of the fluid. The magnetic signal is conditioned and translated in to a pulse signal. A K-factor (number of pulses generated by the sensor per 1 liter or 1 gallon of fluid passing the sensor) is used to define the size of the pipe that the sensor is inserted into. The Magmeter of GF Signet is offered as a blind frequency, 4-20 mA or digital S3L output, or with integral display and control relays.

8.1.2.4. Ultrasonic Flowmeter

GF offers an exclusive range of ultrasonic flowmeter, matching to various specific application requirements. The GF ultrasonic flowmeter are simple to install: The installation is performed within a few minutes and there is no need to interrupt the production process, open or drain the piping system. After initial start-up, the flowmeter works virtually maintenance free and provide accurate measurement results for many years. Frequent cleaning or readjustment apart from possibly normative required calibrations are not necessary. Thanks to non-contact measurement, the GF ultrasonic flowmeter neither affects the production process and medium nor the quality of the end product. No pressure loss occurs. No new design of the process or system is necessary. The flowmeters are not exposed to the flow medium and have no mechanical parts that are subjected to stress during measurement. Hence, maximum availability of the measurement is assured, even in the case of aggressive media, abrasion, high pressures or wide range of fluid temperature.

The GF flowmeters portfolio is suitable for dimension from d16 to d2000 and are largely independent of the medium, piping material and installation site. The ultrasonic flowmeters are using non-contact ultrasonic transit-time technology to measure the flowrate. Ultrasonic waves are emitted and received again from the device in both flow directions. Based on the run-time difference of the two signals the device calculates the flowrate of the media. GF supplies the PF220 and PF330 portable flowmeters. Easy to use and suitable for calibration, troubleshooting, quick-check and semi-stationary monitoring applications with data logging. The GF U1000 V2 ultrasonic flowmeter is a compact direct-mount stationary measuring device suitable for pipe dimensions from d22 to d180. Connectivity to control systems is ensured by 4-20 mA, Pulse and digital Modbus output. The GF U3000 / U4000 ultrasonic flowmeter are high

accuracy wall-mount stationary devices suitable for pipe dimensions from d16 to d2000. Connectivity to control systems is ensured by 4-20 mA and Pulse output. The U4000 is additionally equipped with data logging functionality.

8.2. Level Sensor and Level Switch

8.2.1. Hydrostatic Level Sensors

Hydrostatic pressure is the pressure exerted on a column of fluid by the weight of the fluid above it. Internal to the GF Signet PVDF sensor body is a ceramic diaphragm sensor and capillary tube/cable assembly. The ceramic diaphragm sensor exposed to the fluid senses the hydrostatic pressure of the fluid and compares the pressure to the atmospheric pressure monitored the capillary tube/cable assembly. The hydrostatic level sensor from GF Signet only senses the hydrostatic pressure of the fluid. The Level Sensor is offered as a blind output 4-20 mA or digital S3L output connected to the GF Signet Transmitter unit.

8.2.2. Ultrasonic Level

Our Ultrasonic level sensors Series 2260 / 2270 are non-contact devices, using the travel time of sound and its reflection, for measuring the distance to a liquid or solid surface. Based on this information, GF Piping Systems sensors are capable of calculating a liquid level or volume. Their outstanding narrow 5° beam, allow reliable measurement even at the presence of disturbing objects or when space is limited. The GF Piping Systems portfolio contains sensing ranges 4 m, 6 m and 15 m. Sensors with integrated display or blind sensors are available and provide 4-20 mA, HART protocol or relay outputs. GF Piping Systems ultrasonic level sensors are compatible with GF Piping Systems transmitters, indicators, controllers and valve actuators.

8.2.3. Radar Level

The 25 GHz (K-band) 2290 Pulse Radars are the most progressive non-contact level transmitters for industrial processes. With an excellent accuracy, compact antennas and a user-friendly set-up the 2290 is an effective, simple, low cost choice for demanding level applications. GF's new K-band radar featuring ± 3 mm (± 0.1 inch) accuracy and short dead band excels with its robust full plastic housing. Its antenna range incorporates a stainless steel horn and enclosed plastic tube choices. The enclosed antenna versions can be replaced without removing the antenna enclosure from the process. Local programming of type 2290 is aided by a plug-in display module. The signal processing algorithm of the 2290 is based on years of experience with non-contact level measurement making it an excellent choice for applications simple and challenging alike. Process enclosures are available in PTFE, PP & PE.

8.2.4. Guided Radar Level

With its ability to read accurately when other non-contacting or invasive methods fail, the guided level transmitter type 2291 using GWR (guided wave radar) is the solution to your level needs.

The radar signal is sent down the probe assembly eliminating the interferences caused by low dielectric liquids, heavy fuming, slightly conductive foams, internal tank obstructions, etc. By focusing its energy along the probe, the type 2291 can be installed in tanks with limited space. The type 2291 is also less sensitive to turbulence that would normally upset the readings in ultrasonic and unguided radar technologies. The probes are also available as coated options in FEP & PFA.

8.2.5. Point Level Switches

The GF Piping Systems portfolio of point level switches contains various different detection technologies, to provide a solution for various liquids and application requirements.

8.2.5.1. Vibration Fork

The 2280 Vibration Forks detect a liquid level with two vibrating stainless steel wings. In air, they vibrate with a specific, calibrated frequency. By the contact with a liquid, the frequency changes which forces an electrical output to switch. GF Piping Systems vibration forks are equipped with digital PNP/NPN or relay output. Versions with ATEX or WHG approval are available.

8.2.5.2. Conductive Multipoint Switch

The 2281 Conductive Multipoint Switch contains up to 5 stainless steel electrodes, which allow to detect 4 different liquid levels in a tank. Up to 2 external relay pairs allow to switch pumps or valves. GF Piping Systems conductive multipoint switches work with liquids of min. 10 μ S conductivity.

Their four-in-one design allows fast installation and provides attractive solutions concerning costs.

8.2.5.3. Float Switch

The 2285 Float Switch is primarily used in open basins and pump shafts for detecting liquid level. In an empty tank, they hang in vertical position, attached to the tank wall at their cable. Rising liquid carry them on the liquid surface. At an angle of approximately 45°, an integrated switch is enabled. GF Piping Systems float switches are double chambered and equipped with a mercury-free switch. Hence, they may be used for drinking and for wastewater applications.

8.2.5.4. Guided Float Switch

The 2282 Guided Float Switch is equipped with an air-filled float with embedded magnet. Rising liquid lifts up the float. The magnetic field forces a reed contact to switch. GF Piping Systems guided float switches are available in PP and PVDF to provide best chemical compatibility to corrosive liquids.

8.2.5.5. Ultrasonic Gap Switch

The 2284 Ultrasonic Gap Switch is equipped with an ultrasonic transducer and receiver in their fork tips. Based on the switch design, the sound waves are damped in air. Thus, the output is disabled. In contact with liquid, the sound waves start to travel from transmitter to receiver, which enables the output. GF Piping Systems ultrasonic gap switches provide an electronic relay output, which allows controlling pumps and valves. Thanks to their PPS full-plastic body, they provide a very high resistance against mechanical impacts and corrosive liquids. They work with no moving parts, so they do not require any maintenance.

8.3. Analytic

8.3.1. pH Sensors

All pH sensors from GF Signet are commonly called combination electrodes. The measuring cell is constructed of hydrogen sensitive glass that can detect the concentration of hydrogen ions (H^+) in a solution. The concentration of H^+ ions directly determines the pH of the fluid. The reference cell is used to provide a stable reference signal. The pH signal is measured against the stable reference signal. The reference junction allows the reference cell to encounter the measured. The measured signals are then conditioned and sent as a blind 4-20 mA or as a digital S3L signal to the GF Signet Transmitter unit.

8.3.2. ORP Sensors

All ORP sensors from GF Signet are constructed similar to the pH sensors, except that a noble metal like platinum or gold replaces the silver chloride element of the measuring and reference cell of the pH electrode. Temperature compensation is not used in ORP measurements. ORP is an abbreviation for Oxidation-Reduction Potential. Oxidation is a term used to denote the occurrence of a molecule losing an electron. Reduction occurs as a molecule gains an electron. The “potential” is simply an indication of a solution’s propensity to contribute or accept electrons. ORP reactions (sometimes referred to as REDOX) always take place simultaneously. There is never oxidation without reduction, and ORP electrodes are used to detect electrons exchanged by molecules as these reactions occur. The measured signals are then conditioned and sent as a blind 4-20 mA or as a digital S3L signal to the GF Signet Transmitter unit.

8.3.3. Conductivity Sensors

All Conductivity sensors from GF Signet are manufactured using two stainless steel electrodes. Alternative materials are available in case of chemical incompatibility. Conductivity sensors measure the ability of a fluid to conduct an electrical current between two electrodes. The proper term for this ability of a solution is electrolytic conductivity, since only ions conduct electric current in solution. Electrolytic conductivity (or simply conductivity) is therefore an indirect measure of the ionic concentration of a solution. Generally, conductivity increases and decreases with the concentration of ions.

Most conductivity electrodes consist of two measuring half-cells. The geometry of the

half-cells can be tailored to provide highly accurate measurements over a specific conductivity range. Cell constants help to describe electrode geometry selecting the appropriate electrode for a given application.

A cell constant is defined as the length between the two half-cells divided by the area of the cells. All conductivity sensors have a temperature compensation circuits in order to increase the sensors accuracy.

The measured signals are then conditioned and sent as a blind 4-20mA or as a digital S3L signal to the GF Signet Transmitter unit.

8.4. Multi Parameter Instrumentes

8.4.1. Singel Chanel Transmitter

The GF Signet 9900 Transmitter provides a single channel interface for many different parameters including Flow, pH/ORP, Conductivity/Resistivity, Salinity, Pressure, Temperature, Level and other sensors that output a 4 to 20 mA signal. The 9900 Transmitter (Generation II or newer) has the added capability of supporting the Batch Module for batching control the extra-large (3.90" x 3.90") auto-sensing backlit display features "at-a-glance" visibility that can be viewed at 4-5 times the distance over traditional transmitters. The highly illuminated display and large characters reduce the risk of misreading or misinterpreting the displayed values. The display shows separate lines for units, main and secondary measurements as well as a dial-type digital bar graph.

The GF Signet 9900 Transmitter is offered in both panel and field mount versions. Both configurations can run on 12 to 32 power (24 VDC nominal). The 9900 can also be loop-powered with compatible sensors.

Designed for complete flexibility, plug-in modules allow the unit to adapt to meet changing customer needs. Optional modules include Relay, Direct Conductivity/Resistivity, H COMM, Batch and a PC COMM configuration tool. The unit can be used with default values for quick and easy programming or can be customized with labeling, adjustable minimum and maximum dial settings, and unit and decimal measurement choices.

8.4.2. Dual Chanel Transmitter

The 9950 Transmitter is a two-channel controller that supports two sensors of same or different types in one instrument. The sensor types supported by the 9950 are GF Signet Flow, pH/ORP, Conductivity/Resistivity, Salinity, Temperature, Pressure, Level, Dissolved Oxygen, and devices that transmit a 4 to 20 mA signal with the use of the 8058 iGo® Signal Converter.

The 9950 includes advanced features such as derived functions, advanced multiple relay modes, and timer based relay functions. Derived functions allows for the control of a relay or current loop with the sum, delta (difference), or ratio of two measurements, for example delta pressure and delta temperature. Multiple relay modes allow up to three signals to be used for the control of a single relay. This can be any combination of analog and binary inputs. The timer relay modes allow a relay to be activated on a

repeating basis from every minute to once every 30 days. Weekday timer mode allows a relay to be energized on a specific day or days of the week at a specific time.

The 3-9950.393-3 Relay Module includes the ability to interface up to four binary inputs. The binary inputs are compatible with either open collector or mechanical contacts. The binary inputs can supply power to the four inputs or accepts powered outputs from external devices. These inputs can be used with level switches, flow switches, pressure switches or other devices.

The inputs can be used to directly control the relays of the 9950 or can be used in combination with the measurement readings for advanced control of your process. Instruments:

- One instrument for multiple sensor types
- Two different sensor types can be combined in one instrument
- Configurable display
- Derived measurements
- Optional modules can be added for additional capabilities
- USB Port for field upgrades using standard USB flash drive

8.4.3. Multi Parameter Transmitter

The GF Signet 8900 Multi-Parameter Controller takes the concept of modularity. Each 8900 is field commissioned with the user's specified combination of inputs, outputs, and relays using simple-to-install modular boards into the base unit. Configure the system by selecting either two, four, or six input channels which accepts any of the GF Signet sensors listed below, and/or other manufacturer's sensors via a 4 to 20 mA signal converter (GF Signet Model 8058). To complete your unit, choose a power module with universal AC line voltage or 12 to 24 VDC.

Analog output and relay modules are available and easily installed. Derived measurements include difference, sum, ratio, percent recovery, percent rejection, percent passage and BTU.

The menu system can be programmed to display in multi-languages including English, German, French, Spanish, Italian, and Portuguese.

- 2, 4 or 6 sensor input (Flow, Level, pH-ORP, Conductivity, Pressure Temperature)
- 0, 2 or 4 analogue output (4-20 mA or 0-10 Volts)
- 0, 2, 4, 6 or 8 relay output
- Power supply 12-30 VDC or 110-230 VAC

8.4.4. Transmitter Modules

8.4.4.1. Batch Control

The batch controller manufactured by GF Signet Type 5600 allows batching a pre-selected quantity of liquid. After selection of the quantity to be dosed, a start signal (local or remote) will close a batch controller contact to energize or de-energize a valve and/or switch on a pump. The batch controller counts the pulses coming from any GF Signet sensor with frequency output and stop the batch process as the pre-selected quantity is reached. Advanced features include a user-set security code, an automatic calibration option, and overrun compensation. The batch process is repeatable and is designed for intensive industrial applications.

9. Quality

9.1. Production Conditions

SYGEF ECTFE Pipes, Fittings and accessories shall be manufactured in an environment operating within a Quality Assurance System in compliance to ISO 9001 and an Environmental Management System conforming to ISO 14001.

9.2. Marking

All components are embossed with a permanent identification during the production process to ensure full traceability. The following information will be mentioned:

- Manufacturers name or trade mark
- Production lot number
- Material
- Dimension
- Pressure rating

9.3. Uniformity

Pipes, fittings and welding machines shall be supplied from one manufacturer, namely GF Piping Systems to ensure correct and proper jointing between components and uniform chemical and physical properties of the piping system.

9.4. CAD Library

All components shall be available in GF Piping Systems CAD and BIM library. Available at: <http://cad.georgfischer.com> & <http://bim.gfps.com>

9.5. Training, Certification and Installation

Site personnel, involved with **SYGEF ECTFE** piping installation shall undergo training and certification from an authorized local institution prior to performing any jointing operations on site. For further information, especially regarding chemical resistance, and training please contact GF Piping Systems support under:

Contact:

GF Piping Systems Ltd.

Phone: +41 52 631 11 11

e-mail: info.ps@georgfischer.com

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